Chemistry Update

Newsletter 279, 25th November 2016

Inside this Issue

Calendar of Events

UCAS Days
Dates: 29 Nov; 1, 5, 6, 8, 12 & 13 Dec
Time: 12.30pm—4pm

Research Seminar
Speaker: Dr Thomas Chamberlain, University of Leeds
Date: Wednesday 30 November
Time: 1pm—2pm
Location: A122

Postgraduate Study Information Session for U/G Students
Date: Wednesday 30 November
Time: 2.30pm—5pm
Location: B102

Chemistry Research Forum
(by invitation)
Date: Friday 2 December
Time: 12pm—2pm
Location: A122

RSC Prize Lecture & Symposium
Speaker: Prof Peter Hore, University of Oxford
Date: Wednesday 7 December
Time: 1pm—3.30pm
Location: A101

Following Prof Hore's lecture there will be presentations from Dr Meghan Halse, Prof Simon Duckett, and Dr Caroline Dessent. This will be followed by coffee and tea.

HoD Staff Presentation & Mince Pies
Date: Friday 9 December
Time: 3pm—4pm
Location: A101 & A102

Research Seminar
Speaker: Dr Joseph Beames, Cardiff University
Date: Wednesday 14 December
Time: 1pm—2pm
Location: B101

Date of Next Issue: 19th December 2016

Archaeological Evidence at Major Risk in Wetlands

Important archaeological remains at wetland sites across the world could be at immediate risk, say scientists at the University of York.

In the first study of its kind to assess how changing environmental and geochemical conditions affect the preservation of organic remains, scientists analysed bone and wood artefacts collected from the Mesolithic site of Star Carr, North Yorkshire. They then compared this to results from lab -based experimental burials.

Comparing changes in bone and wood buried in separate containers of sand, garden compost and Star Carr peat for a year, they found unexpectedly rapid levels of organic decay in the latter environment. By applying a suite of macroscopic and molecular analyses (chromatography, p-XRD FTIR, py-GC & SEM), they were able to show that the geochemical changes at Star Carr are contributing to the inexorable and rapid loss of valuable archaeological and paleoenvironmental information.

Such rapid decay is thought to be the result of acidic conditions caused by fluctuations in water levels at the site, caused by the changing climate and human modifications such as land drainage.

Alarming deterioration

Although the very first excavations at Star Carr in the 1940s revealed excellent preservation of organic materials, excavations from 2006-2007 by the Universities of York and Manchester showed an alarming level of both bone and wood deterioration, with bone samples found

demineralised (known as 'jellybones') and wood found flattened and extremely crumbly.

However, little was known about the timescale of deterioration or how rapidly this had occurred, which limited the management strategies that could be put in place to protect the archaeology.

Now, researchers are urging the archaeological community to reassess the assumed tradition of preserving sites such as Star Carr in situ, and consider urgent excavations to retrieve valuable organic remains.

Future management

Dr Kirsty High, Research Fellow in York's Department of Chemistry and first author of the study, said: "The rapid deterioration of unique organic archaeological remains at Star Carr is an irreplaceable loss of our cultural heritage. Critically, the short time scale of this experiment highlights the alarming rate at which this process can occur, raising concerns for the continued survival of matter buried there and at other sites with similar conditions.

"It is imperative that we understand and monitor the environmental and geochemical conditions in wetland areas to determine the timescale for the future management and successful preservation of archaeological sites."

Dr Kirsty Penkman, Senior Lecturer in York's Department of Chemistry and PI of the study, said: "As potential threats to wetlands - such as pollution and changes in land use - continue to occur on an unprecedented scale, it is increasingly likely that other waterlogged archaeological sites are at risk from similar processes to those seen at Star Carr.

"The severity of decay seen in artefacts is rapid and irreversible, and has global implications in informing and challenging the current policy of organic remains being preserved *in situ* – a method previously believed to best protect archaeological artefacts for future research."

Cultural importance

Important previous research at Star Carr includes a Postglacial project examining a unique Mesolithic engraved pendant, and the uncovering of incredibly rare headdresses made out of red deer skulls, thought to have been used in shamanic practices.

Dr High is set to continue research into the preservation of waterlogged archaeological remains in partnership with Historic England, to advise and transfer this new knowledge on organic matter survival at other wetland sites. Such research aims to ensure that scientific evidence is applied in the management of other sites across the UK and Europe.

