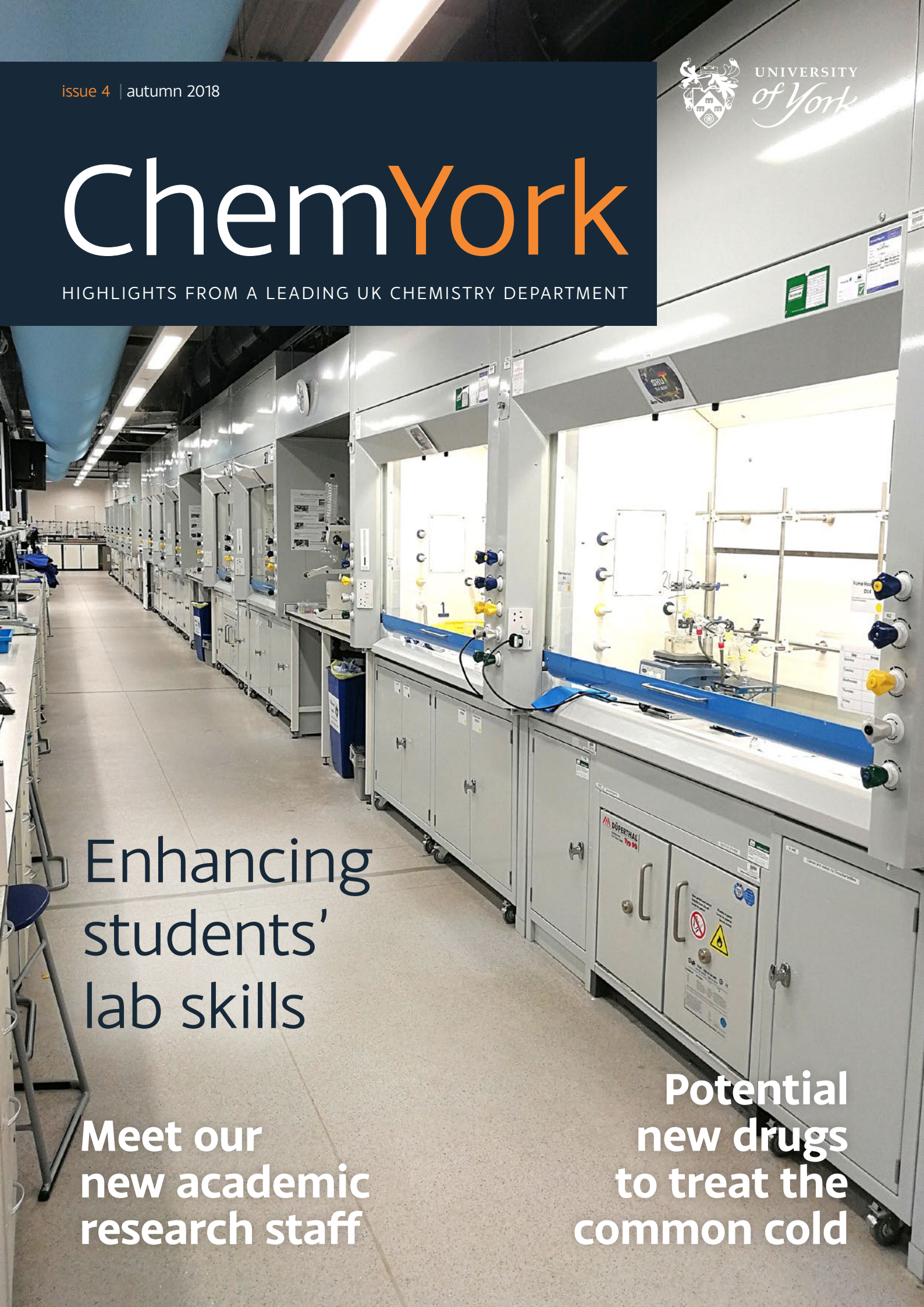


issue 4 | autumn 2018



ChemYork

HIGHLIGHTS FROM A LEADING UK CHEMISTRY DEPARTMENT

A long, modern chemistry laboratory with rows of fume hoods. The hoods are white with blue safety curtains. The floor is light-colored, and the ceiling has recessed lighting. The perspective is from the end of the lab, looking down the length of the room.

Enhancing
students'
lab skills

Meet our
new academic
research staff

Potential
new drugs
to treat the
common cold

Welcome

PROFESSOR DUNCAN BRUCE, HEAD OF DEPARTMENT, INTRODUCES THE AUTUMN ISSUE OF CHEMYORK AND REFLECTS ON THE COMING YEAR WHICH BRINGS WITH IT NEW MEMBERS OF STAFF AND LOTS OF CHANGE

In a university setting, the summer represents the time between academic years when we take stock of the year that has passed and anticipate the year to come. During this period, we are without the vast majority of our undergraduates, although quite a few undertake vacation research projects or are engaged to support the development of new teaching and learning materials.

The absence of the undergraduates gives the possibility to spend more time on research, to prepare for new teaching, to reflect on the things that went well and to contemplate how the coming year will be different from the one that went before.

In looking forward to this academic year, we have much that is different to think about. As you will see elsewhere in this edition of ChemYork, we have added six new members of academic research staff and one of teaching and scholarship staff to our number. Likewise, we are delighted to welcome Matthew Badham and Sarah Harper to the admin team, and Matty Popely as an apprentice in the mechanical workshop. Each of these people is part of a team that supports the work of the Department, but of course the exciting bit is that each is also an individual whom we fully anticipate will bring their individual contribution and insight to their roles, and in so doing will help the Department evolve.

