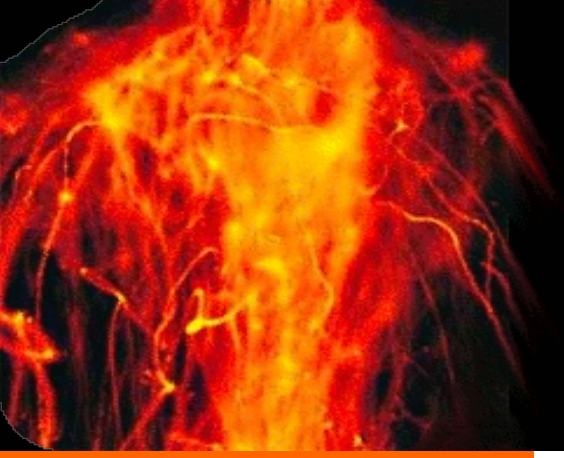


Chemistry Update

Newsletter 307, 29 March 2019

Inside this Issue

Calendar of Events

RSC Chemical Dynamics Award Winner Seminar
Speaker: Prof Klaas Wynne, University of Glasgow
Date: Wednesday 3 April
Time: 1pm—2pm
Location: C/B101

Green Chemistry Seminar
Speaker: Dr Daniel Tsang
Date: Monday 8 April
Time: 2pm—3pm
Location: C/F/106

Inorganic Seminar
Speaker: Dr Emma Richards, Cardiff University
Date: Wednesday 10 April
Time: 1pm—2pm
Location: C/B101

Green Chemistry Seminar
Speaker: Dr Dorothee Laurenti
Date: Tuesday 16 April
Time: 2pm—3pm
Location: C/F/106

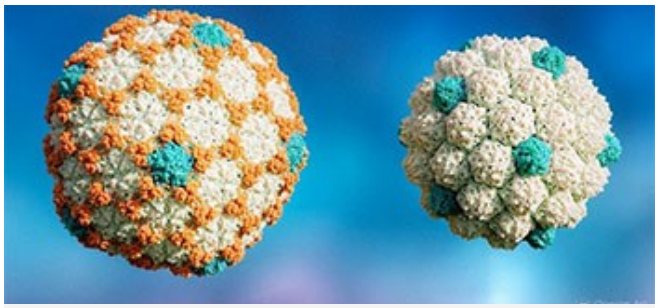
Date of Next Issue: 26 April 2019

Structure of heat-loving virus revealed

Cryo-electron microscopy has provided vital clues to the nature of virus assembly.

Studies of a virus isolated from natural hot water source in Kamchatka, Russia, have provided clues about how the capsid protein shells of viruses assemble and expand. Bacterial viruses (also called bacteriophages) which infect the *Thermus thermophilus* bacterium are found in natural hot water sources. Due to their high stability and evolutionary links with human and animal viruses, these bacterial viruses are excellent model systems for understanding virus assembly.

In a study led by Professor Fred Antson published in *Proceedings of the National Academy of Sciences*, high resolution three-dimensional reconstructions of *Thermus* bacteriophage P23-45 revealed the structural changes that occur as the virus capsid shell matures and expands. These structures were obtained using advanced cryo-electron microscopy and data processing techniques, enabling atomic models to be built for the proteins in the capsid shell. The research unexpectedly showed that these capsids have evolved an increased storage capacity, without increasing the number of protein subunits that constitute the capsid shell.



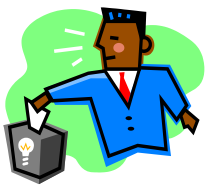
Expanded virus capsid (left), and the immature 'procapsid' prior to expansion (right).

Reflecting on the surprising discovery, Dr Oliver Bayfield said: "When we determined the capsid structures, we were surprised that they possessed what we call a triangulation number of 7, which relates to how many capsid proteins make up the capsid shell, despite the virus genome being double the size expected for this kind of capsid. We had to double-check the microscope was calibrated correctly, as it was quite unexpected".

The virus utilises an unusual modification to a classical virus capsid protein, which allows a doubling of the capsid volume whilst maintaining its structural integrity up to the boiling point of water – as experienced in the hot spring environment. The researchers also developed a way to package DNA into the purified empty capsids in a test-tube, providing the opportunity to further study the mechanism of virus assembly under controlled laboratory conditions. In the future, these capsids also have significant potential to be employed as nanocages in biotechnological applications.