Lessons from Star Carr on the vulnerability of organic archaeological remains to environmental change was published in *PNAS* on Monday 31st October.

10th Anniversary for Cape Verde Observatory

The Cape Verde Atmospheric Observatory (CVO), run by chemists from the University of York's Wolfson Atmospheric Chemistry Laboratories along with German and Cape Verdean scientists, celebrates its 10th anniversary this month.

Cape Verde Observatory

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 through provision of data to global climate models.

The Observatory is one of 31 global stations within the World Meteorological Organisation's Global Atmospheric Watch (GAW) programme, established by the United Nations to monitor trends in the Earth's atmosphere, and one of the few centres in the tropics.

Notable discoveries

Notable discoveries from the CVO over the past decade include:

- The finding that large amounts of ozone – around 50 per cent more than predicted – were being destroyed over the tropical Atlantic Ocean, caused by emissions of the natural halogens bromine and iodine from sea spray and ocean surface chemistry. This discovery was significant because ozone in the lower atmosphere acts as a greenhouse gas and air pollutant, and the results indicated that these processes were ubiquitous over the ocean. This study therefore established a link between ocean emissions and the catalytic destruction of ozone in the lower atmosphere, initiating a new research field for the atmospheric community.

- An international study identified increasing concentrations of ethane and propane gas over much of the Northern Hemisphere, likely due to increasing North American oil and natural gas production. Observing the largest increases over the central and eastern USA, ethane emissions were found to have risen by nearly 50 per cent since 2007. This trend represented a hemispheric-wide reversal of the overall global steady decline in ethane that began in the 1970s, which was primarily due to stricter air quality emission controls.

Global impact

Professor Lucy Carpenter, who leads the CVO team at York, said: "The Cape Verde Atmospheric Observatory has gained a reputation as a high quality international facility, providing vital data to the UK and global atmospheric communities. It provides a powerful tool for characterising transport and transformations of greenhouse and reactive gases, aerosols and dust from the US, Europe, and Africa to the tropical Atlantic.

Professor Ally Lewis, Director of Atmospheric Composition at the National Centre for Atmospheric Science and a lead CVO scientist, said "Measurements at the observatory have led to around 40 scientific publications to date, and many significant discoveries which have made large impacts on our understanding of the global atmosphere."

Scientists from York visited the CVO from 26th – 28th October to conduct a series of workshops to mark the anniversary, reflect on the data and discuss a vision for the next decade.

For more information about the Cape Verde Atmospheric Observatory, visit:
https://www.ncas.ac.uk/index.php/en/cvao-home

New Starters

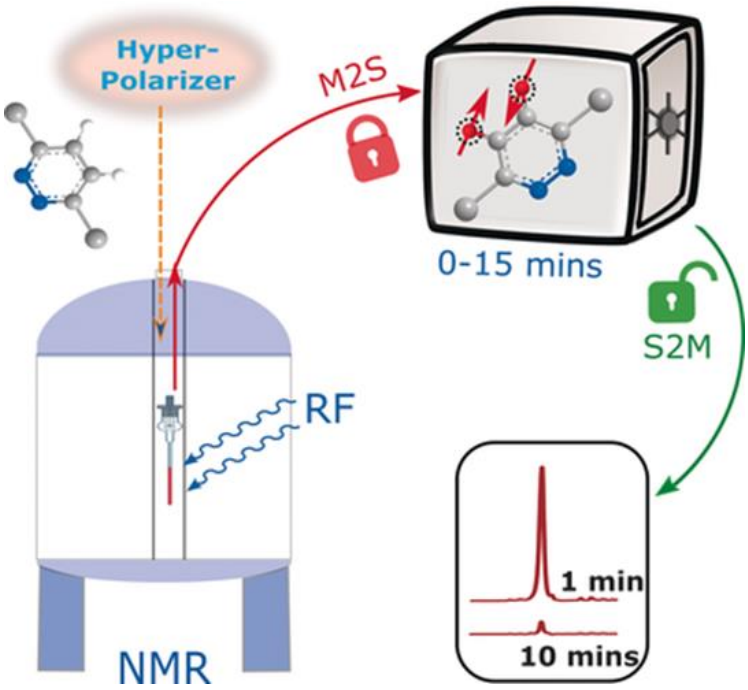
Dr Atallah Elzein, PDRA in Air Pollution, working with ACL
Room: WACL/G116; Extension: 4178 ; Email: atallah.elzein@york.ac.uk

