issue 1 | spring 2017

UNIVERSITY of York

ChemYork

HIGHLIGHTS FROM A LEADING UK CHEMISTRY DEPARTMENT

York 2nd in Guardian League Table

Funding boost for state-of-the-art equipment

What does it mean to be a climate scientist?

Welcome

WELCOME TO THE FIRST EDITION OF CHEMYORK – A NEW AND REGULAR MAGAZINE THAT WILL CONTAIN FEATURES, NEWS AND ARTICLES ON DIFFERENT ASPECTS OF THE DEPARTMENT OF CHEMISTRY, HERE AT YORK. WE HOPE THAT YOU WILL ENJOY READING IT AND WELCOME ANY FEEDBACK YOU MAY HAVE, INCLUDING SUGGESTIONS (AND OFFERS) OF ITEMS THAT MIGHT APPEAR IN FUTURE EDITIONS.

As I write, the final term of the academic year is underway and the last teaching events are taking place as undergraduate students prepare for the end-of-year assessments. It has been a very good year for us – we were placed second in The Guardian University League Table 2018 and fourth in the three major university guides (Times, Guardian and Complete University Guide 2017) and we have just heard that our undergraduate programmes, as well as our MSc in Green Chemistry and Sustainable Industrial Technology, have been re-accredited by the Royal Society of Chemistry (RSC). Interest in studying here remains buoyant: our application numbers for entry in September 2017 are up compared to last year, against national trends.

In research, there are many exciting stories to tell that are detailed elsewhere in this newsletter, but I did want to focus on one of these – cryo electron microscopy (Cryo-EM). Cryo-EM is a technique that has been around for many years, but in recent times, advances both in computational power and, in particular, detector technology have meant that this is now the new 'must-have' technique in structural biology. The York Structural Biology Laboratory (YSBL) is renowned internationally for its work in protein crystallography, owing to work begun by Professor Eleanor Dodson and now ably continued by Dr Kevin Cowtan, on the development of computational methods for solving the single-crystal structure of proteins using X-rays. By definition, the experiment requires single crystals but these are not always easy to obtain; furthermore, X-ray methods do not cope well with very large structures. This is where Cryo-EM comes in. Single crystals are not required and it is possible to image objects up to the level of whole cells, making this a very powerful methodology indeed.

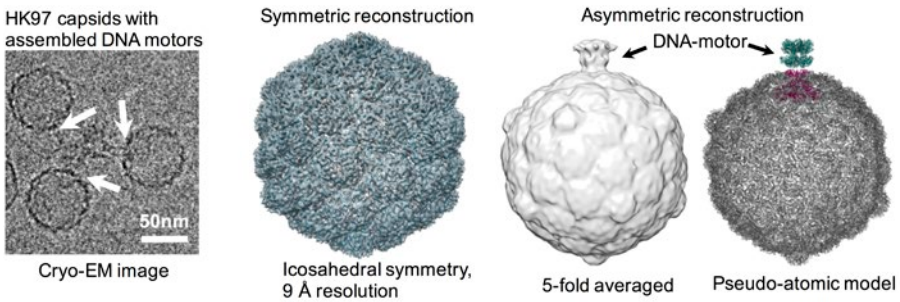
However, the technique does not come cheap, and we have been helped by the incredible generosity of alumnus Dr Tony Wild who very kindly made a donation of £1M, which we decided to put towards a campaign to bring Cryo-EM to York. And we have been successful. Thus, in February we received notification from the Wellcome Trust that we had been awarded £1.6M towards the purchase of a Cryo-EM instrument – one of only six institutions to be successful in their competition. In addition, with significant support from the University, we are currently awaiting the outcome of an application that will provide funds to allow us to house the instrument in brand new, bespoke accommodation. All in all, this has been a busy period of planning and application writing, but we look forward to the arrival of the instrument next year and the really exciting science that will follow. Watch this space!

It has been an eventful period for many members of staff and recent months have seen the arrival of babies to Abi Leng and Phil Helliwell, Katie Stott, Lauren Hunt, Greg Addicott, Jacqui Hamilton and Andrew Rickard, Alice and Simon Duckett, Sarah Wilkie, Lyndsay Muschamp, Tom Farmer, Marianne Fekete, and Saioa Urresti and Jon Agirre. Our staff have also been recognised for their excellence and, in addition to the awards mentioned on page three, we have very recently learnt of the award of an RSC Tilden Prize to Professor Lucy Carpenter, the renewal of a Wellcome Trust Senior Research Fellowship for Professor Fred Antson, the award of the 2017 AstraZeneca, GlaxoSmithKline, Pfizer and Syngenta prize for Process Chemistry Research to Professor Peter O'Brien and the award of the British Liquid Crystal Society Young Scientist Prize to Richard Mandle.

People are at the heart of who we are and what we do and so it will be a very proud moment for us when, in September, we celebrate having held an Athena SWAN Gold Award for ten years. There will be events to mark this in the next academic year and more details will follow in the next magazine.

