50 years of Biochemistry

CELEBRATING 50 YEARS OF THE SCHOOL OF BIOCHEMISTRY AT THE UNIVERSITY OF BRISTOL

2014
Bristol Biochemistry is 50 years old. Initially taught as an offshoot of the Chemistry programmes at the University of Bristol, Biochemistry emerged as a separate discipline in April 1964 when Senate approved the establishment of a new Department of Biochemistry. The first undergraduate intake arrived in October 1964. Initially under the leadership of Phillip Randle, and subsequently Brian Chappell, the Department grew rapidly. It quickly established an impressive international reputation that remains to this day.

Over the past 50 years Bristol Biochemistry has produced an extremely talented series of graduates who have gone on to excel in their varied careers – as Colworth Medal holders, Fellows of the Royal Society, respected world leaders in their fields of research, of prestigious academic institutions, businesses and corporations, and even a rock star. All of this has been achieved through cultivating an innate interest in the fundamental study of the molecular processes that underlie life itself. The Bristol flavour of biochemistry has always been rigorous, quantitative, and with a strong molecular focus. These demanding, but successful, approaches continue to dominate both our research and our teaching programmes.

In preparing to celebrate 50 successful years of Biochemistry at Bristol we have become increasingly aware of the paucity of records for much of our history. This celebratory volume attempts to partially redress this gap. In the following pages we have articles describing the history and achievements of Bristol Biochemistry. We invite you to meet some of the people that have made Biochemistry at Bristol special – there are interviews and reminiscences with many of our past staff and students and photos, old and new. This informal volume attempts to record and identify our successes over the first 50 years and also forms an introduction to our 50th anniversary celebrations to be held in September 2014.

We hope you find this celebratory volume interesting, informative and enjoyable. Perhaps it will also inspire the biochemists of the future to join us for undergraduate or graduate study, or as part of our vibrant and enthusiastic research community. We look forward to another 50 years of bringing molecules to life.

Leo Brady
Head of School 2009-2014
A brief history of Biochemistry at Bristol

David Yates, Jon Lane and Ash Toyé

In 1960, the University of Bristol offered research in Biological Chemistry, supported by professors and lecturers from Botany, Zoology, Physiology, Chemistry and Pharmacology.

The Medical School building had been planned before the war, but construction did not start until the 1950s by both Taylor 1, the West Wing, completed by 1964. Biochemistry was included in the 1962 research compendium, with projects offered in Botany, Zoology, Chemistry, and Physiology. If the University had a research entry it needed a Department of Medical Science in 1963, when the new Medical School was officially opened, a Chair in Biochemistry was advertised.

In April 1964 Philip Randle was appointed as the first Professor of Biochemistry at the University of Bristol. Coming from Cambridge, Professor Randle recruited a number of his colleagues, including Dr Brian Chappell and Dr Peter Garland, as well as his research students who included Dick Yorke, Dick Denton and George Schofield. Randle, Chappell and Garland all recruited research students to join their laboratories; they were housed on D-floor near the main entrance of the new West Wing of the Medical School. The School had an excellent glassblower, Malcolm Fowler, and good mechanical workshops, overseen by John Fellowes, which allowed researchers to develop spectrophotometric, fluorimetric and electrode assays. These new methods were exploited by researchers in bioenergetics and metabolism.

The early years saw rapid expansion. The Department produced numerous papers from their research teams, which justified Randle’s drive to increase both staff and territory within the University. The Biochemical Society recognised early excellence, awarding Colworth Medals (for the most outstanding research student of the age of 35) to Chappell in 1965, and then Garland in 1968. In 1966 the Randle laboratory relocated to the new East wing, as did the Chappell group. Subsequently Garland’s group expanded into the existing Randle territory near the main entrance. Plant biochemists, Dr Owen Jones and Dr Trevor Griffiths, joined the Department and Dr Herbert Fridee. Gutfreund was recruited to strengthen Physical Biochemistry and Molecular Enzymology. Although not coming straight from Cambridge his history added to the Cantab influence. He in turn catalysed the appointment of Dr Herman Watson and Dr Hilary Murhead to set up X-ray crystallographic studies. As Chemistry moved out of the Inner Court, Biochemistry moved in and extra laboratory space was also found in the basement of the Biology Building, where Dr John Holbrook and Dr Mike Tanner joined our staff there. The Inner Court suite of laboratories was renamed the Molecular Enzymology Laboratory, and the coffee room became a dynamic discussion forum. Bristol was recognised again by the Biochemical Society in 1974 when David Trentham was awarded the Colworth Medal for his studies on rapid kinetics of the S1 subfragment of myosin. A little later, Crofts masteredmind the installation of an electron microscope suite, training Alan Britton to offer this service. Watson and Murhead installed a PDP 8 computer to process X-ray crystallographic data, built huge models and trained a generation of research students in Physical Biochemistry. Murhead, a highly respected physical scientist, represented the Faculty on many Boards as a then too rare, woman in science. As Physical Biochemistry was developing in the Molecular Enzymology Laboratory, a third phase of structural development was agreed, and built in 1967/68. The new block was essentially all Biochemistry, with a dedicated teaching lab on the top floor, and use was split between Dentists, Medical Biochemistry and Pharmacology. The development also housed the newly constituted MRC-funded, Regulation in Metabolism, unit. By the mid-1970s Biochemistry had grown to be the most research-active department in the Medical School, and subsequent restructuring concentrated on bringing groups with similar or complementary research into close proximity.

Whilst many staff in Biochemistry received accolades which resulted in promotion within the Department, several staff members were promoted to chairs outside Bristol. In 1970 Garland was appointed to the Chair in Biochemistry at Dundee. Dr Patience Barrow was appointed to assist with the increasing administrative load on the retirement of Ashford in 1973, and took responsibility for undergraduate and postgraduate admissions. In 1975 Randle moved to a Chair in Oxford and Chappell was appointed to Head of Department, a position he would retain until his retirement in 1995. Another promotion saw Philips move to head the Department at Lancaster. Following these departures, Nigel Brown, Steve Halford and Andrew Halestrap were appointed as lecturers. In 1977 David Trentham was appointed to a Chair in Philadelphia, similarly in 1978 Dr Toby Crofts moved to Biophysics at the University of Urbana, Illinois. The recently vacated space allowed Gutfreund to move to the Medical School, and the Inner Court top two floors allowed Halford, Brown, and the newly appointed Dr Wood to set up there. Holbrook moved to the shared laboratory on 4-C floor of the laboratory wing (himself, with help from workers from his farm) across the laboratory so Pharmacology could continue to use their space. These moves consolidated research in the field of DNA enzymology.

New blood lectureships were announced in 1983, and Biochemistry decided to develop expertise in the emerging field of molecular genetics. Dr Len Hall and Dr Bill Chia were appointed, and A100 was converted to provide the required level of safety for working with genetically modified organisms. By this time Holbrook was progressing in the field of site directed mutagenesis, so working with structural biology expertise was further strengthened by the appointments of Chris Dempsey, in 1991, and Andrea Hadfield, in 1999.

Whilst Randle had been the architect of the expansion in the 1960s and 1970s, Chappell steered the Department through several rounds of austerity in the 1980s and 1990s to emerge as a Department that gained a top rating in the Research Assessment Exercise. In 1995 Denton became Head of Department and over the next five years funds for research and development started until the early-1960s with Stage I, providing, for the 25th anniversary meeting in Chemistry Lecture Theatre 1 in 1989.

Biochemistry 25th anniversary meeting in Chemistry Lecture Theatre 1 in 1989.

Herman Watson with a model of yeast phosphoglycerate kinase.
A big initiative by Holbrook brought together biochemists and chemists to bid for a Molecular Recognition Centre

Undergraduate practicals in A89, Biological Sciences Building.

Response to exciting advances in biomedical science concurrent with a research funding squeeze that resulted from cuts to government spending in the public and private sectors. From the outside though the biggest change is in the name: the 50-year old Department, but have become a School.

Over the last decade we have seen some notable changes. New academic staff have been recruited, including Savery, Collinson, Kuwabara, Adams, Frayne, Woolfson (with Chemistry and Biology) and Verkade, Martin and Nobes (joint with Physiology and Pharmacology), as well as Henry and Hall (who transferred from the disbanded Department of Anatomy). Many others, including Melzer, Szafranek, Stephens, Lane, Dillingham, Toye, Curnow and Race have taken up positions having previously held Fellowshipships here. Of these, the joint appointments with Schools within, and outside, of the faculty are particularly interesting as they emphasise how outward looking Biochemistry has become, with an impressive example of the BBSRC/EPSRC Centre for Synthetic Biocatalysis (BSci), expertly handled by Woolfson and Race. The newly dubbed ‘BiosynBio Centre’ will contain several core facilities for Biochemistry along with colleagues from the Faculties of Science and Engineering. Over this past and we have had to wave goodbye to several valued members of staff. These have included Hall (who after acting as Dean of DMFS was appointed Pro-Vice-Chancellor for personnel), Rutter (to become Head of Cell Biology at Imperial), Tanner, Hetherington (to Wolfson Bioimaging Facility, where he is now in charge of the ISL Cell Biology Labs, a useful geographic link between the ISL Cell Biology laboratories of Adams, Cullen and Tavare, and the Physical Biochemistry laboratories of Brady, Race, and Tavare. They were originally occupied by Banting, Stephens and Lane, but with Banting taking up the post of Dean, Mellor and Bass moved in during the summer of 2013.

The C50 labs are located close to the ‘jewel in the crown’ of the faculty, the Wolfson Bioimaging Facility, where recent years have seen exciting changes notably a large expansion, in 2009, making Bristol an international leader in the emerging technique of correlative light and electron microscopy (CLEM). With this expansion came the appointment of Verkade, an expert in the CLEM technique, and the recent award of a large BBSRC equipment grant (Stephens) the facility is extending here dual label capacity. With new equipment arriving soon, and ongoing improvements and expansions planned in the future we will be able to carry out time-resolved proteomics analysis of complex cell biological processes for the first time.

The content and delivery of the Biochemistry programmes have continued to evolve, with a significant development being the introduction of eBioLabs as a platform for delivery of laboratory practicals and tutorials, submission and marking of lab reports and tutor monitoring of marks and feedback. This has been an important element of our teaching, and great possibilities for expansion in the future. In 2014 Leo Brady will be stepping down as Head of School and Kate Nobes will take up the role. She will be taking the helm of a tightly-run School that is already providing high-quality broad-based research base, excellent teaching, and great possibilities for expansion in the future.
Bristol Biochemists

The key to the success of the School of Biochemistry has been, and will continue to be, thanks to the people within it.

Cara Richards interviewed a selection of students and staff, past and present, to learn more about the last 50 years. We start with Hilary Cross, a lab technician, who worked at the School for forty years.

Interview with...

Hilary Cross

Hilary started her career at the University of Bristol as a junior technician in 1971. Initially Hilary spent much of her time working with Anne Cole, helping her set up and run the biochemistry course for dental students. In the 1980s Hilary moved to the main teaching lab where she prepared practicals for Year 1 groups. She became a central figure in Biochemistry, teaching within the School until her retirement in 2012.

1. What was your role at the University of Bristol?
   
   A My role was as a Teaching Laboratory Technician in the Year 1 teaching laboratory. I interacted with a great number of students (Honours Biochemistry, other subject Honours, dentists, vets and medics). I prepared the practical classes, so I’d be very busy during term-time. Each week, each class was different. I tended to be making solutions and trying out the experiments. Out of term-time I would help sort out exam scripts and marks, and try out new practical class experiments.

2. What brought you to the University?

   A I am a Bristolian and attended Ashton Park School. I was always interested in science and wanted to work in a lab so when I was in the Sixth Form I applied for various local jobs. I was fortunate to have an interview with Charles Ashford in the Biochemistry Department and got the job as a junior technician. I was very lucky to start when I did. I don’t think that the Department took on many more junior technicians (certainly not two on the same day!).

3. Can you remember your first day?

   A Nigel Edgell was interviewed on the same day as me and he too got a job as a junior technician. He and I went to primary and secondary school together and we started at Bristol University on the same day. I remember meeting in the foyer of the Medical School Building – I went first to room D20 which was one of the Year 1 labs and I started work straight away. There were no introductory days or anything like that, back then. I started with Yvonne Williams and Les Corbin who were the teaching lab technicians at the time, and they showed me what to do. It was out of term so they weren’t too busy and I had a little while to learn on the job before the term and classes started in early October.

   A A couple of months later I moved to A100 lab and set up the practical classes for the dental students, with Dr Anne Cole, and later also the Year 2 students, with Mollie Luscombe. Then in the mid-1980s the dentists moved to the Year 1 lab and the Year 1 students, dentists, medics and vets, all used the same lab.

4. Why do you think Biochemistry at Bristol is so highly regarded?

   A The department had a very good foundation, with Professor Philip Randle, at the very beginning. The Department has always been very pioneering and at the forefront of research. This attracts the best people and so the Department’s reputation increases and becomes international.