Tessa Keenan, PDRA Glycoscience, working with MAF
Room: B/031 & B/020; Extension: 2594; Email: tessa.keenan@york.ac.uk

Rebecca Stafford, CIEC Administrator, working with Joy Parvin
Room: B016; Extension: 2523; Email: rebecca.stafford@york.ac.uk

Putting Hyperpolarisation in a Spin – Making Highly Sensitive and Long-Lasting MRI Probes

The storage of ultra-sensitive MRI probes allow the detection of signals even 15 minutes after their creation.



A long lived hyperpolarised probe can be rapidly created within an NMR spectrometer before being removed from the magnetic field where it becomes locked in a molecular "safe" - it can then be unlocked up to 15 minutes later and its highly sensitive signals recorded"

Researchers in the Centre for Hyperpolarisation in Magnetic Resonance (CHyM) have discovered a new method that allows highly sensitive signals to be stored outside of a magnetic field for up to 15 minutes which could pave the way for studying biochemical reactions non-invasively in the body.

Nuclear magnetic resonance (NMR) and magnetic resonance imaging (MRI) are two extremely important techniques which harness the magnetic properties of nuclei with applications ranging from molecular structure determination to human imaging. However, in many situations the applicability of NMR and MRI are limited by inherently poor sensitivity and insufficient nuclear spin lifetimes. To overcome these limitations the multidisciplinary team utilised the Signal Amplification by Reversible Exchange (SABRE) approach to create a magnetic resonance probe that was over 14,000 times more sensitive than that typically observed on a standard hospital MRI scanner. Subsequent manipulation of the nuclear spins by radio frequency pulses allowed storage in the long-lived singlet state. Importantly this probe could then be removed from the magnetic field where it was created, stored anywhere in the laboratory before being transported back into the magnet where its strong signals can be observed. This meant that molecular probes that would be undetectable under standard conditions were still visible even 15 minutes after their creation.

This significant improvement in sensitivity and lifetime could open the door to the real-time monitoring of metabolic processes in diseases such as cancer, heart disease and neurodegeneration. A significant feature of these molecular probes are that they are stable outside of strong magnetic fields which means they could be easily delivered to the patient in a clinical setting. Additionally, as this research uses proton nuclei within the probes, instead of

heteronuceli such as carbon or nitrogen, any currently installed hospital MRI scanner can record these measurements which may ensure a rapid uptake of this technique.

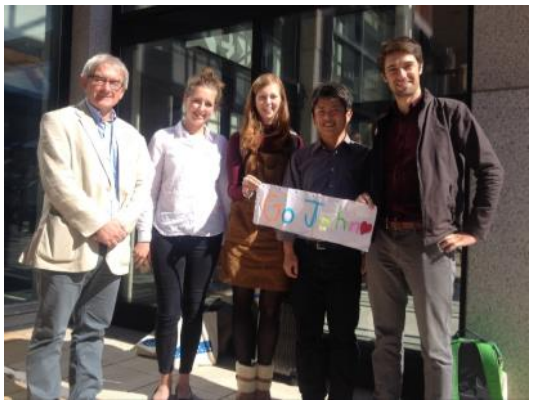
This research is published in *Angewandte Chemie International Edition* and titled "A Hyperpolarizable 1H Magnetic Resonance Probe for Signal Detection 15 Minutes after Spin Polarization Storage":

http://onlinelibrary.wiley.com/doi/10.1002/anie.201609186/full

O'Brien Group News

Fragment-based Lead Discovery Conference 2016 (FBLD2016)

Cambridge, Massachusetts, 9th—12th October 2016



FBLD2016 was held in Cambridge, Massachusetts, US, from 9th—12th October. This conference is held every couple of years around the world and was hosted by Professor Rod Hubbard. Dr Masakazu Atobe, working with Professor Peter O'Brien and Professor Rod Hubbard, presented a poster on his recent results on the 3-D fragment library project.