In the meantime, I hope you enjoy our first issue.

Professor Duncan Bruce
Head of Department



Front cover image: *Ocean buoy used to collect climate data - see feature on page six.* ***Photo credit: NOAA***

Compiled by Cat Dunn & David Smith
Designed by Cookie Graphic Design

Awards and key lectures

TO DATE, THE 2016/17 ACADEMIC YEAR HAS BEEN A VERY SUCCESSFUL ONE FOR RECOGNITION OF THE REMARKABLE WORK DONE BY ITS MEMBERS OF STAFF.

Professional@York recognition

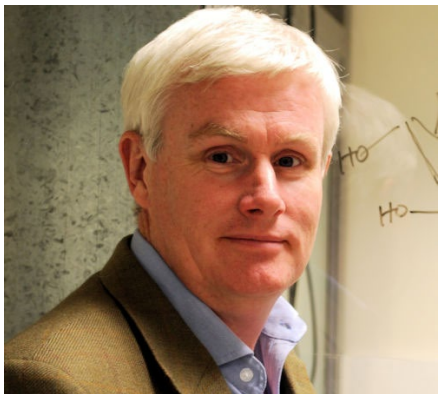
Dr Adrian Whitwood, Departmental Computing Officer and X-ray Crystallographer and Louise Haigh, YSBL Technician were shortlisted as 'Unsung Heroes' at the Professional@York Conference in December 2016.

Adrian's ability to handle a wealth of roles simultaneously, including computing, crystallography and management of student lists and exam marking, has ensured Chemistry, Biochemistry and Natural Sciences are able to function to top form.

During 2016, Louise was critical to maintaining research support in YSBL. During this period the other YSBL support staff were on leave and Louise stepped up and went beyond the call of duty to ensure a high-quality smooth running lab.

SLU Honorary Doctorate

Professor James Clark was awarded with an honorary doctorate from the Swedish University of Agricultural Sciences (SLU) in recognition of his position as one of the key figures in Green Chemistry.



Royal Society Research Professorship

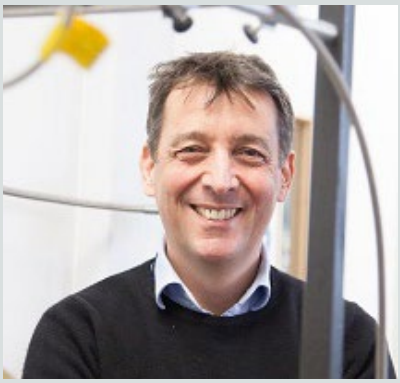
Professor Gideon Davies was awarded the prestigious Royal Society Ken Murray Research Professorship. He received this research award in recognition of his world-leading discoveries relating to the role of specific parts of an enzyme's structure in the catalysis of carbohydrate synthesis, modification and breakdown reactions.

IChemE Global Award for Energy

At a major awards event, Professors Gideon Davies and Paul Walton won the Energy Award at the Institution of Chemical Engineers' (IChemW), awarded jointly with Professor Bernard Henrissat from the French National Centre for Scientific Research (CNRS) in Marseille. This global award recognised their collaborative work on enzymes which are capable of creating biofuels from plant waste.

Royal Society Athena Runner-Up Prize

The Royal Society Athena Runner-Up Prize was awarded to Professor Paul Walton. He received this diversity award for making an impact through promoting evidence-based thinking in equality and his extensive and influential activity as a prominent spokesperson for equality in academia.



Presidential Lecture at BA Festival of Science

Dr Avtar Matharu gave the prestigious Presidential Address at the chemistry section of the 2016 British Association Festival of Science. His address was entitled "Chemistry: a circular sustainable future", which explored chemistry's vital role in achieving the UN Sustainable Development goals.

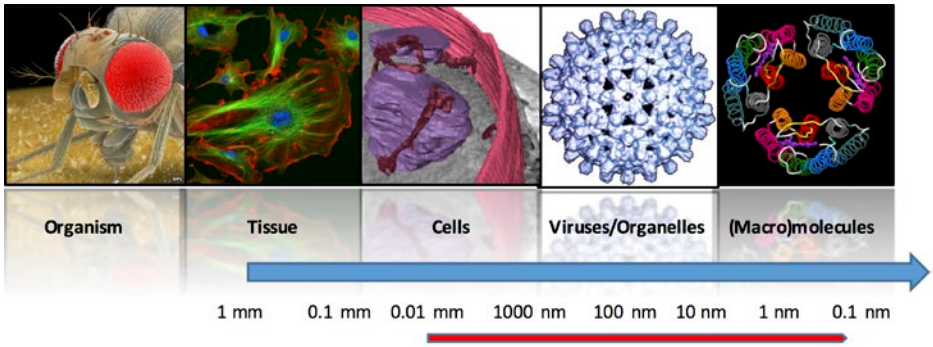
Putting hyperpolarisation in a spin

In an important breakthrough, the Centre for Hyperpolarisation in Magnetic Resonance (CHyM) has discovered a new method that allows highly sensitive signals to be stored outside of a magnetic field for up to 15 minutes. The secret behind the method published in Angewandte Chemie International Edition 2016, 55, 15642-15645, is to incorporate isotopic labels into their probes, which prevent the signal from 'relaxing' too quickly. This research, led by Professor Simon Duckett from Chemistry and Professor Gary Green from Psychology, could pave the way for generating probes with signals that are long-lived enough to survive in the body, enabling the direct study of biochemical processes non-invasively in an MRI machine.