This evolution is essential. We are currently in a process of changing our undergraduate degree, having spent a good deal of time

“We seek to inspire, to challenge people to be the best they can be and to do so in an environment that values and supports all who work here.”

contemplating how we can better deliver some of the material and developing an interesting set of new optional courses. Part of this is the rethinking of the Year 1 laboratory course, more detail of which you can read on pages 8 and 9. In research, new members of staff bring new research interests and offer the possibility of new collaborations, challenging us to think and work in ways that previously we did not. And, of course, the whole operation of the department is underpinned by the committed teams of admin and technical staff, and each new appointee brings a fresh perspective on how we do things, fostering positive change.

The department is made up of more than 220 staff, 650 undergraduates and 145 postgraduates – a community of more than 1,000 people who work together and all of whom are, in one way or another, interdependent. Yet one person can initiate a change that can affect many if not all of the members



of our community and so we have an enviable situation where a large community can benefit from the thoughts and actions of an individual. But that advantage brings with it a responsibility, for not only can we benefit from the input of individuals, but we have a responsibility to support and nurture every member of the department so that we do everything to help them realise their full potential, whatever their role.

As another 180 chemists, 60 biochemists and 30 natural scientists arrive in the department, it is a good time to think how our department is evolving, think how we can contribute and remind ourselves of what the Department does best. We seek to inspire, to challenge people to be the best they can be and to do so in an environment that values and supports all who work here. Here's to a very successful year ahead.

Front cover image: York Chemistry Teaching Labs. Credit: Christina Surdhar.

Compiled by David Smith

Designed by Cookie Graphic Design

Stars of Teaching and Learning

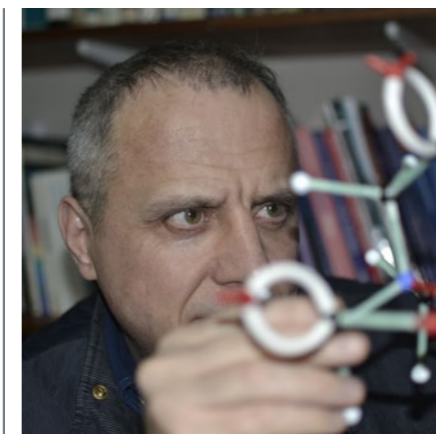
RECENTLY, MEMBERS OF THE DEPARTMENT OF CHEMISTRY HAVE RECEIVED A NUMBER OF AWARDS REFLECTING THEIR HIGH-QUALITY TEACHING.

Teaching excellence is a crucial part of the Department's success. Indeed, the 2018 National Student Survey (NSS) placed York Chemistry clearly at the top of the Russell Group with 97% overall satisfaction, and the Department retained its ranking in the Top 5 departments in all major league tables.



Vice-Chancellor's Teaching Award

Dr Annie Hodgson received a 2018 Vice-Chancellor's Teaching Award. Annie is the Schools Liaison and Outreach Officer, Study Skills Officer, and coordinates the Year 1 Skills for Chemists core module. This year, Annie appeared on stage as 'Benevolus Snape' to demonstrate the 'Art of Potions' to a family audience. Mentions were made by the panel about many aspects of Dr Hodgson's work, including her nurturing of relationships with local schools, and her running of BSc Chemical Communication projects in which students engage in outreach or classroom teaching with school-age children.



National Teaching Fellow

Professor Andrew Parsons was awarded a prestigious National Teaching Fellowship by Advance HE in recognition of his inspirational and innovative approaches to teaching. National Teaching Fellowships are awarded on an annual basis to celebrate and recognise individuals from right

across higher education who have made an outstanding impact on student outcomes. Andy is renowned for inspirational lectures, deploying poetry, pop music, printed t-shirts and pre-lecture slideshows to help students remember fundamental principles. Working with AstraZeneca, he pioneered the introduction of pilot-scale industrial experiments into the undergraduate programme. In recent times, Andy delivered the first ever University of York MOOC (Massive Open Online Course), called 'Exploring Everyday Chemistry' (see Issue 2) - this course has now attracted over 10,000 learners from over 100 countries. Reflecting on his National Teaching Fellowship award, Andy said: 'I am very grateful for all the help and support of colleagues and I have been very fortunate to work with so many talented and highly motivated chemistry students.'

Most Innovative Teacher

Dr Glenn Hurst has been shortlisted for the Times Higher Education (THE) 'Most Innovative Teacher' award based on his work using social media to enhance student engagement and understanding. The Times Higher Education Awards are widely recognised as the Oscars of the higher education sector, attracting hundreds of entries. By making use of social media platforms, including Snapchat, Glenn has enabled students to contextualise chemistry taught in class to everyday life and demonstrate key lab skills. This approach also provides an outlet for students to enhance their communication skills and acts as an additional mechanism for Glenn to share feedback.



New appointment

The Department is delighted to welcome Dr James Bennett as an Associate Lecturer. A graduate of the University of Leicester, James previously worked as a Teaching Fellow at University of Hull. We look forward to his contributions as he joins our outstanding Academic Teaching and Scholarship team.

Awards for top researchers

IN RECENT MONTHS, MEMBERS OF STAFF IN THE DEPARTMENT HAVE WON A NUMBER OF PRESTIGIOUS RESEARCH AWARDS:

Prof. Lucy Carpenter: Royal Society Wolfson Research Merit Award, 2018. Awarded in recognition of her work in atmospheric chemistry.

Prof. James Clark: RSC Green Chemistry Award, 2018. Awarded for the promotion of applied, market-driven green chemistry and engagement with industry and policymakers.

Prof. Gideon Davies: RSC Haworth Memorial Lectureship, 2018. In recognition of his structural and chemical investigations of the biological roles of carbohydrates, dissection of enzyme reaction coordinates and the application of ligands for cellular insight.

Prof. Simon Duckett: RSC Tilden Prize, 2018. Awarded for increasing the sensitivity of NMR spectroscopy through the inventions of the SABRE and SABRE-relay methods.

Prof. John Goodby: Pierre Gilles de Gennes ILCS Prize, 2018. For his pioneering research in organic synthesis of mesogens, contribution to technological applications of liquid crystals, and extraordinary scientific leadership in liquid crystal societies for the past thirty years.