European Lead Factory, Early Career Researcher Event: Annual Chemistry Learning & Achievement Meeting

Lisbon, Portugal, 3th —4th November 2016

Dr Masakazu Atobe, working with Peter O'Brien and Rod Hubbard, was selected to present his library idea at the Early Career Researcher Event, which was hosted by the European Lead Factory project. For this event, 18 early career researchers were selected to participate. Masakazu was selected to give a 2 minute flash presentation and he also presented a poster, entitled "Multiple Novel sp3-rich Scaffolds from a Single Starting Material". The event gave all participants an opportunity to understand how innovative chemistry could be translated into screening libraries; and to network with researchers from pharma, SMEs and academia.

Research Lectures in Lancaster and Vienna

Peter was on his travels at the end of October visiting Lancaster University and the University of Vienna to present his latest results in lectures entitled "Exploring 3-D Pharmaceutical Space: Designing a 3-D Fragment Library and New Routes to Oxygen Heterocycles". At Lancaster, he was able to catch up with several York alumni including Dr Susannah Coote (ex-O'Brien group), Dr John Hardy (ex-Smith group), Dr Vil Franckevicius (ex-Taylor group) and Dr Verena Gortz.

Brighter Skies, Brighter Futures

Universities across the UK come together with Chinese researchers to assess air quality in Beijing.

China is one of the most rapidly developing countries in the world. Producing nearly a quarter of the world's goods requires a huge amount of industrial development in the country, leading to abnormally high pollution levels compared with the western world.

Researchers from over ten UK institutes, including a team from WACL, joined their Chinese counterparts from the Institute of Atmospheric Physics, Chinese Academy of Science, Beijing to run the first of two 6-week campaigns to assess air quality.

The researchers are looking into a variety of air quality measures including nitrogen oxides (NOx), tropospheric ozone, volatile organic compounds (VOCs) and particulate matter, all of which can be damaging to human health. These measurements are being conducted at both ground and elevated altitudes, specifically at 100 m on a 300 m tower to investigate the vertical distribution of emissions.

Investigating the air quality of China's capital should give us a better understanding of the health risks that those living there face and shine a light on the risks posed to other highly polluted megacities. Looking forward, it is hoped that data collected can be used to evaluate and improve emissions inventories.

Team WACL in Beijing! Dr Xiaobing Pang, Will Dixon, Dr Marvin Shaw, Dr Rachel Dunmore, Freya Squires, Professor James Lee, Professor Ally Lewis and Dr Jim Hopkins

University of York's mobile lab.

Prestigious Award for Chemistry

The University of York's Department of Chemistry has received a high profile industry award.

Professor Paul Walton and Professor Gideon Davies won the Energy Award at the Institution of Chemical Engineers' (IChemE) Global Awards, awarded jointly with Professor Bernard Henrissat from the French National Centre for Scientific Research (CNRS) in Marseille.

The IChemE Global Award for Energy was presented for pioneering work on discovering and dissecting enzymes for biofuels.

Using new tools to identify novel copper-containing active sites for a new class of catalyst, researchers from York and the CNRS studied new enzymes that are needed to create biofuels from plant wastes or energy crops.

Adrian Chiles presents (left to right) Professor Paul Walton, Professor Gideon Davies and Professor Bernard Henrissat with the IChemE Global Award for Energy.

Recognising excellence in chemical engineering worldwide, the IChemE Global Awards was hosted by broadcaster Adrian Chiles. The York and CNRS team won amid shortlisted entries from across three continents.

Professor Walton said: "The research collaboration between our groups at the Department of Chemistry at the University of York and Professor Bernard Henrissat at CNRS Marseille has allowed us to identify exciting new enzymes for the degradation and use of biomass.

“It is very satisfying to be given the IChemE Global Award for Energy in recognition of the impact that these enzymes will have on the world of biofuel production.”

Professor Walton was also recently shortlisted for the WISE (Women in Science, Technology and Engineering) Man of the Year Award.

The WISE Awards recognise inspiring organisations and individuals actively promoting STEM subjects (science, technology, engineering and mathematics) to girls and women.

Under Professor Walton’s leadership, York’s Department of Chemistry was the first to be awarded an Athena SWAN Gold award in 2007 – an accolade it still holds today.