Archaeological evidence at major risk in wetlands

In a key study, which has global implications for the preservation of archaeological wetland sites, Dr Kirsty Penkman and researchers from the Departments of Chemistry and Archaeology have analysed bone and wood artefacts collected from the Mesolithic site of Star Carr in North Yorkshire. The team determined how changing environmental and geochemical conditions have caused a rapid deterioration in the quality of organic remains and a tragic loss of cultural heritage. Their study, published in PNAS 2016, 113, 12957-12962, means this can hopefully be avoided at future archaeological sites.

Funding boost for state-of-the-art equipment



IN A MAJOR STEP FORWARD FOR DEPARTMENTAL INFRASTRUCTURE, THE DEPARTMENT WAS AWARDED £1.6 MILLION TO INVEST IN STATE-OF-THE-ART EQUIPMENT

The funding will be used to invest in cryo-electron microscopy (Cryo-EM) equipment which will revolutionise the Department's ability to investigate the three-dimensional structures of biological molecules.

The technique will complement a number of existing techniques for imaging objects of biological/biochemical interest by giving access to an extra range of length scales (indicated by the red bar in the figure) not available currently.

Professor Gideon Davies said: "Cryo-electron microscopy is one of the most exciting developments of recent years. We are extremely grateful for the generosity of Dr Tony Wild and the Wellcome Trust in funding this initiative. We are looking forward to analysing the complex atomic structures of viruses and of proteins involved in human disease, here in York."

The grant was awarded by the Wellcome Trust, and will be matched with a further generous £1M gift from alumnus, Dr Tony Wild. Dr Wild is a leading businessman and philanthropist and has been a long-time supporter of Chemistry at York.

10th Anniversary for Cape Verde Observatory

The Cape Verde Atmospheric Observatory (CVO), led by chemists from the University of York's Wolfson Atmospheric Chemistry Laboratories (WACL) along with German and Cape Verdean scientists, celebrated its 10th anniversary in November 2016.

Funded in the UK by the National Centre for Atmospheric Science (NCAS), the CVO delivers crucial information about atmospheric pollution and greenhouse gas levels in the northern hemisphere and contributes to improved predictions of climate change by providing vital data to global climate models.

Green Chemistry explore ways of reducing food waste

It is now widely recognised that food waste is a major problem at all stages of the food supply chain - indeed, finding ways to both reduce or use these wastes is of high strategic value. The Green Chemistry research group in York are to lead a new research project examining how food manufacturing systems can be improved to reduce waste.

The two-year project, which will explore how systems can be improved to better utilise unavoidable food supply chain wastes, received funding of £800,000 from the Engineering and Physical Sciences Research Council (EPSRC). It is a joint collaboration between the Universities of York, Loughborough and Nottingham.

What does it mean to be a climate scientist?

An interview with Dr Kevin Cowtan

Recent studies, carried out by scientists from the Universities of York, California and Ottawa, have provided vital confirmation that the Earth's oceans have been steadily warming for the past 75 years. There had been some controversy about this because some measures suggested warming might have stalled. Careful analysis of the data and comparing records from multiple sources demonstrated continued warming. The apparent slowdown in warming came from a combination of incomplete global coverage and a shift to using 'cooler' measurements from ocean buoys.

Dr Kevin Cowtan, CCP4 Research Fellow in the York Structural Biology Laboratory (YSBL) based here in York, was one of the scientists involved in leading the studies. We caught up with him to find out what it means having worked in structural biology to become a "climate scientist" and the challenges he faces.

What was your undergraduate degree - and do you use it in your day-to-day job?
My undergraduate degree was in Theoretical Physics at York. One of the best things about the course was all the maths they taught us, and that's the thing I still use on a daily basis.

What did you research in your PhD - and again, has that been useful?
My PhD was focused on computational methods for X-ray crystallography - a field I'm still working in today. Obviously, I still make constant use of the crystallographic material. However, the techniques of data analysis and algorithm development are the same in every discipline - from structural biology and chemistry to climate science and fusion physics.

What does a data scientist spend all day doing?
Analysing data! But that can involve different activities. Some of the work we do involves trying to separate signal from noise in a dataset. Some involves finding features in data. A lot of it is finding the appropriate statistical analysis to test a particular hypothesis.

Why does biological chemistry need data scientists?
There are two main reasons you might need a data scientist. The first is that you have too much data to analyse by hand. Then you need to get a computer to do the same analysis that you would do. Or, sometimes, you can use the speed of the computer to do a rather different analysis to answer the same research question.