   A The School now has more up-to-date, state-of-the-art labs and equipment. From a technician’s point of view, there are a lot more students and fewer technicians than before. I think that everything was more personal in those days – each lab group had their own technician.

5. Why do you think there are not many women in Biochemistry?

   A Being a technician, ie. support staff, there have always been more women support staff so I didn’t notice the difference so much. I agree that there were not a great deal of women academic staff when I first started. But I think this was general for most professions and academics in years gone by. In those days women tended to choose between a career or getting married and having children. Now more women are going to university, taking PhDs and many women combine both career and having a family.

   A When I first started I was working with Anne Cole, Mollie Luscombe, Hilary Muirhead and Patience Barrow who was the department administrator. So I had early contact with several female members of academic staff. I remember during an early Schools Week one of the visiting teachers commented that there were not any female academic staff taking or running the event and that it wasn’t so encouraging for the school girls. In recent years there have been nearly all female academic staff running events for the school children.

6. Do you have a best memory from your time at Bristol?

   A My best memory is of being presented with my Long Service Award in recognition of 40 years of service to the University by the Chancellor, Baroness Hale. It took place at the annual meeting of University Court in December 2011. Nigel Edgell was presented with his award at the same time. It was a lovely occasion. I don’t know where those 40 years went, the time goes by so quickly! I enjoyed my time in the Biochemistry teaching lab. I think the job just suited me and Biochemistry was always a good department to work for.

The department has always been very pioneering and at the forefront of research. This attracts the best people and so the department’s reputation increases and becomes international.
Interview with…

Chris Proud

Chris studied Biochemistry at Bristol as an undergraduate from 1971-74. He studied for his PhD at the University of Dundee, then returned to Bristol as a lecturer and reader from 1985-95. He also worked at the University of Dundee, the University of British Columbia and the University of Kent. He is now based at the University of Southampton where he is professor of cellular regulation.

What brought you to the University of Bristol?

Bristol was already the leading department for Biochemistry when I applied back in 1970. I was invited to visit and had a chance to look around. This gave me a good feel for Bristol as a place to live and study. There was a lot going on in the Biochemistry Department and of course Bristol is also a nice city. I thought it was a good place to come to and I was right because I had a very enjoyable experience as a student in Biochemistry. Indeed, it was my time in Bristol that sent me in the direction that the rest of my career has followed – the lecturer triggered my aspiration to continue with the particular line of research I have followed ever since. I subsequently moved to Scotland for my PhD, and then worked as a postdoc in Göttingen in Germany. In both places I studied how cell metabolism is controlled, and it was my undergraduate lectures in Bristol that fired my interest in investigating this. A decade or so later it was clear that Bristol was a prime location to return to as a lecturer to continue with that research, and I was fortunate to be recruited to the Biochemistry Department at Bristol as a lecturer.

Who do you remember in particular?

Among the lecturers who taught me, the person who probably had the biggest influence on me was Dick Denton. He gave lectures on the emerging understanding of how enzymes are regulated by hormones, and how this controls cell metabolism. I was especially interested in how insulin works – but at that time, we didn’t really know anything about this. Something was already known about how other hormones, such as adrenaline, worked and it was Dick’s lectures on this topic that really inspired me to think how elegant these regulatory mechanisms were and how much I’d enjoy working on this. From my time as an undergraduate at Bristol, I also particularly remember people like John Holbrook and Freddie Guthrie, who introduced me to proteins and enzymes. I also vividly remember John Williams; he had a very different lecturing style from almost everybody else, who gave ‘formal’ lectures, while he just sat on the bench at the front and talked ad lib. It seemed, for 45-50 minutes in a very enthusiastic way. He didn’t use the blackboard much, but kept your attention simply because he was very engaging. It was effective and interesting. I did my undergraduate practical project with Trevor Griffits and that was great fun. Trevor shared his lab with Owen Jones; they and their teams were great to work with, and it was that experience which convinced me that what I wanted to do after graduating was to do a PhD.

Why do you think Bristol Biochemistry has such a good reputation?

I think most of these things boil down to the people we are involved with. As we know, the department is 50 years old now, so it has a long history. Many of the pioneering people in biochemistry in the UK were associated with Bristol. Many of whom had been recruited from Cambridge when the Department was set up, and I think this helped to create a very good high-achieving ethos in the Department. They wanted their undergraduates to do well, and they also wanted to be excellent in their own research. As I mentioned already, the lab that my group was housed in was M101. It had a great atmosphere because there were several groups working together – Dick Denton’s group, Andrew Halestrap’s team and then later, Jeremy Tavare’s.

What advice would you give to new students who are starting a course in biochemistry at Bristol?

This is really advice for someone thinking in terms of their career after graduating – whether or not you’re pursuing a career in research, you need to find something that you’re deeply interested in. It can’t be a passing, peripheral interest, it has to be something which really ‘grabs’ you. I have been very lucky that the topic that interested me as a student at Bristol (the biochemical mechanisms whereby hormones control the functions of cells) still continues to fascinate me and forms the basis of my research today.

Everyone in the lab just got on extremely well and this made it both an enjoyable place to work but also a very productive one. Everyone did it both an enjoyable place to work and also a very productive one, because we worked very well as a team. I think that’s what has helped to build Bristol up, people all try and help each other and strive to be the best they possibly can, which is what you want to do but it’s not always that easy to achieve it.

What changed took place during your time at Bristol?

I think there were two big changes. One was moving researchers up from Woodland Road (Molecular Enzymology) into the Medical School. The second was that, based on its success, the department has grown a lot too, bringing many talented new people across a diverse range of areas.

Why do you have a best memory?

I must confess that my best memories as an undergraduate are less to do with the course and more to do with the social side and the friends I made at that time, almost all of whom I am still in regular contact with. I was very keen on rock music at that time and those were the days when big bands still played smaller venues such as the Colston Hall. Famous, international acts would play there at that time. I went to see Santana, Neil Young, The Small Faces, Jeff Beck. Indeed a whole load of 1970’s rock acts. The Student Union also attracted some pretty big names in those days. I went to see Chick Corea, Wings and The Kinks in the SU.

Do you have a best memory?

Chris studied Biochemistry at Bristol as an undergraduate from 1971-74. He studied for his PhD at the University of Dundee, then returned to Bristol as a lecturer and reader from 1985-95. He also worked at the University of Dundee, the University of British Columbia and the University of Kent. He is now based at the University of Southampton where he is professor of cellular regulation.
David Yates

David was a part of Bristol Biochemistry for more than 40 years. Arriving at Bristol University at the same time as Professor Sir Philip Randle in 1964, David was initially a PhD student with Peter Garland. He subsequently went on to become a research assistant with Freddie Gutfreund, then a lecturer, and finally senior tutor and departmental administrator, up until his retirement in 2006.

Q What were the early days at Bristol like?
A I have many happy memories of my years as a PhD student. It was a time when practical jokes were common and very often these were at the expense of Health and Safety. In the late 1960s to early 70s when Professor Sir Philip Randle used to do many tests on rats, in order to render the rats unconscious, ether-soaked paper towels would be added to the glass tanks in which the rats were kept. The paper towels were subsequently thrown into a wastepaper bin. One day, when Randle returned to his laboratory he promptly emptied his pipe into the bin, causing a large fire to erupt. Randle’s only words were ‘Ah! Ether’. Philip Randle’s notorious love of research on rats was celebrated when the department had its silver anniversary with a commemorative cake in the shape of a large pink rat, which he ceremonially beheaded!

Professor Sir Philip Randle features greatly in David Yates’ anecdotes from his early time at Bristol. He describes the man in detail, a large man in height and build, who used to swim in the pool in the basement of the Student Union. According to Yates, he would stand at the deep end, at the six-foot marker, and in doing so his head and shoulders would be above the surface. Other members of staff would see the pool as a prime location to initiate or continue their conversations about departmental affairs, but due to the extreme height difference would be forced to conduct their business, at the deep end, swimming in circles around Randle.

Q What did you find most enjoyable during your time in Biochemistry?
A My favourite thing was interacting with students. After the retirement of Patience Barrow, I was asked to take over as Admissions Tutor; this was a job I relished, and held for 18 years. During this time, I would visit neighbouring schools and visit careers fairs. This really helped to give me an understanding of what students wanted and the questions they needed answering. I also remember having to give an annual speech to our students every Christmas time, warning them of the need to revise in the hope this would shock them into action.

Q What brought you to the University of Bristol?
A I was recruited, and enticed, by the eminent reputation of Sir Philip Randle and Peter Garland, who had tutored me at Cambridge. I was not to be disappointed.

Q What single thing would you say defines Biochemistry at Bristol?
A Bristol has a strong commitment to academic rigour. The Biochemistry programme has always had a strong chemical and molecular flavour, including plentiful immersion in quantitative methods. It is considered challenging by our students and strong training by their prospective employers.

Q Why do you think Bristol Biochemistry is so highly regarded?
A Biochemistry research at Bristol has always been world-leading. In addition, the biochemistry teaching programme increasingly became a priority for our staff. My appointment was instigated by a need to revitalise teaching practices and to introduce new ideas to the teaching programme. In an effort to instigate change in Bristol’s practical teaching protocol, I would write to other institutions offering an exchange of ideas. This led to me being asked by the Biochemical Society to run a group focusing on practical teaching.

The Department continued with this commitment to provide excellent teaching, by later changing the procedure by which new members of lecturing staff were appointed. Initially new members of staff were selected solely based upon their research prowess, however a new interview protocol was implemented, as part of the interview process, that required new members of staff to prove themselves by giving a sample lecture at a level to engage first-year students. This upset the ante for lecturers and served to demonstrate the desire, in Biochemistry, to provide first-class teaching for our undergraduates.

Q What has changed since your time at Bristol?
A Of course Health and Safety requirements have become increasingly onerous. This seems to have taken much of the fun out of research. In addition, in the early days academics were pretty much free to work on whatever interested their interest. Now, grant funding is essential and more competitive, and the pressure to produce good publications is always there. It is a far more serious business.

Q Most important scientific advances from Bristol Biochemistry?
A There are too many to choose from! The work of MRC Metabolism Unit; Freddie Gutfreund’s work on rapid reaction kinetics; Brian Chappell’s ground breaking research on chemiosmotic transport; Tony Croft’s work on mitochondria and bioenergetics; John Holbrook’s protein engineering studies of enzymes; protein structural studies by Herman Watson, Hilary Muirhead and (later) Leo Brady. Bristol’s strengths lie in metabolic biochemistry and bioenergetics, along with molecular genetics.

Q What advice would you give to new students starting out in biochemistry at Bristol?
A Work hard, keep up with your lectures and revise regularly.

Q Were there any particular people in Biochemistry who had a big impact on you?
A Freddie Gutfreund was always good to his technicians and was a delight to work with, Peter Garland was generous but a challenge to work for – he always thought of the best experiments first! Brian Chappell, despite his fearsome reputation, was extremely fair, excellent at administration and taught me how to be generous.

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I graduated in 1986, nearly 30 years ago, so it’s pretty amazing that I came back and so many people are still here. It must be very hard to leave.

Jordan Raff

Jordan studied for his BSc in Biochemistry at Bristol from 1983-86. He then completed his PhD at Imperial College London; his work focused on cell division in fruit flies. He has continued in this field throughout his scientific career working as a postdoctoral fellow at the University of California, San Francisco, and then as a Wellcome Trust funded, Senior Research Fellow at the Cancer Research UK Institute in Cambridge. Jordan has since relocated to Oxford and runs a lab, backed by Cancer Research UK, based in the Dunn School of Pathology.

Why did you choose to study at the University of Bristol?

To be honest, I was probably a bit naïve! I wasn’t a particularly academic person at that age, so it wasn’t a very informed choice. I had heard that Bristol was a fun place to be and I knew that it had a very good reputation. It was also the right mix of being far enough from my home at the time (London) but not miles away. I visited before I came, and it looked like a lovely city to live in. It was top of my list and I just scraped in with three Bls.

What made you choose to study biochemistry?

It was probably the thing that I was least bad at. I really liked science and if I could have I would have studied physics but I wasn’t good enough at maths. Physics was what I found most interesting. As for biology, I hadn’t studied it at A-level but I had friends who did and it just sounded like so much learning. Plus I couldn’t do chemistry, because of the maths again, it would have been just a little bit too hard. So I decided to pitch at what I felt was right for me and biochemistry turned out to be the correct choice.

How did you find the biochemistry course at Bristol?

I’d be interested to see what the course is like now but, back then, we didn’t have a lot of options; we had to study biochemistry, chemistry and one extra. A lot of people found chemistry really easy but I found it really difficult so in my second year I made a really good choice. I did environmental chemistry. Firstly, it was way easier than chemistry and secondly, it was brilliant. I found it really interesting. Although it was more on the biology side of things, environmental chemistry was the best thing I did here, and the most fun. It wasn’t until my final year when I did a library project and then a rotation project in the lab that I decided to be a scientist. I really enjoyed being in the lab.