The 10th International Vanadium Symposium

In early November, Professor North delivered a keynote lecture at the 10th International Vanadium Symposium. He departed from a wet Manchester where the temperature was barely above freezing and after three flights arrived 24 hours later in sunny Taiwan where the temperature was 28-30°C during the day and did not drop below 20°C at night. This conference has a very broad remit, covering not just the chemistry of vanadium, but also its environmental and biological effects. However, chemistry dominated with most talks on the inorganic chemistry of vanadium clusters, or the use of vanadium complexes as catalysts which was the area Professor North addressed in his lecture.

The conference was held at a hotel located at the intersection of two of Taiwan's main university campuses and within walking distance of central Taipei including Taipei101, where the conference banquet was held on the 85th floor offering a spectacular view of Taipei by night. In addition to learning a lot about areas of vanadium science he previously knew nothing about, Professor North is now fluent with chopsticks.

Suggestion Box

Reminder: There is an online anonymous suggestion box for staff under the Equality and Diversity section of the intranet: http://www.york.ac.uk/chemistry/internal/ and a physical suggestion box located outside Room K167 for YSBL staff. Suggestions from staff are most welcome. All suggestions are discussed by the appropriate departmental committee.

120 Pre-Funded Projects Set to Help Yorkshire Businesses

The Biorenewables Development Centre (BDC), a University of York subsidiary, has secured European Regional Development Fund (ERDF) funding to help more companies grow through bio-based innovations.

Following the BDC's previous popular business support programmes helping more than 200 local small to medium sized businesses (SMEs) over the last three years, the BDC is now able to offer 120 pre-funded projects for eligible Yorkshire businesses by 2018, to be delivered by their team of professional scientists or business specialists.

"We are committed to helping businesses take advantage of the huge opportunities in the emerging bioeconomy, and our biggest local contribution will be helping companies innovate through targeted R&D projects, designed to have the most impact on their business," explains Dr Fabien Deswarte, BDC's Business Development Unit Manager.

The BDC works with organisations of all shapes and sizes to help develop and scale-up greener processes and products using plants, microbes and unavoidable wastes. The BDC's previous ERDF programmes have helped local companies gain scientific insights to inform their business strategy, drive investment and develop improved bio-based products.

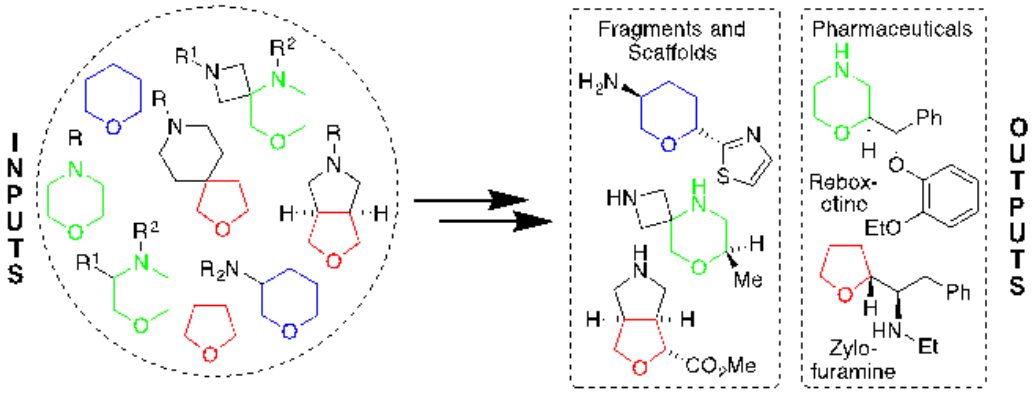
"The BDC's modelling showed that one system would take weeks or months to dry the woodchips, while the other would take days. We are now achieving the desired moisture content in just three days, and producing a high-quality product that is selling at top rates, and winning us

new business," says Landplan Managing Director, Joe Russell, one of BDC's clients.

Fabien elaborates, "What we have found incredible is the sheer diversity of exciting businesses across the region we have been able to help. Many businesses initially think they don't fall under the bioeconomy, but in addition to the more obvious fits with the bioenergy, anaerobic digestion [AD], and chemicals sectors, there is significant support we can provide to food and drink, and waste management businesses as well as those processing plants and crops. So, we would urge businesses with new ideas or business challenges to get in touch."