The second reason is that you might want to extract a very weak signal from very noisy data. Then you need a careful analysis to separate what parts of the data are signal and what are noise, with strong validation to ensure you are not seeing the answers that you want in the noise.

When did you realise that being a data scientist enabled you to solve multidisciplinary problems?
It was by chance - I first got interested in climate when I became aware of people who reject the science. I asked myself how I would reason with such people without relying on appeals to authority. That meant testing the science for myself, which involved reproducing some of the data analysis. When I did that I ran into problems where I found I could make a meaningful contribution.

What challenges did you face in becoming a climate scientist, having no formal background in that area?
The biggest challenges were lack of domain knowledge and lack of contacts. Fortunately, I managed to address both by linking up with other people who were interested in the problem of science denial, some of whom were PhD students in the field of climate. Together we managed to produce our first few papers, some of which were high impact.

One factor was pure chance - we couldn't decide on a name for

one of our datasets so we avoided calling it anything. The user community wanted to use the data, and started referring to the dataset by the names of the authors, which gave me instant name recognition in the field. That opened a lot of doors - I could then write to senior figures in the field about possible collaborations and they would give my requests serious attention.

There are still challenges to overcome - I don't have any funding for my climate work (yet!), which can be a problem for publication, given that most climate journals are pay-to-publish.

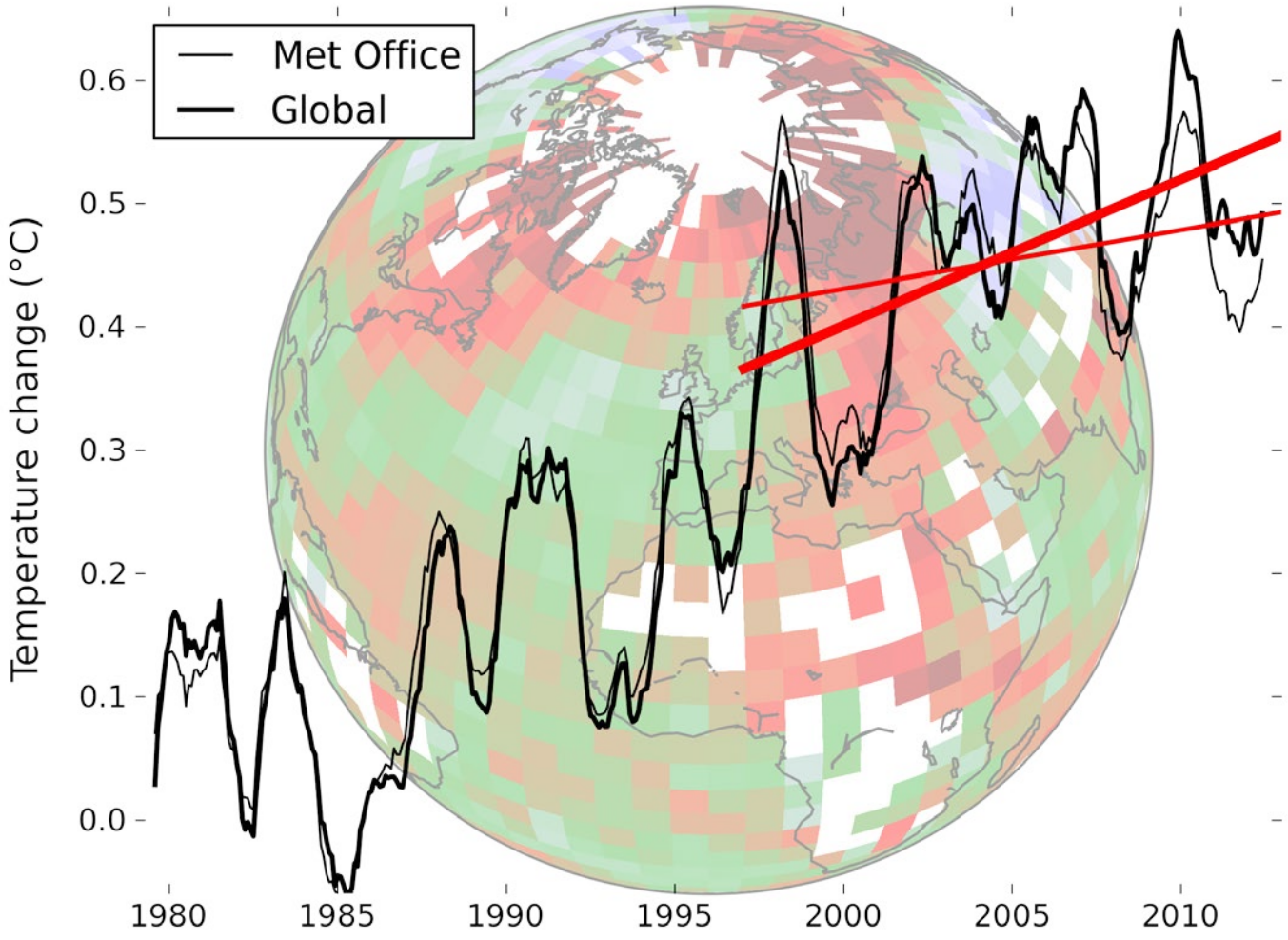
What are the advantages of moving into a new area of research?