Why do you think Biochemistry at Bristol is so highly regarded?

One of the big advantages it has is its history. Everyone knows it’s one of the classic departments. Bristol has a reputation for being a very good place to learn and a great place for research but also the city is really nice. So I think all of those things combine to make this one of the top places where students like to go. Bristol University is certainly still somewhere I’d recommend to my kids.

Have you noticed any changes, in coming back to Biochemistry?

Well, given who is here now I’m sure a lot has changed in terms of the course itself. But I just gave a lecture and the lecture theatre hasn’t changed, they’ve changed the seats but it looked just the same. Nothing else has changed an awful lot. I graduated in 1986, nearly 30 years ago, so it’s pretty amazing that I come back and so many people are still here. It must be very hard to leave. For the department, it’s always good to get new blood in but I think people like it here so much they stay here a long time, it’s really remarkable. There is still that mix of old names who are still here, but also newer ones like David Stephens.

What are your best memories of Bristol?

I met my wife at Bristol, so that’s a good one. She was a physicist and much cleverer than me, she was really good at maths. Meeting her was a definite highlight. In my final year, it was the first time that doing work was interesting so I really enjoyed that last year. I played lots of football on Clifton Downs and I remember the sun setting over the bridge; those are the kinds of things I miss. When we left, a few friends and I went for a final walk around the Downs and it was beautiful day, the sun was setting, it was a pretty magical last day in Bristol. I definitely have very fond memories and I really like coming back.

Have you stayed in touch with any fellow students?

Well, those who aren’t here now it’s hard to know whether I’m going to get in touch with or not. I haven’t heard yet whether I got it, or not, but we’ll see.

Were there any particular people in Biochemistry who had a big impact on you?

One who is no longer here – a guy called Bill Chia and he wasn’t actually at Biochemistry but long before he was the only ‘fly’ person and I was hungering for that kind of cell and developmental stuff rather than the hard-core biochemistry. He gave us the only lectures we had on flies and I remember I talked to him quite a lot when I was thinking about staying in research and about which labs to go to. He’s actually quite a big figure in the field, it’s a bit removed from what I do now but I still bump into him in meetings and things, I also remember both Andrew Hales’ and Steve Halford’s lectures very well.

Can you remember your first day at the University?

It’s seared on my memory. The first thing I can remember is driving up the M4, with my dad and brother, feeling very nervous and not knowing what it was going to be like. As we pulled up to the hall, my brother sees this guy getting out with this big set of golf clubs and he said ‘who brings a full set of golf clubs? This is going to be terrible, you’re going to hate it!’ But that guy became one of my best friends even though I can’t play golf and never did. It’s funny that the people I met on those first days were the people I ended up hanging out with. It’s quite strange, you’re just thrown together really. We also started working in the first week and it was a bit stressful in the beginning, but we survived.

Bristol has a reputation for being a very good place to learn and a great place for research but also the city is really nice.

50 Years of Biochemistry at Bristol
Peter did both his undergraduate and PhD studies at Bristol. Once he had obtained his PhD he lived and worked in Wisconsin, USA. Since returning from the States, Peter has worked at many institutions including the Universities of Leicester and Cambridge, Jichi Medical School in Japan, Guelph University in Canada and Macquarie University in Australia. Peter has been professor of biochemistry and molecular biology at the University of Leeds since 1992.

**Peter Henderson**

Why did you choose to study biochemistry?

At school I was very interested in biology. All I knew was that I didn’t want to do the usual medicine or veterinary sciences. I found a book that had a biochemical chemistry in it, glycolysis and the Krebs cycle, and I thought, well maybe here is an interesting opportunity. At parents’ evenings, the chemistry master advised on universities to choose and I remember my mother saying ‘he thinks Bristol’s a good option’ so I went to an interview and got in.

Can you remember your first week at Bristol?

It was mostly centred around Churchill Hall. The first people who also arrived on my staircase were all Geordies and I could not understand a word they said. So it seemed a little strange to a southerner from Portsmouth. I had a very old bicycle that I used to get to the Department, cycling down Whiteladies Road. It was a matter of honour to cycle all the way back up to the top. The physiology lectures, given by the professor, were extremely strict; he would lock the door so nobody could come in late.

What research did you do at Bristol?

I was very impressed by Brian Chappell’s work on mitochondria, and the advanced techniques he devised to study them. He took on several new PhD students at the time – Brian Robinson, Richard Hansford and myself from Bristol, and John McGivan from Cambridge. Keith Haarhoff and Tony Crofts were already working with Brian. My project was at first investigating the role of calcium in H+O ratios in mitochondria; Brian suspected that the calcium movements might be primary rather than driven by the proton movements as required by Peter Mitchell’s Chemiosmotic Theory. This was rather anti-Mitchellian but he knew Peter very well and visited him in Glynn House in Cornwall. So my project was to try to resolve this. I would use an apparatus, which I partly assembled myself, to measure H+O ratios for the first year or so. Then we managed to inhibit the H+O with EGTA if I remember rightly; thereafter the project wasn’t going terribly far. So I moved on to examining effects of antibiotics, following on some approaches devised by Brian and, I think, Keith or Tony. I was using some new antibiotics that had largely been discovered in Henry Lardy’s laboratory in the USA, which is why I later went to Madison.

I was studying their effects on my own red cells measuring K+H+ exchanges with electrodes when John and I realised (during our usual pub lunch as I recall) that the liposome model membranes he used were a wonderful system to do a similar kind of thing. John and I tended to work in parallel and we devised some great experiments with radioactive sodium, potassium, rubidium and caesium down in the hot room, buried in the lump of rock under the Medical School. We were very experienced so we drafted one paper – these days you’d probably make two or three papers out of it; we put everything in from the effects of all the antibiotics on all of mitochondria, red cells and liposomes, interpreted in terms of the Mitchell Theory, and sent it off to the Biochemical Journal, who accepted it for publication. There were publications from the others at that time too. In retrospect we were very successful, but in a rather informal way.

What were your interests outside of the lab?

The undergraduate Biochemists (initially only nine of us) would certainly meet up and go out for lunch of a pie and a half of bitter. I played rugby for the Churchill second team. I particularly remember going to the Victoria Rooms for the Saturday night dances. There was a bar there and local rock groups would be playing – I remember one called Johnny Slade and the Vikings. Bullocks of girls would come in from the teaching colleges and that was where some of my group met their subsequent partners. It was the time of the Beatles and the Stones and we’d have a round of parties at the weekend – I remember one in a quarry in the Avon Gorge.

Do you have a best memory of Bristol?

I was in Bristol for just over six years altogether, so there are lots of good memories. For example I met my wife there (in a pub called the Albion), and I made some very good friends at University. I enjoyed my first year far more than my second. I remember a Dean’s letter at the end of it, which was a kind of warning. I think part of the problem was I came from a single-sex school and was very immature, and having girls around was a big thing. It sounds very naive compared to today. I settled down in my second and third years.

Why do you think Bristol has such a good reputation for biochemistry?

I studied physiology and chemistry for two years. Then we were so lucky that by the third year, Philip Randell became the first Professor of biochemistry and brought in Brian Crofts and we were the first final year they taught. There were then only six of us. We heard about front line metabolic biochemistry for a year and it was fantastic. I think Bristol Biochemistry grew very rapidly in reputation, the equal of Oxbridge in many people’s eyes.

What advice would you give to biochemistry students today?

It was possible for us, at the end of the undergraduate three years, to feel we had mastered most of biochemistry; I think it would be pretty impossible in these post-genome days for anybody to feel that. Choosing a specialty subject to study is therefore a much more critical aspect of one’s career today than it was then. The other factor is that employability is much more difficult to achieve now. It must be aggravating to the younger generations, but we gave little thought to who was going to employ us. Academic jobs were perfectly possible and industries would actually come to the Universities to recruit people whereas now they sift through thousands of applications for far fewer posts.

The climate is very different now. From my experience, my advice to today’s students, is that a rigorous biochemical training enables you to understand most other biological and biomedical disciplines, creating many career options, but then I would say that wouldn’t be?
Jan Denton

Jan worked as Philip Randle’s secretary from the first day of the new Department, 1 April 1964, until autumn 1967. She met her husband, Dick Denton, at Bristol while he was studying for his PhD under Philip. Around 1970 she worked part-time as a research assistant with Herman Watson among others, and also worked in Senate House for a short time. After leaving the University, Jan began a career in secondary school teaching and later as an educational consultant.

1. What brought you to Bristol?

I’d done a biochemistry degree at Birmingham and I didn’t want to go into research. I definitely didn’t want to do teaching at that stage and I thought I might go into journal work. I was persuaded to take a very short secretarial course, basic typing and shorthand, and I came to do that in Bristol.

Then the job with Philip came up and I thought ‘I’ll just do it for a little while’ and then decide what I want to do after that. Then Dick came along and he was a fixture in Bristol because he was halfway through his PhD with Philip. Then I had children and I never quite made the move into what I thought I might do when I first graduated.

2. What was Philip Randle like?

He was a really good man to work for. He was a very big man! He kept going up, and up, and up. He was halfway through his PhD with Philip Randle. Then I remember too that Philip, very unusually at the time, insisted that everyone in the Department call him Philip, which was very much frowned upon, generally. I’d speak to secretaries in other departments and their Head of Department was totally different – they would refer to their Head as ‘the Professor’ whereas Philip had a much more equal and collaborative approach to running the place. He was also a very thoughtful man and was very willing to give me a lot of responsibility. He was a really good man to work for.

Within the University in general, things were conducted in such a formal way compared with nowadays. The Dean of Medicine at that time was Professor Darling and it amused me to hear Philip’s telephone conversations with him starting ‘good morning Darling’ perhaps. Also there was a Dr Honey in Chemistry, so you can imagine!

3. Why did you choose biochemistry?

I remember Anne Cole who became a good friend, and Charles Phelps who was there at the start, and then all the PhD students arrived – Philip’s lot in various stages of completion and others just starting off. There were also large numbers of visiting scientists from overseas. Philip really encouraged this and that was another lovely dimension. In particular there were people from Asia – a woman from Singapore and one from Sri Lanka – who were delightful, and others from Australia, Canada, USA, Spain, a great guy from Venezuela, all over the world in fact. It felt really multicultural and because there were relatively few in the department, the impact of having the mix of people was much stronger.

Many of us were of a similar age, it was a really young department; I think Philip was under 40 when he was appointed and the average age was probably around 25 to 30.

4. Who do you particularly remember from that time?

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5. Were there many women in the Department at that time?

I remember Anne Cole and Mollie Luscombe from the early days, and the visiting scientists that came from Asia were mainly female. They were really committed to furthering their careers; really interesting, strong women. In terms of PhD students I can only remember one woman from that period. The department was heavily skewed towards males. Hilary Muirhead was the first woman to be recruited from outside. I’ve not really thought about the challenges she must have faced before but I guess Hilary was quite a trailblazer.

6. What are your best memories of Bristol Biochemistry?

When Dick and his generation arrived it was such an exciting period, a time of a lot of friendships. I do remember that side very fondly. People got on very well and were working hard to establish themselves and the Department. There was a high level of energy about the place and a feeling of collaboration. I’m not sure I’ve matched that in any job since.

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Interview with…

Dick Denton

Dick arrived at Bristol, in 1964, three months after Professor Sir Philip Randle. He began as a PhD student, finishing the work he started with Philip at Cambridge. He was then appointed to a temporary lecturership and in time proceeded to become lecturer, reader, professor, head of department and finally, dean. Since his retirement, in 2005, he has continued to work part-time carrying out teaching and research.

Can you describe the time of your arrival at Bristol?

I started my PhD in Cambridge with Philip Randle. When he was appointed as the Head of the new Biochemistry Department at Bristol I followed him. I was the first of quite a few people from Cambridge. It’s amazing that I can still remember my first day; it was nearly 50 years ago. From Philip Randle’s group, I was the first person to arrive and I remember Philip saying to me ‘right, we’ve got to set the lab up’. So I pointed him to the lab and said ‘get it working’, which I did.

Along with many others you decided to stay in Bristol, why was that?

Yes, I certainly didn’t expect to stay and until relatively recently, I assumed I might move. I was offered quite a few other jobs over the years, but I could never quite find them attractive enough. I think it’s a characteristic of Bristol that so many people have stayed. I’ve got very fond memories of Bristol and my wife and I managed to get married within six months of living here. It’s a very nice city, a very good department and I’m very settled.

What have you found to be most enjoyable about working at Bristol?

It’s definitely been the research students; they’ve been an absolute joy. I like teaching, and I enjoyed being Head of the Department – it was a very exciting time. I’d also say the research itself. I’ve been very lucky, I’ve had some really exciting moments in research.

Could you name some of the highlights?