EPSRC Grant for Organic Synthesis

Professor Peter O'Brien and Dr Peter Karadakov, together with academic partner Professor Jacques Maddaluno (Rouen) and industrial partners AstraZeneca and YProTech, have been awarded a new Engineering and Physical Sciences Research Council (EPSRC) research grant. The grant is entitled "C–H Functionalisation of Cyclic Ethers: New Routes to 3-D Fragments, Scaffolds and Pharmaceuticals" and will support a post-doctoral researcher for 3.5 years.



This project will involve the development of novel organolithium methodology for the conversion of tetrahydrofurans, tetrahydropyrans and morpholines (inputs) into 3-D fragments, scaffolds and pharmaceuticals (outputs). Fitting squarely within the remit of the EPSRC "Dial-a-Molecule" Grand Challenge, it will be possible to dial-an-oxygen heterocycle at will via simple C-H functionalisations with high efficiency.

Optimisation of the new reactions will be underpinned by rigorous mechanistic studies including NMR-determined solution structures of organolithiums (collaboration with Professor Jacques Maddaluno, Rouen), in situ IR spectroscopic monitoring, kinetic studies and DFT computational modelling (to be carried out by Dr Peter Karadakov). The prevalance of tetrahydrofurans, tetrahydropyrans and morpholines in FDA-approved drugs means that the new methodology will be of direct relevance to the pharmaceutical industry. To facilitate the translation and impact of the new methods, the York team will work closely with two industrial project partners: AstraZeneca and YProTech.

"Science and Human Rights" by Prof Robin Perutz

"In October I went to a conference with a difference. First it was in an unusual place and second the subject matter was far from chemistry. The venue was a hotel overlooking the Panama Canal and the subject was the human rights of academics.

"I am the Royal Society representative on the International Human Rights Network of Academies and Scholarly Societies. This organisation sends out alerts to its members about human rights violations and encourages them to send letters in support of those who are persecuted. This was a tiny meeting – only about 30 people – but I had distinguished and unusual company. Nelson Sewankambo, for example, is the President of the Ugandan Academy of Sciences and an infectious disease specialist. Nelson was the first person to recognise a completely new disease among Ugandans in the 1980s – HIV. As President, he led a report on the scientific nature of homosexuality in order to challenge the government's Anti-homosexuality Act. He has also reported on the rights of health workers to protection from disease.

"There was much that was new to me about human rights in Latin America including issues concerning the rights of indigenous people. Then there were the countries where the situation in universities is really difficult: Turkey, Palestine, Syria and Venezuela. The situation in Venezuela's universities is particularly disturbing not least because they used to be of very high quality. There were two Venezuelan speakers: to my amazement the first was a human rights lawyer who is the daughter of a close friend of my mother! The constitutional autonomy of universities has been restricted since 2009. The state regulates, supervises and controls educational activities in public and private universities. Teaching and research programmes are subject to government priorities and guidelines. In 2011 the Supreme Court suspended all new elections of authorities at "autonomous" public universities. Rectors (equivalent of Vice Chancellors) have to continue indefinitely beyond retirement. Universities have no right to select students by examination. There have been attacks on academic facilities by violent paramilitary armed groups. Student protesters suffer forceful repression, and this continues after their release

from jail. Professors and their families are harassed.

“I spoke about the support we are giving to the three Syrian academics in the Department, trying to show people that individuals and their universities can make a difference. I also highlighted how many people had willingly given their support for each of our visitors. I was very pleased that *Chemistry World* brought out an article about refugees and one about Venezuela just when I returned.

“All this left me thinking about the link between science, human rights and freedom of expression.”

- Professor Robin Perutz

Equality and Diversity News:
Leonie Jones Gives Unconscious Bias Talk at St Andrews

On 4th November I gave a CPD workshop on ‘*Unconscious Bias in Academia*’ for the early career researchers at the Biophotonics North student-led conference at St Andrews.

This was an excellent meeting with a mixture of research, industry and professional development sessions. There was good representation from York with Professor Mark Leake from Physics also giving a great talk on ‘*Using light to explore single biomolecules’*.

Despite being late in the day, the session was very well received and generated lots of questions and lively discussion afterwards (I eventually had to stop taking questions as it was time to go home and they needed the room back!). It was fantastic to receive such an enthusiastic response and to see unconscious bias being considered an important part of the professional development training for early career researchers, something the EDG have been championing here in the department. We now include unconscious bias training as a core part of the iDTC and a new undergraduate equality and diversity session is planned for the summer term.