There are some benefits to having an 'outsider perspective' on a field. I make some silly mistakes (which generally get pointed out by my collaborators), and reinvent some wheels but I also sometimes see implicit assumptions that people working in the field didn't realise they were making. I'm also not affiliated with existing groups, which makes it easier to critique the different approaches or to combine data from different sources without treading on too many toes.

Some chemists are worried about 'open data' - how do you think it might help the discipline in the future?

Given that both of my disciplines - crystallography and climate - are dominated by open data, I find it hard to imagine how anyone can do science any other way. If I have an idea for a project, I don't have to get a grant before I can start working on it. I find the most relevant resources online and use them to do a preliminary analysis. Often I can do important research just using existing data, but even if I can't the preliminary analysis puts me in a much stronger position to apply for funding.

There are already good resources for some areas of chemistry; for example the National Chemical Database Service. For other areas, including a lot of wet-lab based work, we don't yet have a very good idea of how to best exploit the potential of open data. There is a lot of scope here for future project ideas (and funding!) to make it easier for scientists to see further by "standing on the shoulders of giants".

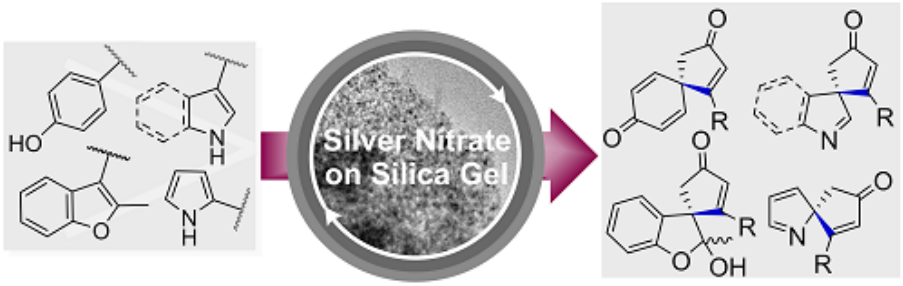


Temperature data from the Met Office (thin lines) compared to the optimal Cowtan and Way (2013) global reconstruction (thick lines). The straight red lines indicate the trend over the years 1997-2012 in the respective data. The background image illustrates the coverage of the Met Office data, with colours indicating geographical temperature trends. The Arctic is warming much faster than the rest of the planet.

New antibiotic for gonorrhoea

Graduate students from the Departments of Chemistry and Biology have developed a new antibiotic, which could be used to treat the sexually transmitted infection gonorrhoea. This is of particular importance given that, in recent years, a highly drug-resistant strain of gonorrhoea has emerged with reported cases both in the North of England and Japan.

The interdisciplinary team targeted the "engine room" of the bacteria using carbon monoxide-releasing molecules (CO-RMs), developed in the research labs of Professor Ian Fairlamb and Dr Jason Lynam. The researchers found that Neisseria gonorrhoeae is more sensitive to CO-based toxicity than other model bacterial pathogens, and may serve as a viable candidate for antimicrobial therapy using CO-RMs.



Silver and Sand - just what the chemists ordered

DRUG DISCOVERY INCREASINGLY RELIES ON DEVELOPING UNIQUE THREE-DIMENSIONAL MOLECULAR SCAFFOLDS, WHICH CAN OPEN UP OPPORTUNITIES TO INTERACT IN NEW WAYS WITH KEY BIOLOGICAL TARGETS.

Led by Dr Will Unsworth (recently awarded the Eleanor Dodson Fellowship), PhD students in Organic Chemistry have recently discovered a cheap and efficient way to make an unusual molecular framework which could be of high value in the pharmaceutical industry.

Using small quantities of silver salts and silica gel, which can be easily removed from the reaction and are reusable, the researchers produced spirocylic compounds with unusual 3D shapes. Spirocycles have historically been overlooked in drug discovery research owing to the complexity of their synthesis, and cost-effective supplies using the method reported in Angewandte Chemie International Edition 2016, 55, 13798–13802, could open up exciting new opportunities.

KMS Seminar Competition Winners

The three winners of the KMS seminar competition were:

Hope Adamson - How to wire up a hydrogenase for hydrogen production or oxidation

Naomi Farren - Recent measurements of organic nitrogen in atmospheric aerosol using comprehensive two-dimensional gas chromatography-nitrogen chemiluminescence detection (GCxGC-NCD)

Michael James - Multiple products from a single precursor through catalyst selective synthesis

They were presented with certificates by Professor Tony Wilkinson.