There are three important ones. Firstly, showing that insulin activated two enzymes involved in fatty acid synthesis. Secondly, showing that calcium activated a bunch of enzymes inside mitochondria, which is still the area I work on. Finally, we have found the protein which transfers pyruvate into mitochondria, Andrew Halestrap and I first identified that there must be such a protein, and very recently the two of us along with a research student, Chloe Burns, have found it.

If you could name people from the School of Biochemistry who have had a considerable impact on your life, and career, who would they be?

Firstly, my wife, of course! She was Philip Randle’s secretary and arrived with him on the 1 April 1964. My students and postdocs too: it’s hard to single out individuals amongst them. Additionally, the two previous heads had a great influence – Chappell and Randle – particularly Randle.

What significant changes to biochemistry at Bristol, have taken place during your time here?

Dick Denton cites the growth of the Department as one of the major changes to have taken place since the Department’s inception. Upon his arrival, he says, there were only two or three members of teaching staff, while the first Biochemistry class was made up of around seven students. Under Philip Randle’s leadership the Department doubled in size, and has more than doubled again in the 40 years since his departure. As well as the unbelievable amount of paperwork, and general bureaucracy which wasn’t there before, another would be Health and Safety. We were not well behaved in the early days; in the first five years or so one particular joke was to put dry ice in rubber tubing, tie a knot in either end, and walk away. That joke was a favourite of Brian Chappell, if I remember correctly.

Why do you think Bristol Biochemistry is so highly regarded?

The department has had many good times. What makes the department successful, I think, is the many good members of staff, lots of productive collaborations and the very good students.

What advice would you give new students starting biochemistry in Bristol this year?

What immediately comes to mind is the Head of Department speech I used to make to the first years. I used to say ‘work hard, play hard’. Also, I advise that they make sure to exploit all the facilities. Most undergraduates have a great time here.
Gallery: now and then

Top left to bottom right: The Medical Sciences Building as viewed from the centre of Bristol; Chris Proud in earlier days; Becky Jones in the lab; Len Hall running molecular genetics undergraduate practical; Rachel Curnock in the new C50 labs; Undergraduate students during the late 80s/early 90s in A89 of the Biology Building; Molecular Enzymology coffee room; Entrance to the Inner Court Biochemistry laboratories in the 1980s; Freddie Gutfreund getting to grips with turnover; Fiona Diffin at work in D40; Rachel Curnock in the new C50 labs; A Schools Week class in the biochemistry teaching labs.
Can you remember your first day?

I suspect what I remember was an amalgam of first days; it was back in 1886, quite a long time ago now. At that point, the labs I worked in were in Inner Court and right down in the basement. While I wasn’t disappointed when I came to this university, it wasn’t the glamour that one would associate with the more interesting research labs in the country. Along with a fairly honourable bastard in research, it was much more mundane and a little bit dinger than I had expected. I remember being given a large jar of green-osh sludge and told ‘there’s some enzyme activity in there, really want to see if you can get that out?’ I said ‘yes, sure’ and it was then that I realised that one of the more exciting and fun, but definitely challenging, things about doing a PhD was that they basically say ‘Welcome! Here’s a very long piece of rope; if you want to go and do things with that rope – that’s great and if you hang yourself with it – well, it happens’.

Why did you choose to study biochemistry?

That’s a good question. I wanted to be a vet and I didn’t get the grades and my Mum said ‘what about biochemistry? It looks like an up and coming discipline’. I looked at it and fitted my A-levels and I knew I wanted to study science, particularly biological sciences and I thought biochemistry sounded interesting. It wasn’t a big, well-thought-out decision; it was like so many decisions in life, I just thought ‘yeah, alright, I’d do that’.

Who have you most enjoyed working with?

Steve Gambin, Gideon Davies who was a research assistant who started with Hilary at the same time as me. I remember Herman Watson and Jenny Littlechild. I remember Janet, who was wonderful and indispensable. She would do all the washing up for us and take all the photos and all the rest of it. She was very kind, and an almost reassuring person to have there. There was a guy called Andrew, who was in a wheelchair and used to run the computers. Some of the lecturers I remember are Steve Halford, the Head of the Department and Brian Chappell. I certainly remember Tony Clarke. I was actually quite unusual in that I knew people outside Bristol University and when I moved down there, there were quite a few people who I already knew. I tended to mix with people outside the University.

Do you have a best memory of Bristol?

Paradoxically I remember writing up because I wrote up in a remarkably disciplined way, for me, but it was probably quite atypical. I wrote, pretty much, nine-to-five, five days a week and then I’d come in for a half-day on a Sunday and I’d write then. I wrote it all down in pen, long-hand, and then I’d type it all up on the computer. I did a bit of editing in between, then gave it to Hilary to look over. She made a few suggestions and alterations but basically handed it back to me and said ‘that’s fine’. I essentially wrote my PhD up in three months and the version I submitted was not substantially different from the original version I put down. I came out from my advisor with a few corrections to do and it was a pass. I don’t know how easily I passed; you only do it once.

My time at Bristol was really important to me. There’s a bit of me that really regrets that I either didn’t persevere enough, or wasn’t good enough to be a research scientist because I’d still love to be one. There’s a little bit of sadness about that but the training I got in Bristol; the rigour, the sharing, the ideas, have definitely set me up for life. I think back on it incredibly fondly and I’m really glad I went there.

Why do you think Bristol has such a good reputation for biochemistry?

It manages to recruit good people and there’s a nucleus of intelligent, thoughtful researchers there who are both supportive and intelligently critical about what you do. It’s really interesting. I’ve been a journalist for the last twenty years and I’ve been effectively looking at science and I’m very aware that the training I got in research at Bristol was extremely good. It equipped me to ask rigorous questions, not only about my own research but also in my capacity as a journalist, about the research of others and to be able to identify what’s good, what’s poor and to spot holes in other peoples’ arguments. I wasn’t ever taught that if something wasn’t right, or other people’s work wasn’t right then to discuss it and talk it through. Just being in that environment of clever, analytical, people is self-sustaining because they would then get new, good, people coming in and it was rigorous – intelligently so.

What did you do once you had left Bristol?

The potted history I tell is that I really enjoyed doing my PhD. When I started my postdoc it began to dawn on me that while I wasn’t bad, I wasn’t as good as some of the other people I worked with. I wasn’t a particularly good bench scientist. I began to realise that being a research scientist is an incredibly valuable and rewarding career but I didn’t think I was going to be as good at it as I’d like to have been. So that left me in a quandary over what to do. Then a key event happened and irrevocably, there’s an anniversary event coming up for this next year as well. There was a short-wave radio station running in Bristol called Fem FM which was Britain’s first all-women radio station. I went along to help out on it. You may ask an obvious question, I have nothing to hide; I am as I was born, I am definitely a man and there was a men’s hour. So there were 23 hours of women broadcasters and then an hour of men and I got involved in that. It was a real light-on moment for me because I realised that while I didn’t have the technical skills, I spent many years listening to speech radio, (Radio 4) so I knew how an interview felt and how an interview should go. I did that and I absolutely fell in love with radio. That was about a year and a half into my postdoc and I thought ‘right, this is what I want to do’.

It’s a hugely naïve thing to say I want to go and make radio programmes, because there’s an awful lot of people who want to do it and very few jobs around, but I was young and idealistic. Basically, I’d come into college and do my work during the day and then in the evenings I would sit at home and make discography programmes with a few friends. We got some stuff on BBC Radio Bristol and I got in touch with people in the BBC Radio Science Unit and asked to go and see them and then eventually, when I came to them and their ideas as well. Key ideas were moving and circulating by talking because that way, new things come along. Ideas always come at the junctions of disciplines and at the junctions of people. I don’t come from people sitting in an isolated little room thinking to themselves, ideas come when you share.
Can you describe your time at Bristol?

My PhD with Dick involved studying a group of mitochondrial dehydrogenases that he’d shown, with Jim McCormack, were regulated by calcium ions. I was tasked with what Dick thought were some fairly straightforward experiments to show that their sensitivity to calcium was the same in situ, inside permeabilized mitochondria, as after purification. To my surprise we found that the calcium sensitivity of the dehydrogenases differed markedly from one another. My PhD eventually became based on trying to elucidate the reasons, at the molecular level, for those differences, and what the point was metabolically. This is something which 28 years later and what the point was metabolically.

What brought you to Bristol originally?

I looked at various places to do a PhD, including Cambridge. The guy I interviewed with there, Rick Martin, was a former student of Dick’s and he told me (paraphrase only slightly): ‘if you’re given the chance to go to Bristol, what they’re doing there is ahead of what we’re doing here…’

I was also very interested in the programme of work; I was fascinated by cell signalling and I had just read work from the group in Bristol so I thought Bristol’s where it’s at. When I visited Bristol and spoke to people, such as Patience Barrow the admissions tutor, I got the impression that besides being an academically strong department there was a very strong commitment to looking after students as individuals and helping them develop both professionally and personally. Doubtless this is an advantage of being a relatively small and stable department. In any case it provided a superb environment for students at the time and I’m sure it still does today. That, Bristol is a great place to live. It has all the advantages of a city but is small and compact enough to feel like a small town. The joys of living 15 minutes from the lab can’t be overstated!

What are your best memories from that time?

Scientifically, turning up things that you don’t expect to see, semi-‘Eureka’ moments, were great. Serendipitous findings, for example finding a new way of purifying one of the enzymes I was working on, also provided nice moments. Socially, there are too many moments. Socially, there are too many memories from that time?

Which members of the Department do you remember in particular?

I received strong support from, and eventually set up productive collaborations with, a number of members of staff notably Andrew Halestrap and John McGivan, as well as Chris Proud. Brian Chappell was Head of Department at the time when I was a student and he was also a co-assessor of my PhD. The most frightening thing I’ve ever had to give was my year-one PhD presentation, to the whole department, in 1986. Brian asked me a lot of penetrating questions which I answered quite badly as I recall. Fortunately he didn’t hold that against me in my viva two years later.

In terms of structural biology there was Herman Watson and John Holbrook, who were very big players in that area at the time. Tony Clarke was appointed to a lectureship not long after I started as a PhD student and he was also a strong influence. The membrane biology side was very strong with Mike Toner carrying various red blood cell transporters and Hilary Murhead on the structural side was a great support. The fact that as PhD students we were presented to the whole Department, and learnt from the whole Faculty how to interrogate visiting speakers was also a boon.

What have been the most important scientific advancements to come out of Bristol Biochemistry?

The Department do you remember in particular?

I had a very productive time in Geneva but was tempted back to Bristol in 1993 to do another brief postdoc with Dick and Jeremy. We set up some nice new approaches for studying signalling in single cells using emerging tools, such as green fluorescent protein, and got a couple of very nice papers. As a result, I was fortunate enough to be made a lecturer in 1995. From then on I worked on insulin secretion, increasingly to try and understand how variants in the human genome, which predispose individuals towards type-2 diabetes, actually work at the molecular level. I was eventually lured away, to Imperial College, in 2006 with the prospect of a bit more resource to develop animal models but I continue to interact with several people in Bristol and it’s a great joy to do so.

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In terms of structural biology there was Herman Watson and John Holbrook, who were very big players in that area at the time. Tony Clarke was appointed to a lectureship not long after I started as a PhD student and he was also a strong influence. The membrane biology side was very strong with Mike Toner carrying various red blood cell transporters and Hilary Murhead on the structural side was a great support. The fact that as PhD students we were presented to the whole Department, and learnt from the whole Faculty how to interrogate visiting speakers was also a boon.
Could you describe your time at Bristol and explain your role?

I came to Bristol in 1969 when Freddie Gutfreund was Head of the molecular enzymology lab. Herman Watson had come in 1968 and he had set up the protein crystallography laboratory and I joined him the following year. We were in the Inner Court laboratories in Woodland Road for a number of years and then we eventually moved over to the Medical School. Neither Herman nor I were biochemists so it was a case of learning as we went along – as far as teaching went. Herman had already met Bob Scopes who was a lead researcher at the Meat Research Institute at Langford, which later became part of Langford Vet School. He was purifying lots of proteins from muscle so he was supplying us with quite a bit of material. Herman also set up a collaboration with the Oxford protein crystallography group so we used to have regular meetings with them. We worked on protein crystallography for the next 28 years.

Do you remember your first day at the University of Bristol?

I’m not sure I really remember it. I do remember that I came over for an interview the day they landed on the moon, and they were watching it in the senior common room on the television. That was my first visit to the University.

What brought you to the University?

I came on Freddie Gutfreund’s invitation. He invited Herman and me to come to Bristol, so Herman came first but then they needed somebody else. Herman and I had been working together at the MRC lab in Cambridge.

What is your best memory from your time at Bristol?

My best memory is the excitement of the new protein structures that came out of our work.

What do you think defines Biochemistry at Bristol?

I think the thing about biochemistry is that it has interfaces with all sorts of subjects. Herman and I were both very much physicists so we were at one extreme end of Biochemistry at Bristol. The people in Woodland Road were mainly at the physical end because there was Freddie and David Trentham. The medical end was over in the Medical School. We were rather far removed from a lot of the work that was going on there. Back then it was more a case of the techniques being physical techniques but the problems were biochemical so it was a question of how do you do it? At other universities, those doing similar work to us were placed in different departments. For example, I think at Oxford they were actually in the zoology department and in other places they would be in physics.