Dr Will Unsworth: RSC Hickinbottom Award, 2018. In recognition of his creativity in the development of new methods for the synthesis of functionalised macrocycles and spirocycles.

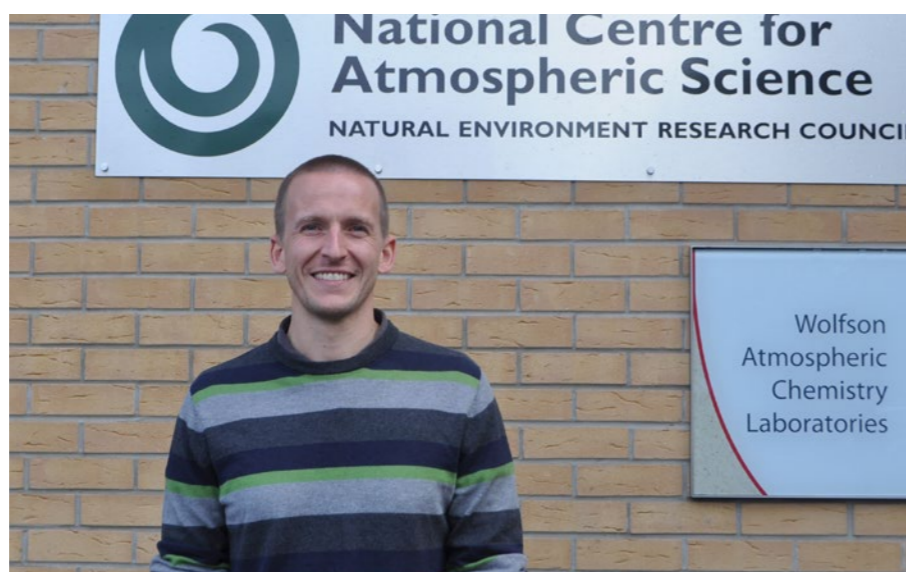


Fellowship success

THE DEPARTMENT IS DELIGHTED WITH THE SUCCESS OF TWO EARLY CAREER RESEARCHERS, DR SARAH MOLLER AND DR PETE EDWARDS, BOTH FROM THE WOLFSON ATMOSPHERIC CHEMISTRY LABORATORIES, IN GAINING FELLOWSHIPS.

Dr Sarah Moller's NERC Open Knowledge Exchange Fellowship will allow her to continue her work with the UK Government, particularly Defra. She will focus on establishing key strategic partnerships, influencing future funding and building collaborations to respond to the emerging needs of Government. In addition, she has also secured the role of Air Pollution Science Programme Lead within the National Centre for Atmospheric Science (NCAS), where she will set the strategic direction for NCAS air pollution research.

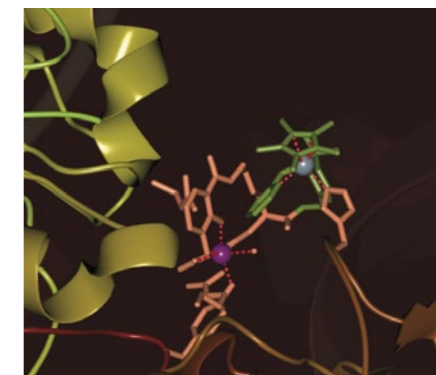
Dr Pete Edwards has been awarded a €1.7M European Research Council (ERC) fellowship for his five-year research programme into 'Quantifying the impact of Tropospheric Chlorine Oxidation'. Dr Edwards said: "This ERC starting grant will provide a step-change in our understanding of atmospheric chlorine chemistry by allowing me the resource, freedom and flexibility to develop and deploy new analytical techniques able to provide the much needed information."



Protein modification breakthroughs

Two York research groups have published significant breakthroughs in protein modification.

A research team led by Professor Anne Duhme-Klair has modified a highly selective and biocompatible protein scaffold with a reactive synthetic metal catalyst, to create an artificial metalloenzyme, combining the beneficial features of selectivity from the protein and reactivity from the metal. Their research paper, published in *Nature Catalysis* 2018, 1, 680-688, highlights a new anchoring strategy to combine these components in a reversible way. They used iron-binding siderophores as linking units, which connect the units in the presence of iron (III), but disassemble them on reduction to iron(II). Their innovative anchor system was used to connect a synthetic iridium-containing



catalyst to the CeuE protein and it was demonstrated that when they were connected, the reduction of imines became more selective - the selectivity of the protein becomes effectively coupled with the reactivity of the metal.

Researchers led by Dr Martin Fascione developed an alternative approach to protein modification. Their ultra-mild 'bioconjugation'

method, uses modern organocatalysis to update classical aldol chemistry. This 'OPAL' (Organocatalyst-mediated Protein Aldol Ligation) method, described in *Chemical Science*, 2018, 9, 5585, allows modification of proteins under mild biologically compatible conditions, meaning that their natural function is more likely to be retained. The team used their technique to attach small molecules to a protein from the surface of the *Leishmania* parasite, which is essential for infection. This is something that happens in the disease *Leishmaniasis* for reasons that are poorly understood. As Dr Martin Fascione points out: "By recreating these natural modifications in a test tube, we can begin to explore why these modifications are so important for infection."

New hope for cold cure

RESEARCHERS HAVE LAB-TESTED A MOLECULE THAT CAN POTENTIALLY COMBAT THE COMMON COLD VIRUS.

The common cold is caused by a family of viruses with hundreds of variants, making it nearly impossible to become immune to or vaccinate against all of them. The viruses evolve rapidly, meaning they can quickly gain resistance to drugs. For these reasons, most cold remedies rely on treating the symptoms of infection - such as runny nose, sore throat and fever - rather than tackling the virus itself.