Johnson Matthey Poster Competition Winners

The five winners of the Johnson Matthey poster competition were:

Emily Burns - Are pharmaceutical exposure predictions fit for prioritising risks to the environment?

Aimee Clarke - Mechanistic and synthetic exploration of a silica-supported silver catalyst in dearomatising spirocyclisations

Joao Pedro Nunes - Ultrafast electron diffraction of 1,2-dithiane

Richard Spears - An organocatalytic aldol ligation for the site-selective chemical modification of proteins

Elizabeth Wheeldon - Embedding nanofibres in fabric: Towards nanoengineered clothing

They were presented with certificates by Dr Martin Partridge who also delivered a seminar on the ammonia industry.

GRASPing Silly Putty

IN RECENT YEARS, IT HAS EMERGED THAT THE BORAX USED TO CREATE THE 'SLIME' OFTEN USED IN CHEMISTRY OUTREACH WORK HAS AN UNACCEPTABLE TOXICITY PROFILE.

As part of a Green Reactants and Sustainable Products (GRASP) project to further embed green and sustainable chemistry within the curriculum, Dr Glenn Hurst, Dr Avtar Matharu and Dr Brendan Garrett focused on developing replacements for this type of 'silly putty' slime. However, rather than simply finding replacement materials themselves, they decided to fully engage our undergraduate students with the discovery process.

Working with a team of undergraduate students as part of a third-year MChem mini-project (including Nick Cox, James Pollard, Rebecca Jeffrey and Alex Bowes), they carried out research into the development of a new undergraduate experiment to investigate the rheological properties of a 'green' calcium-crosslinked alginate gel.

Dr Hurst said "In utilising a 'students as partners' approach, we were able to develop an interdisciplinary, research-led undergraduate experiment to aid student understanding of challenging subject matter through a green methodology."

Following development, this experiment was successfully trialled with the first cohort of Natural Sciences students as part of a new summer activity. In this way, through their research, the third year students had effectively carried out curriculum design and developed a new 'green and sustainable' practical for younger undergraduates.

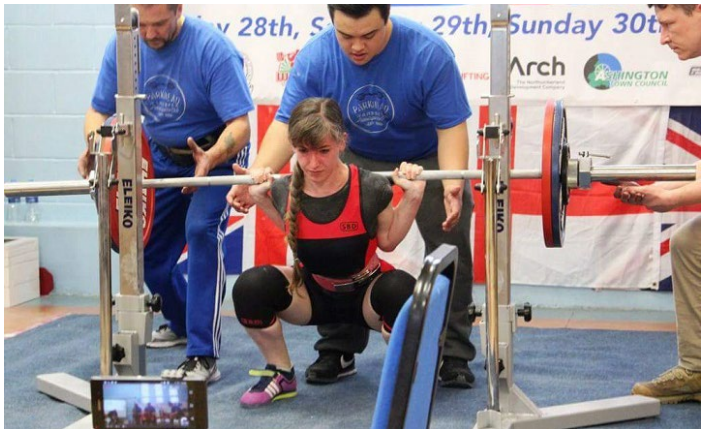
He added "Implementation of the GRASPed experiment with students studying Natural Sciences was a big success. Students commented that 'it was great to conduct an experiment based on the research in York' and that 'it was refreshing to do a totally green experiment without having to use gloves'."

Penultimate Year Prize from RSC

Charlotte Gregson, Year 4 MChem student, won the Penultimate Year Prize for Analytical Chemistry from the Royal Society of Chemistry (RSC). She received £100 and a one-year student RSC membership.

Santander Sports Scholarship

In recognition of her sporting achievement, Elspeth McLeod, Year 4 MChem student, was one of four York students to have been awarded a Santander Elite Sports Scholarship worth £5000. She began powerlifting at York to keep fit but has progressed swiftly through training and has now broken several regional records. She has been selected for Great Britain in the European Championships later this year.



Revised UG programmes

IN SEPTEMBER 2017, THE DEPARTMENT IS LAUNCHING A SET OF REVISED UNDERGRADUATE PROGRAMMES.

Two of the programmes are new (Chemistry, Green Principles and Sustainable Processes and Chemistry, the Atmosphere and the Environment) and relevant to the topical problems of today's world. The subjects of the new optional modules are close to tutors' research interests. In addition, the length of most optional modules is increasing from 10 to 20 credits. This reduces the assessment burden for both students and staff, and simplifies and improves the teaching timetable (e.g. to avoid gaps between lectures and teaching sessions scheduled very late in the afternoon).

We also used this opportunity to refresh the content of all programmes. For instance, teaching of biological chemistry has been reorganised to better match the learning objectives and bring the teaching in line with cutting-edge developments in biological sciences.

Significant changes have also been introduced in the Teaching Laboratory, where the focus of assessment is shifting from marking written reports to the assessment of student performance in the lab. The revised approach will encourage and support students in developing the best possible laboratory practical skills.