Professor Antson is part of York Structural Biology Laboratory which focuses on biological chemistry research, including structural and chemical biology to uncover the fundamental chemical bases for biological and biochemical processes. The research paper can be found here.

Online Department suggestion box



The online Equality and Diversity suggestion box has been extended to be a suggestion box for the whole Department. You can submit your thoughts/suggestions/ideas for general Departmental matters as well as matters relating to Equality and Diversity. You can find the Google form on the intranet homepage or at this link.

Awards for York researchers

Professor Jane Thomas-Oates and Dr Alison Parkin have recently both been recognised with two separate awards for their high quality research, which uses key analytical methods to shed light on important chemical and biological processes.

Dr Alison Parkin (left) and Prof Jane Thomas-Oates (right)

Professor Jane Thomas-Oates has been named as the British Mass Spectrometry Society Lecturer for 2019. This Lectureship is awarded every three years to someone who has made significant contributions to research involving mass spectrometry. During the three year tenure of the award, Jane will deliver around 10 lectures at conferences, Departmental seminars and to the general public, highlighting different aspects of the subject as exemplified by her work.

The research of Jane's team is focussed on the structural analysis of biologically-active molecules. Using mass spectrometric methods, they are characterising systems as diverse as biomolecules from archaeological samples, the metabolism of arsenic-containing compounds, and the signal molecules involved in nitrogen fixing plants.

Dr Alison Parkin has been awarded the inaugural Roger Parsons Medal of the Royal Society of Chemistry Electrochemistry Group. The Medal is presented to an independent early career electrochemist working in the UK or Ireland in recognition of their contributions to any field of electrochemistry. The Medal will be presented at the annual UK 'Electrochem' Meeting at Strathclyde in August, at which Alison will also deliver a Plenary Lecture.

Alison's team use electrochemical methods to understand how transition metals in proteins activate chemical reactions that are essential for life. Understanding such processes is fundamentally important, and can also underpin the development of new antibiotics to halt the rise in drug-resistant pathogens, help design better industrial catalysts, and offer new solutions to environmental problems.

The Department of Chemistry is one of the leading UK chemistry departments, and is recognised for its high quality research and teaching. In particular, the Department is highly regarded for the ways in which it supports the careers of women in science, and was the first UK department to receive the Athena SWAN gold award, which it has held for more than 10 consecutive years.

Save the Date • Friday 19 July • Chemistry Summer Picnic

This year's Staff/Family Picnic will take place on the afternoon of Friday 19 July. The legendary Rounders Match, for anybody who's interested in taking part, will take place prior to the Picnic. Further details to follow.

Senior Fellow HEA Award

Dr Glenn Hurst has become a Senior Fellow of the Higher Education Academy

The award of Senior Fellowship recognises educators working in Higher Education who can demonstrate 'successful coordination, support, supervision, management and/or mentoring of others in relation to teaching and learning'.

Assessors commented that Glenn was particularly strong in this leadership and influence criterion especially given he has not been teaching in higher education for a long period of time, noting that he has had a significant positive impact upon the teaching of colleagues. To help achieve this award, Glenn completed the York Professional and Academic Development scheme.

Dr Glenn Hurst conducts research across all levels of green chemistry education through the Green Chemistry Centre of Excellence (GCCE). He has specific interest in using social media and game-based learning strategies to transform the student learning experience. He regularly publishes in chemistry education and higher education scholarly literature and is chair of the Royal Society of Chemistry Higher Education Group.

Glenn was shortlisted by Times Higher Education in the 'Most Innovative Teacher of the Year' category in 2018 and was recognised by Jisc as one of the top ten social media superstars in higher education. Locally, Glenn is Chair of the Natural Sciences Teaching Committee and of the University Learning and Teaching Forum.

Assessors of his Senior Fellowship application highlighted the evidence-based approaches Glenn uses when coordinating teaching interventions together with his published contributions to the pedagogic literature. Glenn's application was recognised as a 'model submission' and Glenn has agreed for colleagues to be able to use it as a training resource.

The Department of Chemistry is committed to delivering high quality, innovative teaching, as reflected in its exceptional scores in the National Student Survey and the high rankings of the Department in university league tables.