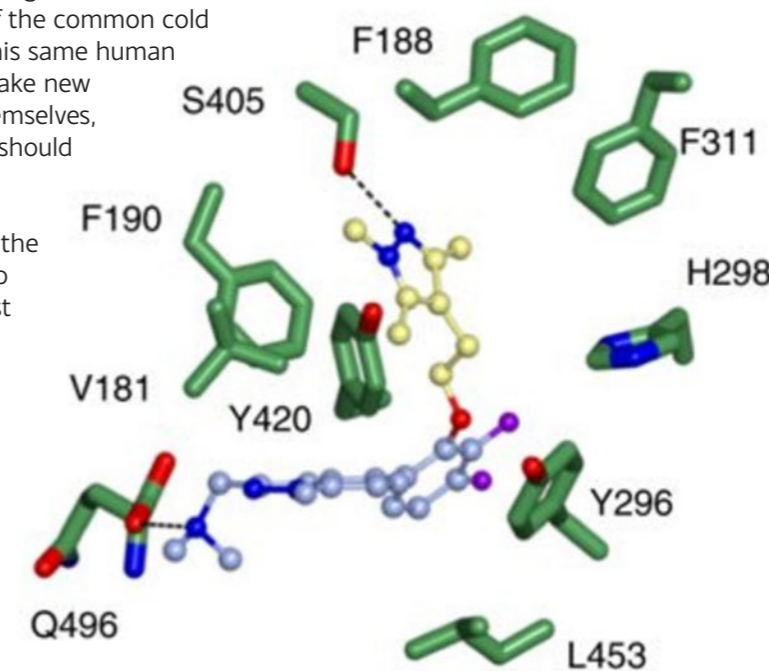
However a new molecule has been developed by a research team led by Professor Ed Tate at Imperial College London, and including Professor Tony Wilkinson and Dr Jim Brannigan from the Department of Chemistry's York Structural Biology Laboratory (YSBL). This potential new drug, code-named IMP-1088 and described in *Nature Chemistry* 2018, 10, 599,

targets N-myristoyltransferase (NMT), a protein in human cells that viruses 'hijack' to construct the protein 'shell', which protects the virus.

Dr Jim Brannigan from YSBL said: "All strains of the common cold virus need this same human protein to make new copies of themselves, so IMP-1088 should work against all of them. Additionally, the molecule also works against viruses related to the cold virus, such as polio and foot and mouth disease."

IMP-1088 is over a hundred times better

than previous compounds, and as a result of these lab-based tests, the team hope to move on to animal and then human trials.



Potential new drug IMP-1088 bound to the active site of NMT

The Super Six

IN THE LAST YEAR, A REMARKABLE SIX NEW ACADEMIC RESEARCH STAFF HAVE STARTED WORK HERE IN THE DEPARTMENT. THEY COME FROM AS FAR AFIELD AS CALIFORNIA, THE NETHERLANDS AND WOLVERHAMPTON, HAVE SCIENTIFIC INTERESTS RANGING FROM LASER SPECTROSCOPY TO TISSUE ENGINEERING, AND HIDDEN SKILLS AS VARIED AS NINJA WARRIOR (IN TRAINING) AND MIND-READING. WE THOUGHT THIS WAS A GREAT OPPORTUNITY TO CATCH UP WITH THE 'SUPER SIX'.

Professor Neil Hunt

Role: Professor of Physical Chemistry
Born: Leicester, UK

Education: MA (Nat Sci), University of Cambridge; PhD (with Prof. Paul Davies), University of Cambridge

Postdoc: Rice University Houston, University of East Anglia, University of Strathclyde

Previously: Professor in Chemical Physics, University of Strathclyde

Famous For: Ultrafast 2D-IR spectroscopy of biomolecules - we are interested in how fast molecular dynamics affect biological processes, from ligand recognition to reaction mechanisms

Ambition: To make 2D-IR into a useful technology - developing the understanding and techniques needed to take it out of the advanced laser lab into applications

Teaching: I hope to use our research to show how new technology can help understand fundamental molecular processes and pass on enthusiasm for solving multi-disciplinary problems

Hobbies: Walking, football, cricket, cooking

Superpower: I bake all of my own bread



THE SUPER SIX

Dr Aneurin Kennerley

Role: Lecturer in Chemistry (Magnetic Resonance Imaging)

Born: Wolverhampton, UK

Education: MPhys (Exptl. Physics), University of Newcastle; PhD (with Prof. John Mayhew), University of Sheffield

Postdoc: University of Sheffield

Famous For: Using MRI to further our understanding of neurovascular coupling. When the brain is active, neuronal cells start to metabolise more oxygen and glucose, increasing the flow of blood and nutrients. The failure of this mechanism could be a key factor in many neurological diseases

Ambition: To be well known/thought of in the field of imaging for rigorous, well planned, accurate science helping push research forward, even if in incremental steps, to answer some of society's big burning questions

Teaching: Public engagement, which I love, is an important skill for teaching. Being able to get very complex ideas across in a fun and unique way can enhance the teaching experience

Hobbies: Strategy board games (from 'simple' ones like Settlers of Catan to 12-hour epics like Twilight Imperium), hill-walking with family (as long as ice cream is available)

Superpower: Amateur Magician and Mind Reader



THE SUPER SIX

Dr Lianne Willems

Role: Lecturer in Chemical Biology

Born: Leiden, The Netherlands

Education: BSc, MSc (Bio-Pharmaceutical Science), University of Leiden; PhD (with Prof. Hermen Overkleeft and Prof. Gijs Van der Marel), University of Leiden

Postdoc: Simon Fraser University (British Columbia, Canada).