Why is Biochemistry at Bristol so highly regarded?

Well I think we get very good students and I think the teaching is pretty good; it’s one of the few remaining biochemistry departments in the country. The research projects available are pretty good and people work pretty hard to get them. I don’t know whether this is still the case but in my time, we always maintained a pretty rigorous mathematical aspect to it; students had to do calculations. This definitely helps with people’s job prospects and I think it’s worthwhile.

What have been the significant changes to the Department?

Well, I’d say the expansion in size of the Department. In Biochemistry you were always ahead of the textbooks; they were never really up-to-date because the subject was moving and changing all the time. In terms of third-year teaching it was very much research-oriented. It has grown from about 40 students in my day to over 100 today. I think that makes it much more difficult to get to know each student.

Can you name some key scientific advancements?

I can only really talk about what I am familiar with and what we were working on was the structures of the glycolytic enzymes. In conjunction with the Oxford group, and also some of the American universities, a major achievement was pretty much completing that pathway with much of the work originating from Bristol.

Were there any particular people in Biochemistry who had a big impact on you?

I think the most influential people would have been Herman and Freddie. We also had some very good students too. I think David Stammers was my first student and he went on to do pretty well. David Shotton was here as a postdoc too, at the beginning, and then he moved to Oxford.

Did being one of the only women in the Department pose challenges?

It certainly did, yes. I think one of the dangers is that certain people will say that you’ve only been put on a committee because they need a woman to be there. I don’t know if that still happens but that was one of the main challenges. Of the two other women in Biochemistry at the time, there was Anne Cole who looked after the dentists and was a senior lecturer but she mainly concentrated on teaching and she also wrote a very good textbook for dental students. There was also Mollie Luscombe who worked with Philip Randle. It is still the case that there isn’t a great deal of women in senior roles in biochemistry.

Why do you think there are not many senior women in biochemistry?

I think you need to be able to get money in. In order to retain your position you have got to get grants. In the past women would find it harder to get grants; it doesn’t seem to be as hard as it used to be. There are now various grants which encourage women to come back after having families, and things like that. For example the Royal Society had various societies to help women come back, there was the Dorothy Hodgkin Fellowship for one. Also, I think it was Birkbeck, in London, which pioneered job-sharing; they had two women sharing a lectureship and they surmised they got considerably more out of the two of them than they did from having just the one lecturer.
Joe Yeeles

Joe was a PhD student in Mark Dillingham’s lab after completing his undergraduate BSc in Biochemistry and Genetics at the University of Nottingham. Upon completion of his PhD he worked as a postdoc with Ken Marians at the Memorial Sloan-Kettering Cancer Centre in New York. He now works as a research fellow at the Cancer Research UK London Institute.

Q When did you come to Bristol?

A I arrived in Bristol eight years ago, in 2005. I managed to get a spot in Mark Dillingham’s lab somewhat fortuitously because I left sorting out my PhD until very late and Mark needed to fill a position. I ended up coming here and it was the best thing that could ever have happened. I was Mark’s first PhD student, and for that to be the first experience of my academic career, it couldn’t have been any better; I really was very lucky.

Q What did you like about Bristol?

A The city, I already knew well; I have a lot of family here and it has a very laid back feel and just enough going on to keep you interested. Coming from London, it’s important for me that Bristol has a busy enough feel. I have to be honest though, I mainly came to Bristol because of Mark’s work rather than the city itself. But it’s a great place to be. I would happily come back here. It’s a place I’d be happy to settle down in and a department I’d be happy to be a part of – if I was offered a permanent position.

Q What was it about Mark’s work that made you want to come here?

A I was pretty disillusioned with my undergraduate project; I didn’t really enjoy most of it but then in the last six months we had a lecture course by a pretty big name in the field of E. Coli and DNA damage response (Bob Lloyd) and some of Mark’s work came up in that lecture course, and then I found out that Mark was advertising a position and that was that. I met him and we got along very well on a personal level so it was pretty obvious that this was the place to come.

Q What do you remember about your first day at the University?

A I remember my interview a lot better. I arrived for my interview and the first thing I did was to go and have coffee and lunch and before I realised it that was the interview. Mark is a very laid back character. In the end I was walked down to the train station and sent on my way so I thought this is a good feeling. Fortunately no one else seemed to be applying for the position, so I got it.

Q How did you find your time here?

A It was really amazing. After finishing at Bristol I went to New York and that was great, I went to a very big institute. I’m now in a huge lab with Cancer Research in London but Mark’s lab was still the most fun I’ve had. Being in a lab where there are only one or two people was great because you get a really hands-on experience and you learn from them directly which I think is why I was able to be successful as a Postdoc. It was that one-on-one practical help but also learning how other people think, which is critical as a scientist.

Q Did you have much interaction with other members of the Department?

A I certainly did in D40, which was the group of people working on nucleic acid enzymes. There were four or five lab groups all sharing a lab space which is relatively unique; I’ve never been anywhere else like that. In other places everyone is in self-contained units, whereas here everybody shares ideas and shares the space. At Bristol Biochemistry you definitely get to know a small group of people very well but perhaps not the broader department.

I’m still in touch with people, like Mark Dillingham, Mark Szczeklik, and Nigel Savery. All of those people have been really supportive of me, for example by asking me back to talk, but also more generally. It’s really nice to be in touch with people who have already made the transition from postdoc to principal investigator (PI) and who have that knowledge to share.

Q Do you have a best memory from your time at Bristol?

A I haven’t got one single scientific memory as, fortunately, there were lots of them. Probably the best time I had in the lab wasn’t actually in Bristol; it was on a trip to Spain. We had a collaborator in Madrid and Mark was really great at letting you get immersed in the collaboration and involving you as a student in the other aspects of the lab. So we went for a week and we spent the entire time doing science and talking about science. For me, that was an incredible experience. That collaboration is still going on now and it has been very fruitful. To have the opportunity to do things like that, as a PhD student, is pretty rare; I certainly don’t know other students outside of Mark’s lab who have had those kinds of opportunities so that was a highlight of my time here.

In terms of the social aspects, I went on one of the retreats, in my first year, it was a day-long retreat. It was nice to get a feel for who was in the Department. Plus, the Christmas party was always fun.

Q Can you remember any funny moments from the Christmas parties?

A No – that’s the problem! But everyone was a good laugh, I’m not sure if the funny moments that I can remember could actually go on record.

Q Do you have any advice for new Biochemistry PhD students?

A Ask lots of questions. Make your PI work for it. I think that’s probably the most important thing. I was conscious that I was constantly bugging my boss too much at the start but he said to me that he’d much rather I asked questions than went in gungho and got it wrong. You’re here to learn from them and they want you to learn from them because they want to mould you into the kind of scientist who can be productive in their lab. So ask lots of questions and listen to their advice. At the same time, try to think about becoming more independent as time goes on. It’s important to make that transition from always asking things to becoming an independent scientist which is crucial in the latter stages of a PhD.

Q Would you advise someone to do as you did and identify a contact in the field that interests you?

A Definitely, if you don’t have a specific interest it becomes a challenge. That said, there are lots of PhDs now where people don’t apply to specific labs they apply to programmes, which then have rotations. But do think long and hard about it, because a career in science doesn’t get easier. It’s not a case of getting a PhD and then you’ve made it, it gets more difficult but perhaps more rewarding too.
Interview with…

Patience Barrow

Patience read chemistry at Oxford before working as a research assistant at the New York University Medical School. She next worked in Canada, again as a research assistant, at the University of Toronto. Patience then returned to New York and joined a research group working on cancer cells. Following this she moved back to the UK and worked at Middlesex Hospital in London before being appointed as a lecturer/administrator in Biochemistry at Bristol in 1970.

A How did you end up in Bristol?

After having worked in New York and London, my husband and I decided we wanted to live in the country and my experience in London was that you couldn’t live in the country and do research. We all shared equipment in those days and you had to come in at night-time to do your experiments. So when I saw this post advertised I thought I’d try it. All of my colleagues said ‘don’t be so stupid, you’ll spend the rest of your life arranging interviews when you could come and moan to, or even just to say how happy they were’. Because I had a biochemistry background I did take some tutorials; it was either the medical or the vet students, but I didn’t do any lecturing. The reason I was called a lecturer/administrator was because the University Grants Committee wouldn’t provide money for an administrator so they had to call me a lecturer even though I did not give a single lecture.

A What did your job involve?

In a way I was able to choose the things I wanted to do, and the things I didn’t, which was very nice. A lot of my time was spent arranging interviews with undergraduate students. At that time we interviewed all the applicants we were interested in. Towards the end of the Christmas term and the following term we’d conduct interviews, there were about five people who would interview groups of 20 or 30. Another aspect of the job was grants - a side I was not so happy with. People had research grants, as they still do now, and the Finance Office had to handle the money and somebody had to go through the books and make sure that no mistakes were being made and people were spending the money on the right things. We also set up our own store and that was done fairly early on but Professor Randle was responsible for making sure we had a store just for Biochemistry and I was one of the people who had to do that. For the teaching labs, one of my first jobs was to sit next to Charles Ashford when he interviewed Hilary Cross and Nigel Edgell. If the washing-up ladies, or anybody, was unhappy then I was the central person who they could come and moan to, or even just to say how happy they were. Because I had a biochemistry background I did take some tutorials; it was either the medical or the vet students, but I didn’t do any lecturing. The reason I was called a lecturer/administrator was because the University Grants Committee wouldn’t provide money for an administrator so they had to call me a lecturer even though I did not give a single lecture.

A How would you describe your time at the University of Bristol?

My role was a new post because when the Department was set up by Professor Randle, he inherited one or two people from Physiology and one was Charles Ashford who had done quite a bit of teaching in the past but was due to retire. There was administrative work to do but they wanted someone who wasn’t involved in research and I was lucky enough to be chosen. I worked with Charles for the first two years and then he retired. It was rather nice because there were only two or three other administrators in the science faculty back then. One was in Chemistry and one was in Physics and we were known as the ‘Unholy 3’.

A What was it like working with Philip Randle?

He had an extraordinarily friendly department, and he was determined to keep it that way. People didn’t only work for themselves, they worked for each other – he was definitely the leader and was a very strong man. I found him really easy to work with, because I came in with absolutely no admin experience whatsoever and he put up with me. Charles was also very helpful – in fact I didn’t have enough to do, I was a little bit bored in the beginning, but at least I was learning.

A Can you remember your first day?

Anne Cole was asked to look after me on my first day, so she showed me around and introduced me to everybody – they were very friendly. I particularly remember meeting Trevor Griffiths because he was a brand-new father. He now has three sons; and one of his sons had been born the night before I started and he was very excited about it all. I also remember the following week because it was the August bank holiday and on the Tuesday following the bank holiday, I came in to work as usual but the whole place was locked up and nobody had remembered to tell me that we had the Tuesday off as well!

A Why do you think science tends to be male-dominated?

I think probably the public school system was at fault, in my case, because it was quite difficult for a girl to get decent, advanced, scientific schooling. It was also due to the segregation of girls’ schools and boys’ schools and that science simply wasn’t taught in the girls’ schools.

A Did you face any challenges being one of the only women working in the Department?

For me it was difficult, on the social side, in a way. I knew all the men but I didn’t know their wives. When we had parties Richard, my husband, came along and always felt a little bit out of place and that was a bit difficult. I don’t know how the men felt about having a female administrator – they might have been horrified, but they never made me feel so. I always worked in labs which were predominantly more male-dominated so I didn’t notice a difference really.

A Do you have a best memory from Bristol?

I think the overriding memory was that it was a very friendly, cooperative department for the whole time I was there. Things went wrong but no-one held it against anybody and we tried as hard as possible to be loyal. We had a very enjoyable time. We also had an enjoyable evening at the Orangery at Goldney Hall for what was perhaps the 20th or the 21st birthday party. Quite a few of the older graduate students who left had come back.

We always had a very nice secretarial department. I think someone ought to pay tribute to them because we had a series of secretaries, I think there were four of them altogether and they got on well. I saw a lot of the secretaries, for obvious reasons. I enjoyed the interaction with people; it was such a change from doing research.

A Can you name some of the most significant people?

I got on with them all, I hope! I’m sure I was horrid to some of them but I had a nice side as well. It’s hard to pick significant people from everyone in the Department.

He [Philip Randle] had an extraordinarily friendly department, and he was determined to keep it that way. People didn’t only work for themselves, they worked for each other.
Nigel worked in Bristol Biochemistry for more than 40 years. He joined the University in July 1971 initially as a technician in the teaching laboratory. In the late 1970s he became a research technician, primarily within Dick Denton’s and Andrew Halestrap’s laboratory, and rapidly became one of the most senior technicians within Biochemistry.