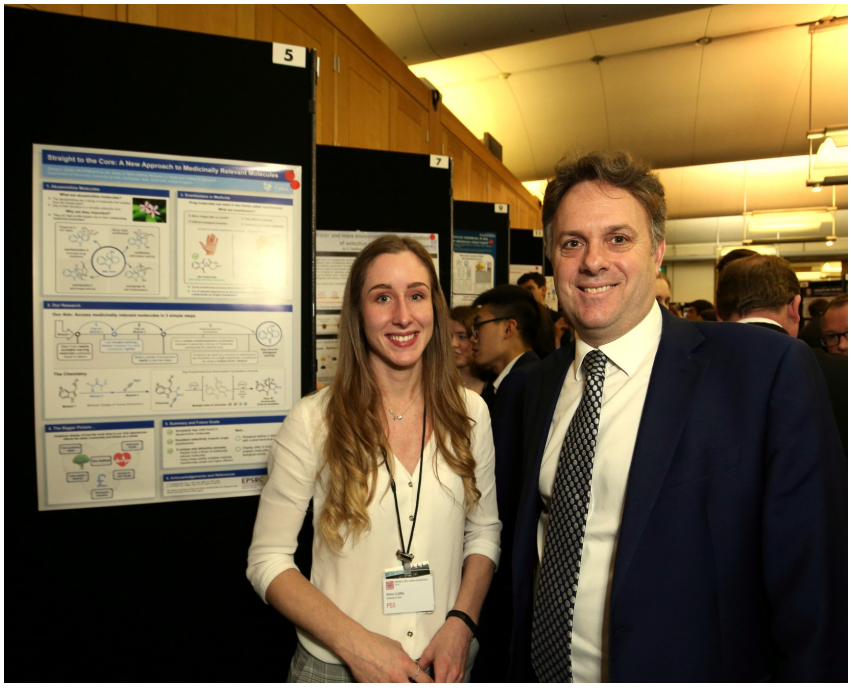
Clarke Group News

The Clarke group welcomes Laksamee Jeanmard, who has joined the group to study for a PhD.

We also congratulate Giacomo Lodovici, who successfully defended his PhD thesis on 12 March.

York research presented at Westminster

Dr Aimee Clarke presented her research to MPs in the Houses of Parliament at the STEM for Britain event.



Credit: John Deehan Photography Ltd

Dr Aimee Clarke, a postdoctoral researcher from the Department of Chemistry working with Dr William Unsworth and Professor Richard Taylor, was one of only 30 chemists nationwide, selected to present research at STEM for Britain. This annual event, at which early career researchers from across the STEM (Science, technology, engineering, and mathematics) subjects discuss "ground-breaking and frontier UK research" with Members of Parliament, presents a unique opportunity for researchers from academia, rather than industry, to meet and engage with politicians.

Hosted in the Attlee Suite in Portcullis House at the House of Commons, the focus of STEM for Britain is a poster competition, which presents the basis from which research is discussed. Throughout the event there is the opportunity for researchers to network with one another as well as with MPs and representatives from professional bodies such as the Royal Society of Chemistry. Awards are made for the best research work and results by an early-career researcher, along with their ability to communicate their work to a lay audience.

Aimee presented a poster entitled “Straight to the Core: A New Approach to Medicinally Relevant Molecules” which communicated her complex work on a new approach to access medicinally relevant scaffolds using an enantioselective dearomative cyclisation cascade. Aimee said:

“I was judged by two of the five chemistry judges - physical chemist Professor Helen Fielding and the head judge for chemistry, Dr Peter Machin a medicinal chemist. After the judging I got to present my work to my MP Julian Sturdy, who I had invited to the event, a definite highlight of the day. He was very enthusiastic and excited to hear about my research.”

Aimee highly recommends the event, although she was not among the prize winners on this occasion:

“It was a fantastic day and such a privilege to be given the opportunity to present my research in the Houses of Parliament. Not many people can say they have been able to do that. It was always going to be a challenge presenting complex synthetic chemistry research to a lay audience but I enjoyed the engaging conversations with judges, other researchers and MPs. I would recommend this event to any final year PhD students or postdocs who fancy a challenge.”