The refreshed chemistry programmes were developed in consultation with all of the teaching staff and the student body in the Department. They have been approved by the Periodic Review of teaching (a University-led exercise which runs every five to six years and involves external assessors). The changes are also compliant with the York Pedagogy, a recent University initiative focused on programme design and clear learning objectives. All of the new degrees have been accredited by the Royal Society of Chemistry (RSC).

Top of the Russell Group in NSS 2016

WITH AN OVERALL STUDENT SATISFACTION SCORE OF 97%, YORK WAS PLACED JOINT 1ST OUT OF THE 21 RUSSELL GROUP UNIVERSITIES OFFERING CHEMISTRY DEGREES.

Furthermore, York Chemistry was in a clear 1st place among the Russell Group in terms of its scores for Teaching, Assessment & Feedback, Personal Development and Organisation & Management. The Department was also placed 2nd and 3rd out of 21 for academic support and learning resources, respectively.

Across all aspects of the survey, it is evident that students here at York are very happy with the education they receive. The Department continues to invest in teaching facilities, such as the world-leading Teaching Labs and will continue to innovate in the way it delivers the highest quality undergraduate education, through the academic team who are dedicated to providing students with an outstanding experience.

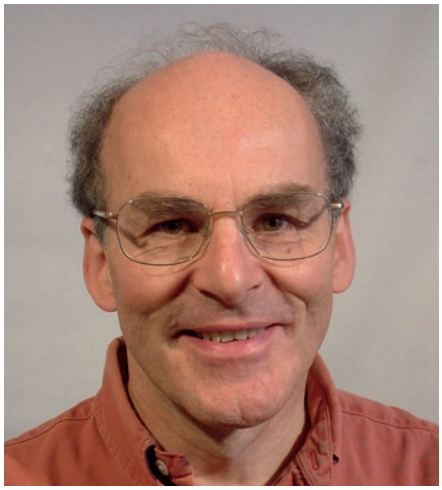
2nd in The Guardian University League Table 2018

Chemistry at York has moved to 2nd place in The Guardian University League Table 2018; its highest ever ranking. Out of 53 chemistry departments, York was ranked in an outstanding 2nd place, up two places from last year. York gained high scores across all areas with an overall score of 96.6% and 87.1% for feedback satisfaction; the highest of all of departments.

Chemistry at York was also ranked 4th in the 2018 Good University Guide. York gained high scores across the board, most notably in Student Satisfaction and Graduate Prospects.

This builds upon our previous success from last year when we also ranked 4th in The Times' Good University Guide 2017. The Department's scores in The Times league table for teaching and student satisfaction were the highest of all Russell Group universities.

Science, Human Rights and Refugees



PROFESSOR ROBIN PERUTZ IS A MEMBER OF THE ROYAL SOCIETY'S DIVERSITY COMMITTEE AND THE UK ACADEMIES HUMAN RIGHTS COMMITTEE. HERE HE WRITES ABOUT SOME OF THE ASSOCIATED ISSUES.

They came to this country as children on the Kindertransport, as students escaping invasion or as mature University professors; some who were here already found themselves unable to return home. Such stories of scientific refugees have repeated themselves many times. Although the most famous sources of refugee scientists are Germany and the countries it invaded, Britain has welcomed scientists from Hungary escaping Soviet invasion, those escaping apartheid South Africa, Pinochet's Chile, persecution in Argentina and Iraq or war in former Yugoslavia.

The roll-call of scientists who went on to become famous is extraordinary: Sir George Radda, father of NMR in biology; Cesar Milstein, inventor of monoclonal antibodies; Lise Meitner, discoverer of atomic fission; Ernst Chain who isolated penicillin, Ludwig Gutmann the neurologist who treated paraplegics at Stoke Mandeville Hospital and many more. Behind the famous are many more who made their own contributions to our country. I have worked with refugees from Bosnia, Iraq and Syria. My own father came to Britain as a research student but became stateless, a de facto refugee, when Germany annexed Austria in 1938. In 2014, Royal Mail marked his centenary with a postage stamp.

Looking at an exhibit of Alan Turing's nomination papers for election as Fellow of the Royal Society, I was reminded that the persecution of homosexuals, including gay scientists, is a stain on our history in my lifetime. No doubt there are many more LGBT+ scientists round the world who still experience persecution.

Universities and Research Councils in Britain and the US have kept government at arm's length from appointment and grant decisions, affording us our academic freedom - we don't usually think it could be at risk. Since the inauguration of President Trump, this freedom has come under serious threat in the US from climate change deniers and the emasculation of the Environment Protection Agency. The whole world may be denied measurements of the temperatures or changes in forest cover because EPA and NASA are facing cuts. Moreover, many may lose their jobs as a consequence.

What can we do to help scientists who face danger, oppression or suppression? Even if we can't stop the wars, we can raise awareness of the issues, host refugees or raise funds to support refugees and the victims of human rights abuses.

The Royal Society of Chemistry (RSC) ran a cover article in Chemistry World on the plight of refugee scientists last autumn, and Nature recently included a series of articles on refugees.