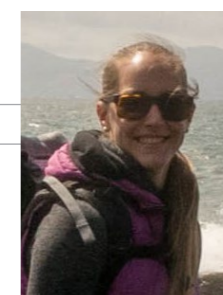
Famous For: Developing new chemical biology tools to study enzyme activity in relation to human disease. These include, for example, a set of diagnostic probes to monitor cellular levels of active glycoside hydrolases which, when deficient, cause lysosomal storage disorders

Ambition: To be a key expert in the field of glycoscience, finding new ways of using chemistry approaches to better understand the links between sugar processing and disease

Teaching: I'd like to share my enthusiasm for interdisciplinary research with students, making them aware of the many possibilities that are opened up by combining chemistry with other disciplines such as biology or physics

Hobbies: Hiking, travel and the outdoors

Superpower: I took a 7 month career break to go travelling through Asia, including 3 weeks trekking in the Himalayas



THE SUPER SIX

Dr Alyssa-Jennifer Avestro

Role: Royal Society Dorothy Hodgkin Research Fellow in Molecular Materials

Born: Oakland, California, USA

Education: BSc (Chemistry), University of California at Berkeley; PhD (with Prof. Fraser Stoddart), Northwestern University (Evanston)

Previously: Royal Commission for Exhibition of 1851 Research Fellow - Durham University

Famous For: Through-space electron delocalisation and rate-enhanced charge-transfer properties in spatially-confined conjugated organic materials

Ambition: To unravel the fundamental origins of enhanced electrochemical performance from three-dimensionally π -conjugated (3D π) organic materials and establish 3D π as a strategy for new materials design with significant advantages over well-known 2D π systems



Dr Jamie Blaza

Role: Lecturer in cryo-Electron Microscopy (cryo-EM)

Born: Leicester, UK (with childhood in Switzerland, Greece & Rutland, UK)

Education: BSc (Microbiology & Virology) University of Leeds/ National University Singapore; PhD (with Prof. Judy Hirst), University of Cambridge

Postdoc: University of Cambridge

Famous For: Developing methods to measure electron transfer reactions in mitochondria, and using them to disprove the hypothesis that substrate channelling is important in mitochondria supercomplexes

Ambition: To establish cryo-EM at York visualising interesting structures at fantastic resolution. I also hope my own lab will help understand how important pathogens extract energy from their environment, particularly Mycobacterium tuberculosis

Teaching: I hope that by showing how scientific discoveries are made, rather than just teaching facts, will give undergraduates an appreciation of the scientific method

Hobbies: Photography, beer and whisky

Superpower: I'm actually dyslexic - I've had lots of support throughout my educational career which has helped massively, I'm still often accused of using 'bizarre English'!



THE SUPER SIX

Dr Chris Spicer

Role: Lecturer in Molecular Materials

Born: Bury, Lancashire, UK

Education: MSci (Nat Sci), University of Cambridge; DPhil (with Prof. Ben Davis), University of Oxford

Postdoc: Imperial College London, Karolina Institutet (Stockholm)

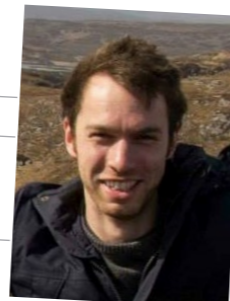
Famous For: Developing and applying new reactions for chemical protein modification, and the synthesis of functional biomaterials for application in tissue engineering

Ambition: Making a big impact on how we think about designing biomaterials for growing tissue, and for developing powerful chemistries to precisely control and manipulate how cells behave

Teaching: I can't wait to bring my background in applied chemistry, solving biological problems, to the undergraduate course at York, highlighting emerging topics outside of traditional chemistry where chemical knowledge is vital

Hobbies: Football, cricket, hiking

Superpower: Asbestos hands - let me know if you ever need to lift anything hot!



THE SUPER SIX

Teaching: I believe in contextualised learning, skills and communication. We need young researchers who are passionate and enthusiastic, who naturally want to train themselves to the highest level and enjoy sharing their discoveries with others

Hobbies: Food and travel, Ninja Warrior in training, and karaoke enthusiast (it's in my Filipino DNA)

Superpower: Returning from an enforced career break through ill health during my PhD has given me a unique view of life in academia

THE SUPER SIX



Up-skilling teaching labs

IN 2014, THE DEPARTMENT OPENED THE DOORS TO ITS BRAND NEW TEACHING LABORATORIES, PROVIDING AN OUTSTANDING ENVIRONMENT FOR PRACTICAL CHEMISTRY. NOW, A NEW PRACTICAL COURSE HAS BEEN ROLLED OUT TO OUR FIRST YEAR UNDERGRADUATE CHEMISTS. IT IS HOPED THIS WILL IMPROVE THEIR PRACTICAL SKILLS AND BETTER EQUIP THEM FOR FUTURE CAREERS IN CHEMISTRY. THE NEW COURSE IS THE BRAINCHILD OF LECTURERS DR NICK WOOD AND DR DAVID PUGH, SO WE GOT TOGETHER WITH THEM TO FIND OUT ALL ABOUT IT.

Why did you want to develop a new Year 1 Teaching Lab?

In some ways, there is a new Year 1 Teaching Lab every year! We always keep a close eye on how practicals run, and how students engage with them; every year we update the course along these lines. However, this year was different - the biggest change we have ever undertaken - with the aim of fundamentally changing the way students think about practical chemistry.

What was wrong with the old approach?

Previously, the focus of assessment was on the report students write after a day in the lab. This introduces problems with the validity of the assessment, since instead of rewarding outstanding practical work, the highest marks go to the students who write the best reports. Writing reports is, of course, important and is worth assessing, but if

our aim is to assess the practical skills, then a report is not always a suitable proxy. Think of it like a technical challenge in Bake-Off. The contestants submit their 'work' to a judge, who assesses it in the most direct way possible - by eating it. No-one would suggest the contestants should do their baking, then submit an essay describing their work.

We were also simultaneously teaching students during the laboratory sessions, while assessing them on the outcomes of the practical they performed. Inevitably, students would prioritise achieving results over understanding techniques, with some students feeling stressed and pressured by the situation every single week. We wanted to try to separate teaching and assessment, so students could relax and learn effectively - you wouldn't have an exam at the end of every lecture.