Dr Glenn Hurst shortlisted for Educate North Award

Dr Glenn Hurst, Assistant Professor of Chemical Education in the Department of Chemistry, has been shortlisted for the Teaching Excellence Award at the Educate North Awards.

The Educate North Awards are a prestigious awards event which recognises and shares best practice and excellence in the education sector in the North. Now in their fifth year, the awards have 19 categories, ranging from Business Collaboration and Social Mobility to Teaching Excellence. The awards are judged by a panel of industry leading experts and professionals. They use a rigorous two-stage judging process which includes pre-scoring to determine the shortlist and a further judging session to select the eventual winners.

The winners of the Educate North Awards will be announced at an awards event on 25 April 2019 at the Hilton Deansgate in Manchester. The evening event will celebrate the outstanding teams and people behind the incredible initiatives of further and higher education institutions from across the North.

New starters

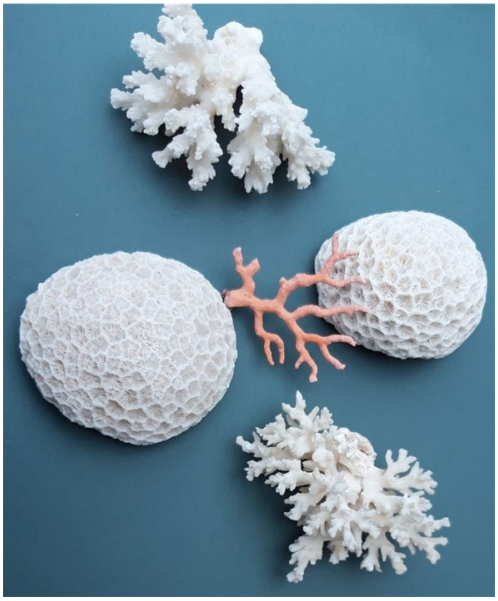
Nick Moriarty, Web Application Developer
(with Adrian Whitwood and Richard Fuller, IT Services)
Room: C/A138; Ext: 3484; Email: nick.moriarty@york.ac.uk

Elaine Driver, Administrative Assistant (Graduate Office) with Alice Duckett
Room C/A142; Ext: 4544; Email: elaine.driver@york.ac.uk

Dr Jamie Gould, PDRA with Dr Alyssa-Jennifer Avestro
Room: C/E202; Ext: 2593; Email: jamie.a.gould@york.ac.uk

Samantha Presslee, Research Technician with Kirsty Penkman
Room: C/D024; Ext: 4472; Email: sam.presslee@york.ac.uk

New NERC-funded project on coral chemistry



Last week Dr Kirsty Penkman's new three-year NERC-funded project "Trace element and isotope partitioning in carbonates in simulated biological environments" started, which combines biomineral chemistry and physics to identify the origin of vital effects in marine biogenic $CaCO_3$, and how this affects the climate signal that they contain.

Many marine organisms produce calcium carbonate structures, providing tissue support and/or protection from predators and the physical environment. However the chemistry of the skeleton is affected by the environment, and so can provide information on the temperature and chemistry of seawater at the time the organism lived and grew. As these mineral structures are preserved after the death of the organism (e.g. as coral reefs, foraminifera fossils in sediment), analysis of these fossils offers an excellent route to reconstruct records of past environmental conditions, helping us to understand past changes and interactions in global climate and therefore to predict 21st century climate change.

However, understanding how other factors affect the chemistry of the shells and reefs is key to accurately interpreting the climate information recorded in fossil specimens. Coral skeletons and foraminifera tests form at specialist calcification sites, either in or adjacent to the organism. The calcification sites contain both soluble and insoluble organic biomolecules (e.g. proteins, lipids), which control and guide the precipitation and growth of the mineral. These biomolecules also affect the chemistry of the mineral, and in this project we will analyse modern and fossil corals and foraminifera to determine how the concentrations and compositions of organic biomolecules at the calcification site have varied throughout time. Led by St Andrew's and involving both Chemistry and Physics at York, we will be using advanced analytical and microscopy techniques to visualise the structure of the mineral precipitated under different conditions and to watch the formation of minerals in real time. We will also precipitate $CaCO_3$ minerals *in vitro* under conditions replicating those of past and present calcification sites to determine how variations in biomolecules affect mineral chemistry, and therefore optimise the accuracy of past seawater temperature estimates. This research will constrain how the biological environment affects geochemical proxies and determine how such changes influence palaeoclimate information.