Q What made you apply for the job?
A I knew I wanted to get a job that had something to do with biology because I loved the subject. After starting work, at eighteen, I did seven years of part-time learning eventually studying for my M.Biol. This was really hard work and took up most of my free time, and I was about half-an-hour for exams, and a lot of coursework was set each week making it a hard slog.

Q Can you describe your early days in the Department?
A I was incredibly lucky to get the job. My bus was late on the morning of my interview and I was about half-an-hour late. As I was walking to the Medical School the chap who was interviewing me, Charles Ashford, was walking out for lunch! If the porter hadn’t hailed him, as he was just about to walk down the steps, I never would have got the job and I never would have ended up working there.

I started off in the dental teaching lab and there was an experienced technician called John Van Strien, a Dutch chap, who had already spent 20 years working in the Medical School, starting when our department was called Chemical Physiology. The dental teaching lab was run by Anne Cole. I was there for about three months and then I moved across to the main Biochemistry honours teaching lab. Les Corbin was the senior technician and he patiently taught me the job.

I was very green, and a bit slow, because I was anxious not to make mistakes and to do well. Les taught me the basics of the job which helped me ever since. Les was, and remains, a great friend and we are still in regular contact. David Yates, who was responsible for the honours lab, also helped me a great deal. I look back on my time there with great affection as I was lucky enough to work with a friendly team including Yvonne Williams, Betty Croker, Win Cuff, Win Swift and Mary Hale.

Q Did you ever consider relocating to a different university?
A No I didn’t seriously consider this. However when my great friend, Roger Brownsey, moved to take up a post in Vancouver, his descriptions of the Lifestyle and beauty of the place made a big impression on me and it sounded fantastic. He came back a few times and we stayed in touch. Over the years I’ve heard a few depressing stories from other parts of the University where there was an apparently abrasive relationships between the support and academic staff and a lack of mutual trust. I think I’ve been really lucky, I’ve never worked for anyone I didn’t get on well with.

Q Who did you most enjoy working with?
A I’ve enjoyed working with all categories of staff in Biochemistry. Dick Denton was a great influence on me, particularly during my early years in M101. He was quite demanding but he instilled good habits, taught me the essentials and made me realise the importance of thorough preparation and good organisation. Dick took a great interest in all the people who worked for him and was very keen to see them advance. He helped me immeasurably with my M.Biol, allowing me to do my project in his lab which was a big advantage. Some of my contemporaries had to do all their experiments at the college itself, using equipment which wasn’t familiar to them. Dick supported me throughout all the time associated with biochemistry research and I owe him a great deal.

I worked very closely with Jeremy Tavares, Andrew Halestrap and Pete Cullen after I moved on to a supervisory role; looking after B-Floor and D- and E-Floors ISL, with my office located on E-Floor. I really felt that they trusted me and vice versa. These relationships were especially valuable to me during the momentous period during the establishment of the ISL and the laboratory moves arising from this. I really enjoyed working directly with the senior postdocs when I was a research technician. These included Jim McCormack, Roger Brownsey and Kelly Moule, who have all gone on to be very successful and remain firm friends. Later on I was fortunate enough to be able to work with Gavin Welsh and Maz Wilson. Both gave me fantastic support and I value their friendship very highly.

As for support staff, Gary Wiltshire who was the Technical Manager of Biochemistry between 1997 and 2012 is a great friend and colleague. We worked very well together and supported each other during some tough times. Gary was a rock for me to lean on and his contribution to the success of the Department was enormous.

Gloria Lambert, who worked with me on D- and E-Floors and Jo Parker on B-Floor, were a tremendous help to me and were totally dedicated and reliable, as well as good friends. Di Garland, formerly Financial Services Manager, was a great colleague and also a sensitive and supportive friend when times were difficult. Teresa Gornall, with whom I happily shared an office on E-Floor for eight years, was a pleasure to work with and a true friend. To sum up I think the Biochemistry Department had a family feel to it, with people rallying around to support colleagues when they needed it.

Q What would you say have been some of the biggest changes to Biochemistry at Bristol?
A I think the approach of the students has changed. The late 1960s to early 70s was a time of many student protest movements, so I think that students used to be much more politically aware than they are now. I think now we’ve come through the Thatcher era, students are much more focused on coming out with a decent qualification. Students will always be students, they’ll always have a good time but I think they apply themselves more now, I think that’s because there aren’t as many jobs these days. Today if you have a degree but it isn’t particularly good, there’s a chance you won’t get a job.

I also think that Bristol has to be giving the students a really good experience now because all universities are competing for students in ways they never had to before. A lot of it comes down to money; there was a lot of money about back then.

During my time in the honours teaching lab, David Yates undertook the modernisation of practical classes provided for the students. By the time I came to leave the lab David had successfully fulfilled his remit. Together with academic colleagues, who ran the practicals, he organized the introduction of more sophisticated experiments largely relying on a new, multi-use class instrument, the Spectroplus, which he had developed in cooperation with the manufacturers, MSE.

Bristol itself is a big attraction. It is widely held to be one of the nicest cities in the country. It has a vibrant atmosphere and many pleasant and interesting places.
Steve Halford

Steve came to Bristol as a student in 1964 and received a BSc in Biochemistry in 1967. He went on to obtain a PhD and after spending a few years in the States returned to Bristol. Following some time as postdoc, became a junior lecturer, then a full-time lecturer, and subsequently a professor. He was elected a Fellow of the Royal Society in 2004.

Tell us about your early years at Bristol?
I started here as a student in 1964, admittently reading chemistry rather than biochemistry. In those days, the biochemistry course was a two-year programme, so I did chemistry in my first year along with maths. In my second year I did chemistry and used biochemistry as my subsidiary subject. I went along to a lecture by John Williams on sickle cell anaemoglobin and this inspired me to be a biochemist rather than a chemist. In my final year I switched my honours subject to biochemistry. I then did a PhD with Freddie Gutfreund, from 1967 to 1970.

What would you say have been Bristol’s most important scientific advancements over the years?
There have been quite a few actually. I think Freddie Gutfreund ran a very successful laboratory, some of the work he did on enzyme kinetics, and the senior postdoc who then became a lecturer, David Trentham, did some really pioneering work on the fast reaction kinetics of myosin. There was also a very strong structural group led primarily by the late Herman Watson. He had some brilliant students, including Dave Stuart, Steve Gamblin, Gideon Davies and Dale Wigley. We actually didn’t really realise how good they were, until they’d been and gone, but that was a powerful group. It’s also worth mentioning Richard Coggill, Neil Hunter and Baz Jackson as they did some very important work on bioenergetics, essentially validating the chemiosmotic hypothesis that Peter Mitchell had proposed a few years earlier, and for which he was awarded the Nobel Prize.

What have been some of the most significant changes over the years?
There are many of them. One of the main things would be that lecturers these days appear to have a much tougher job in terms of all this stuff coming down from on high. We didn’t have to bother with all that bureaucracy before. Another of the most significant changes was all of us moving to one site. When I was a student and a postdoc, and later a junior lecturer, the Department was split on two sites – half of us were down in what they call the molecular enzymology laboratories on Woodland Road, part of Earth Sciences, and the other half of the Department was in the Medical School. It was only later, about 1990, that we all actually moved together on to one site, which I think made a big difference and a big improvement, to the department. I also think teaching has noticeably changed over the years. The teaching programme is getting more progressive and more regimented. I believe that the job of tutorials is to enthuse the students, not to teach them what they haven’t been taught in the lectures.

Who have you most enjoyed working with?
Freddie Gutfreund was my scientific godfather. I’ve also had a very successful relationship with Nigel Brown, because Nigel and I were appointed at the same appointment panel. Together we set up a joint laboratory so he was very helpful, as was John Grinstead who also played a very important part in my career. But then of course, of my own students and postdocs, a fair number have gone on to do well, and have been great to work with.

Why do you think Bristol Biochemistry is so highly regarded?
I think the record of any university department is based on its research profile. We’ve taught a lot of students and a lot of students have gone on to make significant names for themselves, but the actual ranking part is done on the University’s research record. There have been a fair number of FRs and other successes, including significant grants and for example, if one is just thinking in research terms, Bristol is in the top four or five biochemistry departments in the country, it has been for some time and will continue to be.

What are you most proud of?
If I had to choose a single event, it would be being made an FR. In research terms there have been two main things. Firstly I had a very good PhD student, John Taylor, who was brilliant in the lab. We were working on an enzyme called EcoRV that cuts DNA at one particular sequence and nowhere else, so we expected the protein to bind to that one sequence only. I asked John to do some binding measurements and he kept producing the same result. His results showed that the enzyme was binding all the way along the DNA, not just at the expected site, and everywhere with exactly the same affinity. So I sent him back to do it again, stupidly, and he did it time and time again. Eventually I realised that he was telling me the truth and it ended up being, at the time, an important discovery. It showed that it is only when restriction enzymes actually get to their target sequence that they activate themselves for the DNA cleavage reaction.

The other main event that comes to mind was a few years later. A colleague in the USA, Ira Schidlowski, suggested we should work on another enzyme called StII because it had a very unusual target sequence. Again we put a student onto this project, Lois Wenzell. We had no DNA in the laboratory with only one copy of the target sequence, the only DNA we had had two copies. Lois purified the protein and did her assays with this DNA with two target sites. You would expect the enzyme to cut at one site and then come back and cut at the other site, but what the enzyme did was to cut at both sites at the same time. You could see that from the very first test we ran. This turned out to be the start of two quite big stories – proteins acting at two DNA sites simultaneously, and DNA looping interactions where the protein binds two bits of DNA at the same time.

Could you give an example?
In the good old days you used to be able to smoke in the lab, and I used to have a cigar habit. So I would smoke a little cigar, let it go out and then light it up again later on and carry on. My first PhD student, who is now Head of Biological Sciences at UEA, decided as a joke to take my unlit cigar and push a match up inside and so when I came to light it up, of course the match exploded. Everyone else found it very amusing.

What would your advice be for this year’s first-year biochemists?
It's different from when I was a first-year student. It depends very much on where you see your long-term career headed, remember only a fraction of our students end up in research, so my advice to those would be to get the best lab to take you. You can't make hard and fast rules about what first-years should be doing, because so many end up in different fields.
Biochemistry at Bristol, past and present

The following articles have been written by members of the School. They address both key scientific findings and research which has taken place at the University of Bristol and also some of the current areas of work.

The full articles can be viewed at: bristol.ac.uk/biochemistry

The Bristol DNA double helix

Leo Brady, Gus Cameron and Emily Coyte

In the early 1950s there were various theories about the structure of DNA, including triple helices and inside-out versions of the real thing, but none of these fitted the data in a way that seemed plausible. Before computers became powerful enough, the best way to test structural theories was to build physical representations using metal models. Watson and Crick decided to tackle the DNA structure problem in this way and asked the workshop in the Cavendish Laboratory in Cambridge, where they worked, to make those parts that were not already available. They then used the available data, such as the relative proportions of the individual components, and data from Rosalind Franklin’s X-ray experiments, to build various structures. The one that made both chemical and biological sense was the, now-famous, double helix.

This iconic model is perhaps the best recognised representation of a biological molecule in the history of science, and was immortalised alongside its creators in a famous photograph by Antony Barrington-Brown. By a strange twist of fate, this model subsequently spent many years housed within Biochemistry at Bristol. When the fledgling Department of Biochemistry was established at the University of Bristol, many of its founding members of staff were recruited from Cambridge. This included Dr Herman Watson (no relation to James) in 1968. Herman Watson was a protein crystallographer who had learned his trade from the Nobel laureate Max Perutz at the newly established Laboratory of Molecular Biology (LMB) in Cambridge. X-ray crystallography was a technique which had only recently been applied to proteins, and both expertise and associated equipment were in short supply. When Herman moved to Bristol, understandably he was keen to bring whatever surplus equipment could possibly be ‘spared’ by the LMB. This included several drawers of, no longer used, components for molecular models. Included in this mix was Watson and Crick’s, now dismantled and abandoned, very first model of the DNA double helix.

The model was reassembled and for many years it was discreetly displayed at one end of our undergraduate teaching laboratory. At quiet moments during the long afternoons of practical classes, many of our lecturing staff would proudly show off to our students this hand-built model with its original scribblings on the tin-plate base pairs. These viewings were invariably accompanied by an increasingly exaggerated story of the great heist by which Bristol had stealthily removed this famous model from right under the noses of Cambridge colleagues.

But possession is only nine-tenths of the law. As the fundamental importance of Watson and Crick’s seminal discovery became ever more evident, the Science Museum in London launched a hunt for this iconic model. Quite how the trail eventually led to Bristol is unknown – it is assumed we were betrayed by one of those quiet boasts to a practical class on a dark winter’s afternoon, inspiring an unforgettable memory in a loose-lipped undergraduate. How the negotiations with the Science Museum went is also a mystery, suffice to say they did manage to extract most of the original model which is now on display in London and viewed by nearly three-million visitors annually.