- Leonie Jones, Employability and Diversity Officer

Andy Goddard & Phil Helliwell Star in 'TO HULL AND BACK'

"I'd just like to say a big thank you for supporting my recent 'Cycle ride for Dan & Lauren' in aid of the @SLAquaFC Daniel Wilkinson Foundation.

"Andy and I set off on 29th September, from Hull to York (a slight change in direction imposed by logistics, but still the same route), after something of a longer warm up through Hull than we anticipated, caused by my lack of a sense of direction. That added a few miles to the 48 planned, but in my defence it's not well signposted. After we finally found the starting point we set off pretty smartly through Cottingham, until we hit the route 66 cycle track. I can't recommend it on a road bike, it's definitely a bit squirrelly over the aggregate path. Beverley came and went pretty smoothly, then on to Cherry Burton and Etton, where we had our first pit stop. On to Market Weighton after that and the flat home stretch. By Melbourne we were ready for another pit stop and adjustments to various items of Lycra clothing, before pushing on through Elvington, Wheldrake, Crockey Hill and on to Naburn. The finishing straight to the Designer Outlet was taken at a leisurely pace, but we'd done it.

48 miles
2h 57min

"With the tour of Hull thrown in, plus the distance from the Designer Outlet to the Marcia in Bishopthorpe, for a well-earned pint, and the trip back to Holgate, we covered 63.5 miles all in, which explained why I was walking like a cowboy.

"Now, the bit you've all been waiting for, those of a nervous disposition be ready, the pictures;

Before, with Dan's family at the KCOM in Hull. Afterwards, with Lauren.

I think I fill the tights pretty well, the top maybe a little too well, but I warned you about the possibility of gratuitous Lycra.

“And finally, many thanks to some great friends; Andy, for constant encouragement, taking care to make sure we were riding safely, making me eat a banana and having a Garmin, so we didn't get lost twice in a day in Hull. I couldn't have done it without him or Abigail, who drove the support vehicle and made the rocket fuel flapjack.

Never have two men ever been happier to be at the Designer Outlet. Sorry for the man-spreading, there was a really good reason for it

“I'm happy to say that right now the total raised by the ride is £697 and I know of a few more people who have promised me a donation. I would like to thank you all for your generosity, I'm incredibly grateful for such strong backing and Dan's parents asked me to say how grateful they are for the support you've all given to the ride and the foundation. Right now they are 29% of the way to their target, so I hope they'll make it in the next 2 months target they’ve set themselves.

“To finish, I said in my original post that Dan was a model student, but he was also a typical one; he liked to play hard as well as working incredibly hard. He had a toast for boozy nights out, which he made quite often, which I'll share with you now;

"To nights we'll never remember, with friends we will never forget."

“I'd just like to say again how thankful I am that you backed me to do something which will help to help to fulfil the latter half of that sentence.”

Best wishes, Phil

Dr Glenn Hurst in Brazil

Dr Glenn Hurst delivered an invited talk on the subject of “Green Chemistry Experiments for Secondary Schools in Remote Locations” at the ACS Global Innovation Imperative in Belem, Brazil at the start of November. Glenn showcased the work of the GCCE at primary, secondary, tertiary and continuing professional development levels, incorporating hands-on practical demonstrations into his talk.

Further to presenting best practice, Glenn also visited local communities and schools (including the Amazon rainforest!) to further understand the challenges of teaching in remote areas. Following this, he contributed towards the production of a White Paper containing recommendations for improving the learning experiences of students living in these communities.

Glenn established collaborations with international educators and industrialists, which will hopefully enhance the impact of our work in green chemistry education even further. Glenn is excited to work with new international colleagues on collaborative projects and is very grateful to Professor James Clark, Dr Avtar Matharu and Louise Summerton in the GCCE for the opportunity and for supporting his attendance.

Going Green in Asia!

Dr Andrew Hunt, a senior researcher from the Green Chemistry Centre of Excellence (GCCE), spent five weeks in September and October 2016 promoting the importance of green chemistry and interdisciplinary sustainable science at the Department of Chemical Engineering, Khon Kaen University (KKU), Thailand.