Student refugees need help to go to university because they may not be eligible for student loans. The University of York is offering fee waivers and its Office of Philanthropic Partnerships and Alumni is raising money for "Equal Access Scholarships" to cover living expenses. Many universities are offering similar scholarships and these are collected together by the Helena Kennedy Foundation. The International Human Rights Network of Academies and Scholarly Societies acts as an information centre for national academies around the world reporting on individual cases of academics facing persecution.

Organisations such as the Council for At-Risk Academics (CARA) in the UK, the Scholar Rescue Fund in the US and the Humboldt Foundation in Germany provide bursaries for academics to come as visitors to escape persecution or war. Indeed, here in Chemistry we have hosted two CARA fellows and one supported by the Scholar Rescue Fund, all from Syria. This is a vital part of the Department's contribution to the global community of scholars.

Equality Good Practice Guide

The Department of Chemistry has been featured in the Institute of Physics (IOP) good practice guide for Juno Champions working towards Athena SWAN Gold, 'Journeying to the end of the rainbow?'.

The guide features tips, advice and a number of beacon activities, highlighting good practice from successful Athena SWAN Gold departments. The York case study focuses on our part-time working assurance.

Take your opportunities when they come

An interview with the RSC President

Professor Sir John Holman, Emeritus Professor in the Department of Chemistry was appointed President of the Royal Society of Chemistry (RSC) in July 2016. After a fulfilling first year, we grabbed a moment with him to talk about his role as President and the world of chemistry.

How did you feel when you became President of the Royal Society of Chemistry?
I'm the first RSC President from a school teaching background, and I feel personally honoured as well as pleased that chemistry teaching has been recognised in this way. Teachers have a critical job to do inspiring the next generation of chemists and without them there will be no future chemistry. When I walk along the corridors of the RSC HQ in London and I see the galaxy of eminent past presidents, I feel honoured but also humbled.

How did your previous jobs as teacher, headteacher and university professor prepare you for the role of President?
The President does a lot of public speaking, and if there's one thing a headteacher can do, it's talk! I feel familiar with chemistry in schools and universities, and I'm enjoying the opportunity to meet chemists from industry. My work as a government adviser in 2006-2010 is also useful experience because the President interacts with a lot of policymakers. Being a Trustee of other organisations, such as the Natural History Museum has also given me useful perspectives as we carry out the RSC's governance review.

What is/are the best thing(s) about being President of the RSC?
Meeting people across the diverse mosaic that is chemistry. Chemistry is diverse in three dimensions. First, there are the many fields of chemistry, growing all the time, especially at the interfaces with other sciences. Second, there are the many different kinds of people who work as chemists – all ethnicities, faiths, gender, sexuality, introverts, extroverts…. There's no one identikit chemist, thank goodness. Third, there are all the places where chemists are to be found – the RSC has members across 124 countries. I get to meet many people across this diverse chemical community.

What would you most like to change in the world of chemistry through your role as President?
Three things:

- For chemistry to assert its identity more positively – not as an endangered science under threat from its neighbours, but as the enabling science without which others cannot grow, and a science in its own right.
- For the RSC to become an even more inclusive community, for example, expanding the membership of technicians as well as graduates, and including people who are not professional chemists at all, but just find chemistry fascinating and want to know more about it.
- For chemistry to become ever more popular as a subject to study.

What has been the most unusual/ interesting experience during your Presidency?
Visiting a chemistry class in a school in India and being handed the stick of chalk and asked 'Will you teach them please? You have 45 minutes'. I quickly made up a lesson on polymers, the adrenaline kicked in and I taught one of the most enjoyable lessons of my life. There's nothing like a class of enthusiastic 14-year-olds, hungry to learn, to make you rise to the occasion.

Has anything surprised you in your role as President?
The vote for Brexit surprised and saddened me, as it did many people. I represent the scientific societies on a high level advisory group that Science Minister, Jo Johnson has convened and the complexity of what lies ahead is sobering. I believe there will be opportunities for UK science as well as challenges, and we need to be focused on that. The biggest challenge is around the movement of people: science is a human activity and without movement of people between countries, science cannot flourish. At the RSC we're determined to get the best possible outcome from Brexit for science that we can in the complex haggling that lies ahead.

In a career where you have achieved so much, what advice would you give to an undergraduate student starting out at York?
Take your opportunities when they come. Don't spend too much time wondering whether you are up to the next challenge – just go for it! Life is more exciting that way.

Talking of opportunities – I owe an enormous amount to Chemistry at York. Thanks to David Waddington, I had the opportunity to work here in the 1980's, while still a schoolteacher, on the new Salters' chemistry courses. In 2000, the University gave me the chance to work here permanently as Salters' Professor of Chemical Education. And once I was at York permanently many more opportunities opened up, including the chance to bid for the contract to build the National Science Learning Centre.

The Department is exceptional in many ways. For me, above all, as a place that values education for its own sake.