Nonetheless, Bristol somehow held on to two sets of the original tin-plate, hand-cut, base pairs and these have been incorporated into our own (partial) replica of the very first model of the DNA double helix. To celebrate our 50th anniversary, the model was completely renovated and provided with a new display case in summer 2013. It still sits at the front of our first-year teaching laboratory, and is repeatedly shown off to potential new students at open days. Its location in the teaching lab means that this inspiring model can continue to provide our students with a beautiful and unforgettable link to one of the greatest discoveries in biochemistry.

To celebrate our 50th anniversary, Watson and Crick’s very first model of the DNA double helix was completely renovated and provided with a new display case in summer 2013.
The regulation of metabolism

Dick Denton

The study of the regulation of mammalian metabolism at Bristol got off to a flying start with Philip Randle, Brian Chappell and Peter Garland. M101 was not the only laboratory in the Department in which the regulation of mammalian metabolism was studied, but it was the focus for this research for over 30 years.

All three of their research groups contained research students and ex-research students that were to become members of academic staff within a few years. These included George Schofield, Dick Denton, Chris Pogson, Paul England and Steve Ashcroft with Randle, Tony Crofts and John McGivan with Chappell, and David Yates with Garland. Research was funded by substantial long-term funding from the Medical Research Council and from the British Diabetes Association (now called Diabetes UK). These two funders remained hugely important in the funding of metabolic research in Bristol, and much of this research has been related to diabetes. Another theme has been the study of the regulation of intra-mitochondrial metabolism covered elsewhere in this volume.

In the first 12 years of Biochemistry at Bristol, major advances were made in the understanding of the regulation of mammalian metabolism, which established the Department as a centre for such research. Highlights included: detailed studies on the metabolism of the heart that accompanied different fuels and workloads (Randle, England, Denton); glucose stimulation of insulin secretion from pancreatic beta-cells shown to require the intracellular metabolism of glucose and increases in ATP concentrations (Ashcroft, Randle); after the departure of Randle and Ashcroft to Oxford in 1975, metabolic research in Bristol was soon underpinned again by long-term support from both the MRC and BDA (to Denton). Studies by the groups of England, and later Chris Proust, made major advances in the understanding of protein phosphorylation in the regulation of muscle contraction and protein synthesis respectively. The research of Denton and his group concentrated on understanding the mechanism of action of insulin, particularly in fat cells.

Findings over the next 20 years or so included much evidence that insulin signalling involved the activation of intracellular protein kinases resulting in the increased phosphorylation of important proteins including acetyl-CoA carboxylase as well as the activation of protein phosphatases, which led to the dephosphorylation of other proteins such as pyruvate dehydrogenase. Important colleagues in these studies over the years were Roger Brownsey, Graham Belsham, Jeremy Tavare, Kelly Moule and Kate Heesom. Denton, mainly with Jim McCormack, also established the role of calcium ions in intramitochondrial metabolism following their finding that two other important intramitochondrial dehydrogenases (NAD-isocitrate dehydrogenase and oxoglutarate dehydrogenase), in addition to pyruvate dehydrogenase, were activated by micromolar concentrations of calcium ions.

The parallel activation of the three intramitochondrial dehydrogenases by calcium ions was shown to be an important means whereby ATP synthesis was enhanced in stimulated cells without the need for any change in ATP concentration. Andrew Thomas and Guy Rutter also made major contributions to the understanding of the regulation of the calcium-sensitive intramitochondrial dehydrogenases including some of the earliest measurements of increases in calcium ion concentrations within mitochondria of stimulated cells. Denton gave the Lawrence Lecture of the BDA in 1981 and was elected to FMedSci and FRG in 1998.

In the mid 1990s, under the influence of Tavare, Rutter and Peter Cullen, the character of research in this area changed with emphasis on intracellular signalling pathways and the introduction of a full range of molecular genetic techniques and real-time cell imaging using mainly confocal microscopy. The latter had been introduced by Schofield and Chappell but was greatly facilitated by the advent of the Bristol Imaging Facility, funded by a grant from the MRC. Important advances involving real-time imaging included: demonstration of the rapid transfer of the glucose transporter and other proteins to the plasma membrane in cells exposed to insulin (Tavare); measurement of changes in mitochondrial calcium ion concentrations in beating heart cells (Elinor Griffiths, Rutter); detailed studies on the movement of insulin-containing granules together with associated changes in the concentrations of ATP and calcium ions in pancreatic beta cells initiated by glucose metabolism (Rutter); and investigations into the importance of inositol phosphates and phosphoinositides in intracellular signalling (Cullen). These and associated studies resulted in Tavare giving the Lawrence Lecture of the BDA in 2000, Rutter winning the Minkowski Prize of the EASD in 2004 and Cullen giving the Morton Lecture of the Biochemistry Society in 2010.

The laboratory had the catchy name of M101 with M referring to the fact it was a mezzanine floor. It was destined to become the centre of metabolic research in the Department until the Integrated Signalling Laboratories opened in early 2001 for which the regulation of mammalian metabolism was studied, but it was the focus for this research for over 30 years.
Structural Biology at Bristol: a brief history

Leo Brady

A picture tells a thousand words. This must have been self-evident to the early founders of molecular enzymology at Bristol, Freddie Gutfreund and David Trentham, as a priority in the early days of the Department was to make appointments in the then emerging field of protein crystallography.

At that time, protein crystallography was the only way in which detailed pictures could be obtained of the exquisite atomic arrangements that determined the properties of proteins. In the early sixties this complex technique had been extended to proteins, leading to the breakthrough determinations of the structures of myoglobin and haemoglobin by John Kendrew and Max Perutz respectively, and for which they were awarded the Nobel Prize in Chemistry in 1962.

Max Perutz and John Kendrew

Max Perutz and John Kendrew were the founders of molecular enzymology at Bristol, Freddie Gutfreund and David Trentham, as a priority in the early days of the Department was to make appointments in the then emerging field of protein crystallography.

In the days before recombinant protein production, the large quantities of purified proteins required for a structural determination had to be obtained directly from biological tissues. Herman and Hilary quickly realised that scientists at the Bristol Vet School already had access to such proteins sources in the flesh of cows, pigs and sheep. This convenient resource was quickly matched up with local enzymology interests and a programme in determining structures of most of the key glycolytic enzymes resulted. These structures were fundamental to understanding energy derivation within living organisms and their association with Bristol was a substantial contributor to the emerging international reputation enjoyed by the Biochemistry Department.

Using both local X-ray generators and the Daresbury Synchrotron Radiation Source, in Cheshire, Herman and Hilary took thousands and thousands of X-ray images on film as part of a laborious and complex process by which the molecular details of a protein crystal could be determined. This also required substantial computing power and hence expertise in programming was also essential. Single structures could take years to resolve. Over nearly a quarter of a century the protein structures that emerged from Bristol included an almost complete ‘Who’s Who’ of glycolytic enzymes: D-glyceraldehyde-3-phosphate dehydrogenase, 3-phosphoglycerate kinase, fructose-bisphosphate aldolase, phosphoglycerate mutase (all from Herman’s group), and glucose 6-phosphate isomerase, pyruvate kinase, lactate dehydrogenase, and ovotransferrin (all from Hilary’s group). Many of these studies relied on close collaborations with other groups – such as those of Bob Scopes at the Vet School, and John Williams and John Holbrook in the Medical School. The immense investments of time and expertise in each of these structures were made possible by the growing teams comprising some very talented researchers. Although it is difficult to single out individuals, some of those who trained and worked with Herman and Hilary included Dave Stammers, Dave Stuart and Dave Shelton (now all in Oxford), Chris Davies (MUSC, USA), Steve Gamblin (NIMR), Gideon Davies (York), Dale Wigley (CRUK) and Jenny Littlechild (Euter). It is remarkable that half of these former lab members are now Fellows of the Royal Society.

In 1993 Herman Watson retired and, very sadly, died not long after. This was a great loss for Bristol Biochemistry. He was replaced in 1994 by Leo Brady, who brought a history of HIV research with him from York. In addition to these interests, it was not long before he too became involved in Bristol molecular enzymology. With John Holbrook, the structure of lactate dehydrogenase from Plasmodium falciparum (the causative agent of malaria) was determined, and this then formed the basis for a substantial drug development programme. This, incidentally, was one of the very first ‘public-private’ partnerships for developing new drugs, a model that is now being deployed against many infectious diseases that plague the developing world. Together, in the mid 1990s Leo and Hilary modernised much of the infrastructure for structural biology research in Bristol, until Hilary’s retirement in 1997. Hilary has remained in Bristol since and now forms a very welcome, but insufficiently frequent, visitor to Biochemistry.

Hilary was replaced by Andrea Hadfield who also tapped into local enzymology interests pursuing time-resolved studies of aspartate semialdehyde dehydrogenase and, once again, glyceraldehyde-3-phosphate dehydrogenase. During the early 2000s Bristol structural biology also benefited from a very convenient decision to build the next UK synchrotron just down the road in Didcot. The Diamond Light Source now forms a premier resource for protein crystallography and its nearby location has transformed structural biology research in Bristol. Although Andrea left in 2010, Paul Race has since joined the School and is now very actively pursuing an expanding programme in polyketide synthases and their application in synthetic biology. This also complements Leo’s more recent work on synthetic proteins, with Derek Woolfson in Chemistry, along with a long-standing interest in cell surface adhesion proteins. As the determination of protein crystal structures has become much quicker (although no less unpredictable) many other researchers at Bristol have also begun to dabble in structure determination. In varying degrees of collaboration with Leo and Paul, these include Ross Anderson, Ian Collinson, Tony Clarke, Mike Jones and Richard Sessions.

The considerable achievements during the last 45 years of structural biology research at Bristol would never have been possible without the skills and dedication of the graduate students and postdoctoral researchers who have gone on to excel in their future careers, and a monument to the rigour that infuses all research in Biochemistry at Bristol.

25 years of glycolytic enzyme research in Bristol...
Mitochondria, bioenergetics and metabolite transport

Andrew Halestrap

Philip Randle brought two rising stars in mitochondrial research, Brian Chappell and Peter Garland, when he moved from Cambridge to establish Biochemistry at Bristol in 1964.

Brian was one of the first to accept Peter Mitchell’s Chemiosmotic theory and this underpinned his groundbreaking research on metabolite and ion transport across the mitochondrial inner membrane. Peter’s research focused on mitochondrial fatty acid and citric acid cycle metabolism. They each received the prestigious Biochemical Society Colworth Medal, in 1965 and 1968 respectively, with Peter leaving for Dundee in 1971. Between them they trained many PhD students and postdoctoral workers, several of whom were to make their own mark on the field of mitochondria, transport and bioenergetics. These included David Nichols, Martin Brand, Peter Henderson Richard Hansford, John McGivan and Tony Crofts.

Tony and John established their own research groups in the Department with Tony becoming a world leader in photosynthesis, and John developing his influential studies on amino acid transport and metabolism. Several of Tony’s students and postdocs themselves became major players in the field of bacterial photosynthesis including Baz Jackson, Roger Prince and Richard Cogdell.

Towards the end of his academic career, Brian, together with Lydia Henderson, worked closely with Owen Jones on superoxide production by NADPH oxidase in neutrophils. Owen’s major research interest was metalloporphyrin synthesis and bacterial photosynthetic electron transport systems and these studies were complemented by the research of Trevor Griffiths on chlorophyll synthesis and Paul Wood on microbial electron transport chains. One of Owen’s PhD students, Neil Hunter, went on to make major contributions to the field of photosynthesis, becoming a Fellow of the Royal Society. Today, studies on bacterial photosynthetic electron transport systems are continued in the School by Mike Jones.

At the same time as mitochondrial studies flourished in Brian’s laboratory, the metabolic research group headed by Philip Randle was becoming increasingly interested in the regulation of mitochondrial metabolism and especially pyruvate dehydrogenase. This work, and how it developed, is described in the article WHERE by Dick Denton. In 1973, one of Dick’s PhD students, Andrew Halestrap, discovered a potent and specific inhibitor of the previously unidentified mitochondrial pyruvate carrier and the plasma membrane lactate transporter which laid the foundation of his own research career in Bristol. He has continued his studies on the mitochondrial and plasma membrane pyruvate and lactate transporters, making major contributions to their characterisation, identification, structure, mechanism, metabolic role and regulation. He has also made important contributions to our understanding of the role of mitochondria in the hormonal regulation of gluconeogenesis, including elucidating the mechanism of action of the antidiabetic agent metformin.

More recently the focus of Andrew’s research has been on the molecular mechanism mitochondrial permeability transition pore (MPTP) and, with Elinor Griffiths, its role in ischaemia/ reperfusion injury of the heart and as a drug target for cardioprotection.