The new course would also maximise the use of all of the fantastic new

facilities and instrumentation across the year, allowing each student to have more time per instrument, which is better for training and much more efficient.

What were the major changes you introduced?

We consolidated practical chemistry into a dedicated year-long module, allowing us to create more coherent learning outcomes, and giving us freedom to set assessment timings. The main change was then to focus on practical skills, and clearly outline their progressive build-up. As each week passes, new skills are introduced, with previous skills re-appearing for practice and reinforcement. In the main, the experiments are not hugely different to 12 months before, but we have changed their delivery.

We removed week-by-week lab-script assessments; Year 1 experiments are now formative and do not carry marks. The course is then ultimately assessed directly on practical skills via a series of short technique tests, done in the lab at the end of each term.

The focus on skills development is crucial - some incoming students have limited experience, so we must properly introduce these skills, build their confidence, explain techniques, give chances to attempt techniques, make mistakes and try again. At the same time, the focus on the ultimate

assessment of these skills means students are positively incentivised to engage fully and understand the techniques thoroughly.

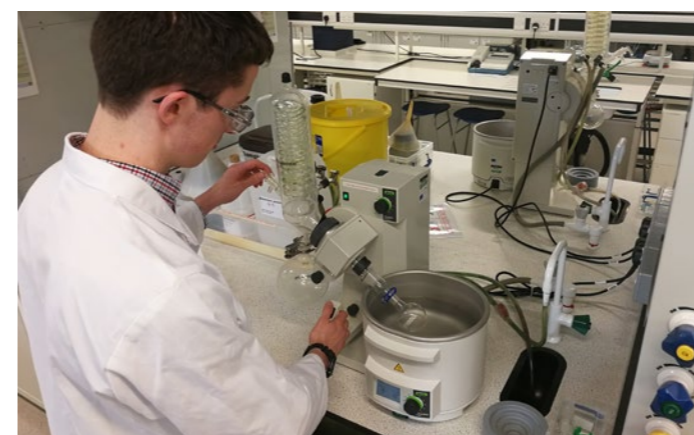
How has this changed the student experience?

There is a much more relaxed atmosphere during the term, and students seem to enjoy practical days more, which I believe makes for a better learning environment. In particular, if an experiment doesn't go perfectly, it doesn't mean the learning outcomes aren't met. Indeed, we saw numerous examples of things going wrong and students working hard to repeat techniques in order to perfect them.

Did students find the practical assessment stressful though?

The Autumn assessment is perhaps the most stressful, as it is a pass/fail test of lab competence and safety. To mitigate this, we brief the students extensively on how it will work, and for those who don't pass, it is immediately followed by a learning-support session with resit opportunities during Spring term. The analogy we use is that of a driving test - you might not pass first time, but you can retake it. It's crucial to pass it eventually, to show you can work safely in the lab.

The Spring assessment is structurally similar to the Autumn assessment, so they are somewhat familiar with the arrangements. Each practical skill activity carries a significant credit weighting, which might be a source of stress for the students - but the credit weight is broadly comparable to one question in an exam, and this is the analogy I use when briefing them to allow them to place it in context.



Did students like the new Year 1 labs?

Feedback was very encouraging. Interestingly, when I have discussed the redesign with students in Year 2 and 3 (who took the old lab course), they were very positive. I think this is because, as more experienced students, they can look back and realise the weaknesses they had as first-year students, and see the benefit of assessments that would have revealed their competence (or lack of it!) early on, when they still had lots of opportunities to practise and improve.

How did the new course change the experience of graduate teaching assistants in teaching labs?

Graduate Teaching Assistants (GTAs) are a vital element of our lab teaching - they instruct students, monitor work, help and reassure them, and keep the lab a safe place. Now the majority of lab days carry no assessment, GTAs are no longer "gatekeepers" of marks - they are free to teach and explain as much as they can, with no danger of compromising assessments.

Instead of students asking what answers they need to maximise their mark on a lab script, they are asking wider ranging and deeper questions, really trying to understand the finer points of the techniques, making the role of GTAs much more interesting. GTAs have enjoyed this - and of course, they are no longer obliged to mark scripts each week.

What do the technical staff think of the new course?

Technical staff have long argued for greater focus on skills teaching, and this delivers something they are

pleased to be involved with. Many of them helped as assessors during the course and were pivotal in design, ensuring we created something that could be implemented!

Are other universities doing similar things in their practical teaching?

Some other universities are making similar changes, with Keele University being a pioneer in direct skills assessment. However, we believe this is the first time an entire year's course has been 'up-skilled' for a large cohort of students (ca 200 undergraduates) in the UK.

Do you have any evidence that student skills have improved as a result of the new course?

We hope to see evidence of this in subsequent years! Indirectly, comments from demonstrators and technical staff have been positive, and we have observed improved glassware handling skills and greater knowledge of what techniques actually do. Interestingly, in the end-of-year Integrated Chemistry Practical projects, which have not changed, this year's students performed more accurate analyses of standardised alcoholic drinks than students in previous years, which might suggest enhanced levels of skill.

Ultimately, we hope the proof-of-the-pudding (returning to our Bake-Off analogy) will come when these students finish teaching-lab training and move on to research projects. They should be better skilled as practical researchers to rapidly make a real impact. Hopefully this will help them to secure the best job and PhD opportunities, and move on to the most successful futures in chemistry.



Undergraduate project published in Science

During his final year, Khoa Chung, an MChem (Industry) undergraduate student contributed to a paper published in the leading journal, Science. His project, carried out in the lab of Professor Sarah O'Connor at the John Innes Centre in Norwich, aimed to understand the biosynthesis of vinblastine, a potent but rare anti-cancer drug. Access to its life-extending chemistry is very laborious. It takes

approximately 500 kilograms of dried leaves of the Madagascar Periwinkle to produce just 1 gram of the active drug.