New arrival

Chris Spicer (Lecturer in Chemistry) and wife Vicki are delighted to announce the arrival of their baby girl, Millie-Rose.

She was born on 20 March, weighing 7lbs 10oz. All three are doing well.

Green Chemistry postdoc attends Media Skills Training Day at the Royal Society in London

Green Chemistry Centre of Excellence (GCCE) PDRA Dr Katie Lamb recently attended a one-day "Media Skills Training" course run by the Royal Society and Screenhouse Productions, at the Royal Society main office building in London. The course is designed to help early career and postdoctoral scientists develop skills in working with television, radio, newspapers and with other media interactions, with a focus on effectively communicating scientific research to the general public. Katie was successful in applying for funding from the Department of Chemistry to attend this course and found the experience very beneficial. During the course, Katie undertook mock radio and TV interviews, where she talked about the research she is currently undertaking with Professor Michael North, using aluminium to catalytically transform carbon dioxide into commercially valuable products. The course featured talks from Dr Maggie Aderin-Pocock MBE, current presenter of the BBC's "Sky at Night" programme, on experiences in dealing with the media and Royal Shakespeare Company trained actress Victoria Pritchard, on conquering nerves and finding your voice.

Undertaking mock TV interview practice interviews with Barbara Govan of Screenhouse Productions

Katie said "I found the whole day extremely rewarding and was glad that I attended this event. There have been a few occasions during my career where I turned down the opportunity to take part in a face-to-face interview, due to anxiety and lack of experience in dealing with the media. I now feel that if I have the opportunity again to take part in a video (or radio) interview, I would be better prepared and I gained valuable information in how to communicate my research to the general public. I also had the fantastic opportunity to meet one of my science idols Maggie, who is fantastic at communicating science and is such an inspirational scientist."

After attending this course, Katie was given copies of her on-the-spot radio and TV interviews she gave during the course. A copy of her TV interview can be seen on her Twitter page at @Dr_Katie_J_Lamb. When Katie watched her TV interview, and listened back to her radio interview, she noticed her sentences do not always make grammatical sense, her message could have been clearer, she could have spoken more slowly and there were some mistakes with her facts (urea formation from CO_2 was established in the 1900's, not the 1800's).

Dr Katie Lamb undertaking her mock TV interview as shown on her twitter page

Although these interviews were not 100% perfect, Katie sees these mock interviews as vital learning material. "I have lived with mild semantic-pragmatic disorder my whole life, therefore it can be difficult for me to convey my message effectively and often what I think in my head is not what I end up saying out loud, especially when under pressure or feeling anxious. However, I will not let my disorder stop me from improving or undertaking future media interactions. I have learnt the valuable lesson that to become better at communicating my research, I must tackle my anxiety and problems head on. My advice to others would be to record yourself speaking to listen/watch yourself back (something we all dread) and practice, practice, practice. I would recommend anyone with any interest in dealing with the media to attend this course at the Royal Society, which are being run in May and October of this year."

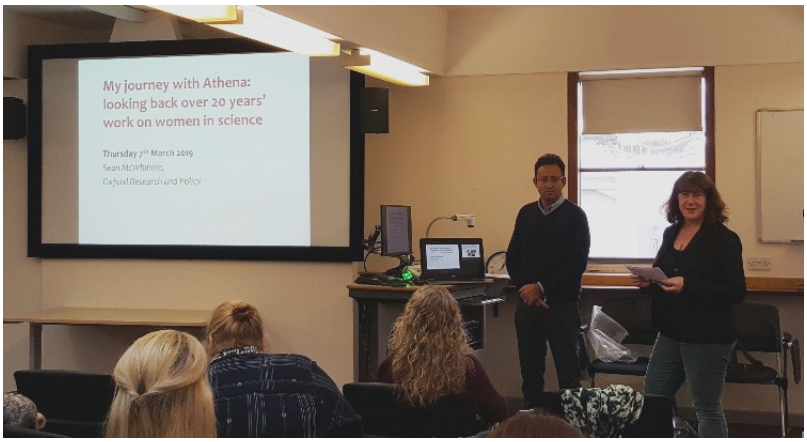
"Being A BAME Chemist": EDG Lunchtime Forum

The Equality and Diversity Group held a lunchtime forum on Friday 15 March to discuss some of the issues that BAME (Black, Asian, and Minority Ethnic) individuals face in Chemistry. Dr Avtar Matharu who now chairs the University's Staff Race Equality Forum led the session, which included viewing some YouTube clips highlighting everyday racism and the topic of microaggressions.