The study of metabolite and ion transport across mitochondrial membranes initiated by Brian Chappell was soon complemented by studies on their transport across the plasma membrane

Andrew was elected a Fellow of the Academy of Medical Sciences in 2008 and awarded the Kellin Medal of the Biochemical Society in 2015. In more recent years, the research of others members of the School has taken on a mitochondrial slant including Jon Lane (mitophagy), Jeremy Henley (regulation of mitochondrial fusion and fission by sumoylation) and Nigel Savery and Mark Szczelkun (mitochondrial DNA replication and transcription). Mike Tanner joined the Department in 1970 and started his groundbreaking work on the structure of the erythrocyte anion exchanger. His research broadened to include other major membrane proteins including the Rhesus proteins and glycoporphin.

The importance of red cell membrane proteins in defining both major blood groups and rare variants led to a long-standing collaboration with Dave Anstee in the Blood Transfusion Service (now NHSBT). Mike retired in 2004 but his work is continued by his former postdocs Lesley Bruce (now at NHSBT Bristol) and Ash Toye. Ash was awarded the Race and Sanger award in 2013 by the British Blood Transfusion Society.

Mike trained up many other PhD students and postdocs who went on to develop their own successful careers in membrane protein biochemistry including Steve High, Chris Tate, Mark Young and Mark Parker.

Plasma metabolite transporters are also a focus of Paula Booth’s group which studies the mechanisms underlying the folding of membrane proteins including the role of the membrane lipids. Paula was awarded a Royal Society Wolfson Merit Award in 2008 and a prestigious ERC Senior Investigator Award in 2013. Paul Curnow, a former member of Paula’s group, is studying the biochemical and biophysical properties of the novel 12 transmembrane helix silicon transporters of diatoms, unicellular algae that sheath themselves in an intricate outer cell wall made of silica glass. He was awarded a Biochemical Society Early Career Researcher Award in Bioenergetics and Metabolism in 2009 and is now funded as an independent Research Fellow by a prestigious ERC Grant.

The full article can be found at bristol.ac.uk/biochemistry/50th_anniversary and details of all current research on mitochondria and transporters can be found at bristol.ac.uk/biochemistry
Some current areas of work at Bristol Biochemistry

Emily Coyte

Osteoarthritis is a painful joint condition which is becoming increasingly prevalent as a result of an aging population. Loss of protective cartilage from a lifetime of wear-and-tear and its ectopic replacement with bone matter causes the rubbing of bone-on-bone which can make normal movements, such as getting out of bed or putting the kettle on, very painful experiences. While twin studies have demonstrated a strong genetic component to osteoarthritis, the identity and effects of these genes are only recently being examined. Using Zebrafish as a model organism, the Hammond lab aims to understand more about the genes involved. Since then, the lab has used Zebrafish to study a number of other genes which have been implicated in human osteoarthritis, including one called Mc2I. This protein is known to cause the degeneration of some cell types including breast cancer and Schwann cells, but what role it could play in osteoarthritis is unknown. Using the transparent embryos of Zebrafish, the lab has been able to observe the changes in the Mc2I gene expression and bone development was shown for the first time in any animal model. The lab has also observed that the expression of Mc2I is highly expressed in developing jaw cartilage. Following the establishment of normal expression patterns, future work will involve the overexpression and knockdown studies of genes like Mc2I to see what effect this has on joint development.

The lab also seeks to understand the complex tissue interactions with different types important in cartilage and bone development, and what effect physical activity and strain may have at a genetic and cellular level. Osteoarthritis is suffered by 40% of people over 70 years old and can progress to a debilitating extent. While symptoms can sometimes be managed or prevented, there is no known cure. The origins of the condition need to be better understood. The Hammond lab’s work towards identifying and characterising the genes responsible for cartilage and bone development aims to reveal some targets which may lead to a much-needed pharmaceutical cure.

Ross Anderson: Artificial enzyme design and assembly

W ith proteins as with novels, it’s one thing to understand and another matter entirely to be able to successfully create your own. Our knowledge of proteins and the relationship between structure and function has improved so much in the past 50 years that we are right now at an exciting transition between understanding protein structure and designing our own. From Taq polymerase in PCR to restriction enzymes in genetic modification, enzymes have been used outside of their natural context for decades, but the range for utility is limited by what evolution on this planet has given us. The development of new enzymes has been extremely fruitful for molecular biology and molecular medicine. The approach of the Anderson lab uses an alternative route – not adapting pre-existing enzymes, but designing them from scratch for every use and as diverse and specific catalytic tools. The proteins they work with are called maquettes ‘rough drafts’ of fully-functional new enzymes. These are mostly based on simple four-helix bundles with side groups, each amino acid has a simple and clearly defined role, which may include the binding of cofactors at the centred of the bundle. The tractability of each amino acid sequence control over the maquette’s fundamental properties in a way simply not possible in natural proteins.

As well as sculpting these maquettes into a wide range of fully synthetic enzymes, an exciting challenge for the Anderson lab is useful integrating them into living organisms. They have already successfully designed a maquette which is expressed, translated and post-translationally modified by natural machinery of E. coli, converting a non-covalent enzyme into a covalent adduct of heme C. This was a phenomenal proof-of-concept and the first example of a natural enzyme being packaged with a natural cofactor in vivo. Removing heme dissociation in this way has greatly facilitated study of the maquette’s structure and possible functions with an aim to synthesize enzymes able to open new routes into natural biochemical pathways such as respiration or photosynthesis.

The maquettes are capable of binding two cofactors with different redox potentials simultaneously which provides selective transfer across the protein. The lab has demonstrated this in a maquette with one heme B and one heme C which had been integrated into a respiratory pathway. They also found that replacing the iron in heme C with cobalt allowed the maquette to substitute for heme C. This was a phenomenal proof-of-concept and the first example of a natural enzyme being packaged with a natural cofactor in vivo. Removing heme dissociation in this way has greatly facilitated study of the maquette’s structure and possible functions with an aim to synthesize enzymes able to open new routes into natural biochemical pathways such as respiration or photosynthesis.

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Research on nucleic acids

Steve Halford

Freddie moved to Bristol when the Department began and continued his very successful research career here. His field was protein biochemistry, though Freddie noted this as "Freddie’s red herring" on the grounds that the instructions for the protein were already laid down in the DNA! The original Watson-Crick model was later found languishing in the basement of Cambridge Physics and, circulated in the lecture theatre by the university, was brought to Bristol by another émigré from Cambridge, Herman Watson.

Nucleic acid research in Bristol started shortly after Biochemistry was founded, with the arrival of John Hindley in 1968, from Fred Sanger’s laboratory in Cambridge. At that time, Sanger was between his two Nobel-winning projects, protein and DNA sequencing and was trying to sequence RNA. Perhaps John’s most famous research came shortly after moving to Bristol, in a collaboration with Charlie Weissmann in Zurich on a virus with an RNA chromosome. John advanced Sanger’s methods sufficiently to obtain a sequence of 175 bases from the viral RNA, a massive achievement at the time (1970). Meanwhile, Weissmann determined the amino acid sequence of the corresponding protein, and when lined up their two sequences revealed one of the first validations of the genetic code in real life.

University expansion in the 1970s provided much-needed space. This meant that the nucleic acid biochemistry lab, founded in 1976 – Nigel Brown and Steve Halford, shown below (left and right respectively, at play), Nigel, like John Hindley, came from Sanger’s group, but in a later era when DNA sequencing had become practicable. With Sanger, Nigel contributed to the first genome sequence, a viral chromosome 5375 bases long. Nigel’s first objective in Bristol was to sequence a transposable DNA element that conferred resistance to mercury, an element also being studied at that time by John Grinsted and Mark Richmond in what was then the Department of Bacteriology. Nigel went on to cover the general processing of toxic metals in bacteria, though he moved in 1989 to the Chair in Microbiology at the University of Birmingham. Nigel’s later career followed administrative pathways, as Director of Science at the BBSRC and as Head of Science and Engineering, and then Senior Vice-Principal, at the University of Edinburgh. He was awarded an OBE for services to science in the 2014 New Year’s Honours.

Conversely, Steve Halford stayed in Bristol throughout his career – as an undergraduate in the second set of students to do Biochemistry in Bristol (1964-67); as a postdoc with Freddie Gutreund (1967-70); as a postdoc with Freddie and Mark Richmond (1972-76); and then staff appointments as lecturer (1976), reader (1989), professor (1995) through to an emeritus post on his retirement in 2011. Steve’s research as a PI focussed primarily on restriction enzymes, where he deployed what he had learnt about enzymes from Freddie and whatever he needed to know about DNA from Nigel and John Grinsted. Some years later, John and Steve set up the Molecular Genetics II course that is now embedded in our second year Biochemistry programme.

Steve’s research made significant contributions to our knowledge of the reactions proteins on DNA, how they find their target sites on DNA; how they can catalyse reactions at one sequence whilst excluding all others; and how in many instances they trap loops by binding two sites on the same DNA. Numerous colleagues participated here and the photograph above, from Steve’s retirement, shows almost all of his postgraduate and postdoctoral associates. Steve’s work was recognised with the Novartis Medal from the Biochemical Society (2011) and election to the Royal Society (2004).

In 1983, the University of Bristol strengthened its research on nucleic acids by forming the inter-departmental Unit of Molecular Genetics, with several new appointments across the life sciences. Two of these were in Biochemistry – Bill Chia and Len Hall. Bill was primarily interested in developmental genetics but while in Bristol was waylaid by Tony Clarke and Dale Wigley into using his expertise in molecular genetics to enable John Holbrook’s team to carry out their pioneering studies in protein engineering. Bill moved on to a research institute in Singapore in 1991 to work uninterruptedly on development where he advanced that field considerably. Len’s research area was in the fertilisation of mammalian eggs by sperm but he was to take on progressively more demanding administrative roles – as Head of the Department in 2000, Faculty Dean in 2004 and Pro Vice-Chancellor in 2008.

The Halford and Brown groups were initially located in the Inner Court laboratories on Woodland Road, previously the home of the molecular enzymology laboratory. However, they moved in 1986 to a suite of old laboratories in the D40-50 corridor of the Medical School, to bring them closer to Bacteriology. The space left by Nigel’s departure was later occupied, from 1995, by Kevin Gaston.
As demonstrated in this volume, 50 years of Biochemistry at Bristol has produced many research successes and has inspired generations of research scientists, now scattered about the world, who were taught as undergraduates or trained as PhD students or postdocs here in Bristol.

Over the last 50 years the Biochemistry research themes have evolved to three broad areas, which we define as: Dynamic Cell Biology, Membrane Biology and Enzymology. They span single molecule study of DNA-protein interactions to in vivo model organism studies of immune cells interacting with cancer cells. This broad research base makes Biochemistry at Bristol attractive as a place to come for undergraduate students through to young scientists wanting to set up their own labs. It also enables important interdisciplinary interactions and collaborations with chemists, physicists and clinicians both within the University and beyond. Importantly, this means that our undergraduates are exposed to cutting-edge research spanning the nanomolecular through to clinical translational studies, and hopefully giving them the opportunity, not only to become well-trained and rounded biochemists, but also to find what inspires them most.

Biochemistry in Bristol receives strong results year-on-year from our undergraduates in the National Student Survey. Of course, we work in a nationally and internationally competitive climate and it is very important that we maintain our popularity with the students. Teaching has always been very important to the School, and will remain so, informed by our wide-ranging, leading-edge research activities. Another of strengths is our tutorial system that, despite pressures on time, is expanding and evolving each year and increasingly functions to hone the research and transferable skills of our students. Maintaining this relationship between staff and students and keeping a family atmosphere such that students feel at the heart of the School will be a key challenge for the coming years as student numbers expand to reflect the successes and popularity of the course.

Practical work in teaching laboratories in the first and second years, and individual research projects in the final year, are integral to the Bristol Biochemistry BSc experience. Despite the extra pressure that increased student numbers have placed on our resources, we feel this is a particular strength of our courses. We are looking at increasing the options here to cater not only for those students who are looking at a research career, but also for those who are looking to apply the skills they have learnt during the course to other career paths. The challenge is always to maintain these important selling points whilst recruiting the best national and international students in an increasingly competitive environment.

Our PhD student numbers have expanded relatively slowly in recent years. Many of our postgraduate students are now recruited through our collaborative doctoral training programmes. This is an area that Biochemistry, in working with other schools, faculties and universities, has had several big recent successes. It is important that we continue this trend; maintaining PhD student numbers is key to keeping our research activities vibrant.

Recruiting talented staff is one of the most important roles of a Head of School and, of course, the current financial climate means there are likely to be few standard opportunities to do this; we need to think outside the box perhaps to solve this one! One aim will be to nurture the careers of future research stars by attracting and sponsoring the very best junior research fellows for those who are looking to apply the skills they have learnt during the course to other career paths. The challenge is always to maintain these important selling points whilst recruiting the best national and international students in an increasingly competitive environment.

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I am delighted to be taking over as Biochemistry Head of School in August 2014, and I hope the next 50 years will be as exciting for Bristol Biochemistry as our last half century.

Kate Nobes
Head of School of Biochemistry
Summer 2014