Professor Sarah O'Connor's team used modern genome sequencing techniques to identify the missing enzymes in the biosynthesis. Khoa made important contributions to the work by synthesising key intermediates. Professor O'Connor said: "The compounds Khoa made were

essential for testing the enzymes and understanding their reactivity. The whole team is very grateful that we had Khoa in the lab at exactly the right time!"

The more detailed understanding of the biosynthesis of vinblastine should ultimately allow it to be more easily produced in greater quantities by engineering the genes into convenient hosts such as yeast.



PhD student Mark Dowsett being presented with his award by YUSU Chemistry course representative, Alvaro Lopez-Acosta.

GTA of the Year

Mark Dowsett won the "Graduate Teaching Assistant of the Year" award in the 2018 York University Student Union (YUSU) Excellence Awards.

The students who nominated Mark for the award wrote: "Mark manages to strike this perfect balance between being approachable, professional and informative when he is acting as a lab demonstrator."

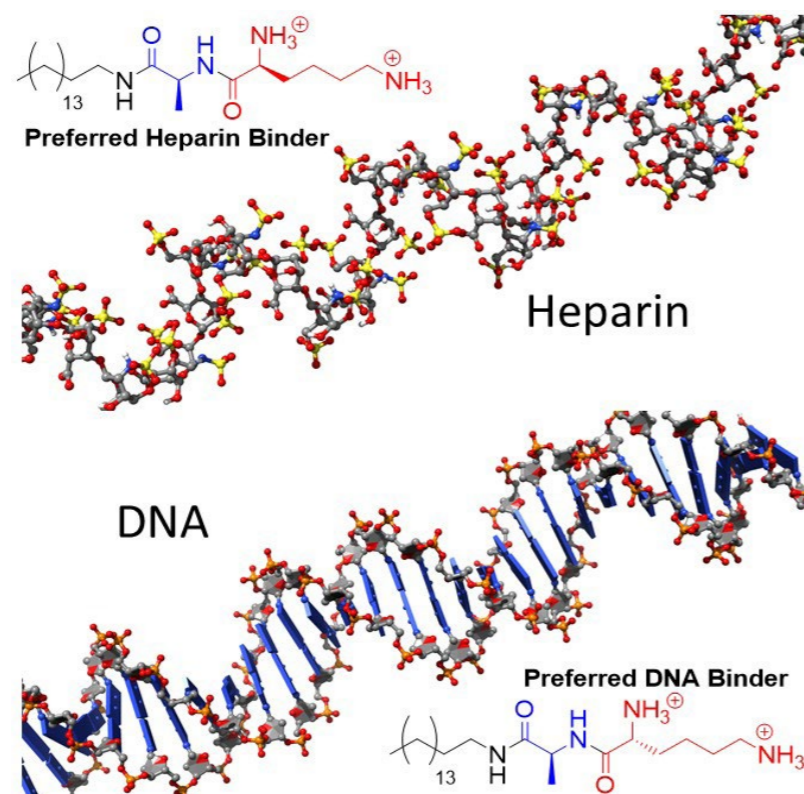
The YUSU Excellence Awards celebrate the work of staff across the University of York who have a positive impact on the academic experience. The Awards are entirely student-led, and recognise teachers and staff who are making an outstanding contribution to students' lives.

Cracking the chiral code of DNA binding

A RESEARCH TEAM INCLUDING MSC STUDENT KIRI THORNALLEY HAS OPTIMISED SELF-ASSEMBLED NANOSYSTEMS FOR DNA BINDING.

As outlined by the researchers in *Angew Chem Int Ed* 2018, 57, 8530, binding DNA has potential applications in gene therapy, but in the bloodstream, other negatively charged molecules such as heparin, can also bind to gene carriers, limiting their activity. To understand this further, Kiri, working in the research

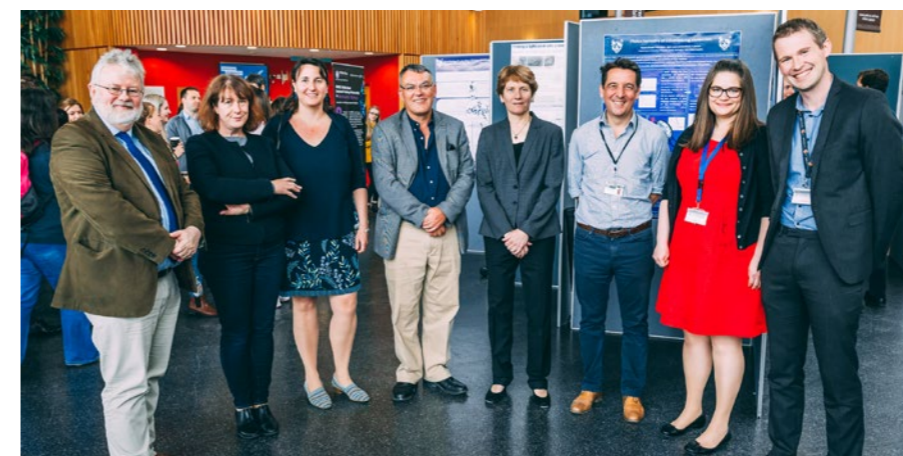
team of Professor David Smith and in collaboration with Professor Sabrina Pricl at University of Trieste in Italy, found that tuning chirality can make a DNA binder much more resistant to the presence of heparin. Future work will aim to use this understanding to develop systems that are better optimised for gene delivery.



Ten years of Athena SWAN Gold

IN A LANDMARK TWO-DAY EVENT, YORK CHEMISTRY CELEBRATED 10 YEARS OF HOLDING AN ATHENA SWAN GOLD AWARD, THE LONGEST-HELD AT THIS LEVEL.

Carolyn Bertozzi symposium



In May, Professor Carolyn Bertozzi, of Stanford University, USA, visited the Department, giving a keynote research talk and public lecture. Carolyn Bertozzi has been described by the RSC as a "Rockstar Chemist" and even has her own Lego avatar.