“When I was invited by the Faculty of Engineering at KKU to visit Thailand to encourage the application of green and sustainable chemistry into chemical engineering, I was thrilled. I jumped at the chance to help inspire a generation of sustainable scientists in a part of the world where green chemistry is still developing. I was fortunate enough to be able to deliver courses on aspects of green chemistry, catalysis, elemental sustainability and also scientific writing/literacy.”

“A key workshop to undergraduate students at KKU was on the principles of green chemistry. This workshop was student directed and promoted the significance of working in teams to solve or formulate answers to problems. Although the students were aware of environmental issues related to the chemical industry, none had heard about the 12 principles of green chemistry or sustainability.

“I was overwhelmed at how enthusiastic the students were to actively participate in presenting their thoughts on what the 12 principles of green chemistry should be! Many of the students were inspired by these principles and discovered the importance of applying them to their studies or research projects. In teams, the students then went on to develop their own 12 principles of green chemical engineering. I was really pleased that the students made this event a true success.”

Mr. Pongsakorn Nonsi, a 4th year student at KKU said “Over the past few weeks in KKU, Dr Hunt taught us so many things, mostly about green chemistry. This is very important for us as chemical engineering students in order to gain the knowledge and understanding of catalysts and green chemistry. From what we have studied, we have learned the importance of green chemistry and elemental sustainability. This highlighted that it is important for the engineer to create processes to recover substances without releasing waste. Thank you so much for your time and experience that you shared with us, we really appreciated it and one day we hope we will meet again.”

"This trip also helped develop a number of collaborations between the GCCE and the Department of Chemical Engineering, Khon Kaen University (KKU). One such collaboration focusses on the use of supercritical carbon dioxide as a sustainable extraction technology to obtain waxes from tropical based agricultural residues. This builds on a current PhD being conducted at the University of York on rice straw biorefineries, sponsored by the Oil Refinery Contract Contribution Fund and the Ministry of Energy, Thailand. Such approaches to the extraction of valuable chemicals from waste biomass are already being applied in an EPSRC funded project, *SusChemFeed*.

"Other research that was initiated during this trip includes the valorisation of food wastes to make chars, which are being tested as materials for water purification. These carbonaceous materials may also find use as part of a Horizon 2020 project called Porous4App. The use of specialised furnaces at the Department of Chemical Engineering, Khon Kaen University (KKU), could also lead to the development of new carbonaceous materials that may expand the range of applications for which current Starbons® (mesoporous materials developed at the GCCE) can be used for.

"I went to Thailand to inspire students to go green and form new collaborations but, I myself left feeling inspired. I feel honoured that I was able to help increase the popularity of science and promote green issues to a wonderful group of students. I see a promising future for green, sustainable and multidisciplinary research in Thailand and throughout Asia."

- Dr Andrew Hunt

CHN is Moving!

As of 23rd November, the CHN service will be moving from the lofty heights of D Block to the newly re-floored and re-lit B/130, cohabiting with the Departmental Chromatography Service.

During this time no samples will be run but, (assuming no hitches), service will resume around the week commencing 28th November.

I'm also going to start running sulfur analysis. This is a titration-based method (as opposed to the automated CHN), but there are a few restrictions on the types of sample that can be run. If you are interested in getting S-analysis, please contact me. I'm hoping that more elements (particularly halogen analysis) will be available in the future.

Graeme

(gdm1@york.ac.uk or extension 2527)

RenewChem Launch

The inaugural RenewChem advisory board meeting was held on 15th November, and attended by representatives from the first six industrial members, Croda, Unilever, GSK, Nestle, Brocklesby and Anatune. Following this was the launch event opened by Professors Duncan Bruce and James Clark, and attended by both industrialists and academics.

RenewChem combines research through PhD, MSc and proof of concept studies with online CPD courses and a dedicated multidisciplinary course in sustainable manufacturing. All activities will be guided by the non competitive industrial advisory board comprising companies covering a diverse range of the chemical manufacturing space. This ensures practical relevance in combination with the extensive expertise at the GCCE and its collaborators.

See http://www.york.ac.uk/greenchemistry/renewchem for more information about RenewChem.

50th Anniversary Book

To mark 50 years of Chemistry at York, Dr Barry Thomas has put together a fascinating book that tells the history of this period, gives a good amount of detail of the early days and contains contemporaneous accounts from people who were there.

Books can be purchased for £10 from Jo Eastwood in A121 between the hours of 12.00 and 14.00 each day.