The first day featured a symposium in which Carolyn presented her keynote lecture. She demonstrated with panache how she has transformed chemical biology. Her research focusses on understanding sugars involved in cell surface recognition, with relevance in diseases such as cancer and infection. She has also developed powerful 'bioorthogonal' methods so biological systems can be synthetically manipulated in their living environment.

Other speakers included York alumnus Professor David Haddleton from the University of Warwick. David is one of the Royal Society's 'Parent-Carer' Scientists, and in his talk, '30 Years of Controlled Radical Polymerisation', described his career as being hugely influenced by his family. Local speakers, Kirsty Penkman, Paul Walton, Meghan Halse and Will Unsworth, highlighted

collaborative work, a key feature of research enabled by the supportive environment in the Department.

The symposium included a lively poster session, and Carolyn also met early-career researchers to discuss career development. The afternoon was rounded off with a wine reception and a celebration cake.

The following evening, Carolyn gave a moving Beacon Public Lecture in which she discussed her own life and career experiences, not just as an award-winning scientist, but also as a lesbian woman, in a lecture that took in the full sweep of America's recent social history. She described the importance of her own resilience and vital support from those who were open, supportive and encouraging.

Carolyn was interviewed by freelance journalist Kate Ravilious, who opened the questioning out to a panel including Dr Liz Rowsell, R&D director at Johnson Matthey; Dr David Bass of the Equality Challenge Unit; and Professor David Smith from the Department. The panel spoke passionately about efforts to address diversity and how institutions can try to accelerate the pace of change.



Department featured in Vote 100 book

The Department was featured in the official History of Parliament Trust Vote 100 commemorative album "Voice and Vote", produced as part of the celebrations for the 100th anniversary of the Representation of the People Act 1918. The book launch at Westminster Abbey was attended by Dr Caroline Dessent and Dr Leonie Jones, the Department's Employability and Diversity Officer.

The book narrates the story of women's fight for the vote and explores how the struggle for equality still continues today. It showcases diverse organisations and Dr Caroline Dessent, chair of the Equality and Diversity Group, presents the Department of Chemistry, focussing on how the Department has developed equal and transparent policies, and seen the percentage of female senior academic staff rise from 7 to 22 per cent in the past ten years. Part-time and flexible working has become much more common, helping many staff to balance career and family life.



Flexible fathers?

IN JULY, A GROUP OF STAFF IN THE DEPARTMENT GOT TOGETHER OVER LUNCH TO TALK ABOUT PARENTAL ROLES IN THE MODERN WORLD, PARTICULARLY THE ROLE OF FATHERS. HERE, PROFESSOR DAVID SMITH REFLECTS FURTHER:

'The Athena SWAN Gold award held by the Department means a commitment to offsetting the disadvantages that some groups of people suffer and the advantages that others enjoy. This has led to important initiatives such as pay gap analysis, promotion of female role models, a flexible working guarantee and a part-time working assurance. Although these initiatives are primarily targeted at redressing the imbalances faced by women in the workplace, it was evident from the discussions that the Athena SWAN approach benefits fathers, as well as mothers.

For example, as Dr Laurence Abbott told me, "After my wife tragically passed away shortly after my daughter Jessica was born, I took some time off to adapt to my new life as a single parent. I am now fully responsible for Jessica's care and have to stay at home when she is ill. This can involve having to drop everything immediately to go and pick her up. The department allows me to be flexible and work around any such sick days."

“Perhaps at some point in the future, when a group of fathers discuss work and family, it will be those who don't take significant time out of their working patterns who will be seen as exceptions.”

This was echoed by Research Facilitator, Dr Andy Goddard who noted, "My wife is a teacher so cannot make it to events that fall within the school day. The flexible working policy made it easy for me to attend Harvest Festivals, Christmas plays and sports days. I won the dads' sack race this year! I have also covered periods

when the kids are sick. It is great that we are allowed this level of flexibility."

Indeed, from my own experience, when we adopted our son, the Department was very supportive of me working part-time, which I did for the first year, while he settled into our home. I had the assurance that I could transition back to full-time work when the time was right. As my husband's health is now sadly declining, flexible working has been massively beneficial, and I am once again exploring patterns of part-time work that would allow me to match additional time off with school holidays.

It is interesting to reflect, however, that although there is UK legislation for shared parental leave, national evidence shows that current take-up amongst fathers remains very low (<5%). Furthermore, surveys show that on average, women do over twice as much childcare as men. Strangely, men are still often labelled as 'exceptional dads' even for doing just 50% of the childcare – a fair share. This is compounded by the fact that women also take on the

majority of other caring roles, such as for elderly or sick relatives, as well as doing 60% more housework than men.

In terms of childcare, there seems little doubt that societal expectations influence parents' decision-making. I think that in the absence of such expectations, men would feel



empowered to become more involved in childcare. For example, I am a gay parent, and there were absolutely no expectations about who would do what. My husband and I started from the assumption that childcare should be split 50/50 and worked from there - why would we do anything else?

However, it remains clear that many people worry about the impact that childcare and part-time or flexible working may have on their careers. This view is doubtless informed by the many years in which the shameful lack of some employers' support for women with childcare responsibilities has been one of the factors having a negative impact on their careers. This is a key reason that a visible set of departmental policies on family-friendly working, as well as highlighting female role models who have successfully balanced family and career, is so important in engendering change.

I strongly believe that real change in gender roles will actually be driven by changing the roles of both men and women. It is vital to support women in the workplace, but it is also important to start a conversation in which men's roles in the home are questioned. Perhaps at some point in the future, when a group of fathers discuss work and family, it will be those who don't take significant time out of their working patterns who will be seen as exceptions. Such parental equality would have huge impacts in workplaces everywhere.'

Opinions expressed in this article are those of Professor David Smith unless otherwise credited.