Dr Caroline Dessent, Chair of the Equality and Diversity Group (EDG), comments "I am very grateful to the people who attended the meeting who were prepared to relate some of their personal experiences where they have encountered racism. This gave all who attended the forum much to reflect on, and will help the EDG to begin to focus more effort on supporting BAME students and staff in the Department. If anyone who was unable to attend the forum has experiences or views they would like to share around being BAME in Chemistry at York, please get in touch (in confidence) with either Dr Avtar Matharu or myself".

"For further reading on these issues I would recommend a joint IOP/RSC report on 'Representation of Ethnic Groups in Chemistry and Physics' that was published in 2006. The report is still available through the IOP's website. The report provides sobering reading, but also provides strong suggestions for further research which still needs to be conducted to better understand and support BAME students."

Sean McWhinnie Seminar



Sean McWhinnie of the Oxford Research and Policy consultancy visited the Department on 7 March to give a Beacon Equality & Diversity seminar entitled "My journey with Athena: looking back over 20 years' work on women in science". The seminar was very well attended by people from within Chemistry and from outside of the Department.

Robin Perutz with Sean McWhinnie

Sean has researched the question of why women are badly represented at the higher levels of academic science for 20 years, and his seminar provided a historical perspective on the work he's been involved in. He recounted how he had first visited Chemistry at York when Professor Robin Perutz was Head of Department in 2003 as part of his work as a Science Policy Researcher at the Royal Society of Chemistry. Sean described his impressions of the Department, and related how the good practice that was growing at York at that time influenced recommendations that seeded much of the early work around supporting women in chemistry. He also described how Chemistry at York had provided material for early reports on gender equality compiled by the RSC, and how PhD students in York had contributed to research he carried out on career intentions and experiences of chemistry PhDs. It was interesting to hear about the early days of the Athena Project, which eventually developed into the Athena SWAN scheme. Sean ended his seminar by presenting some comparisons of the representation of women in chemistry 20 years ago compared to now. This highlighted the significant challenges that remain to improve gender equality in our field, and led to a lively discussion about the pros and cons of the current Athena SWAN scheme, as well as broader E&D issues including underrepresentation of BAME individuals in chemistry.

Triathlon in memory of Robin Virgo

Message from Alison Fellgett (Biology): Robin Virgo was a student in the Department of Chemistry and passed away from terminal cancer in December 2017. St Leonard's Hospice was invaluable to both Robin and his family during an exceptionally difficult time. In light of Robin's passing, I have decided to run a triathlon to raise money for St Leonard's Hospice. Donations can be made via this fundraising page.

O'Brien Group News

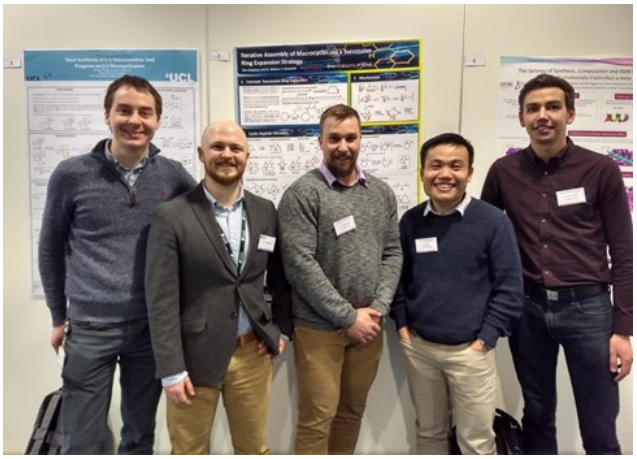
The last few months have been rather busy for the O'Brien group. Read on…

RSC Heterocyclic & Synthesis Group's January Meeting

In his role as Chairman of the group, Professor Peter O'Brien hosted the January meeting at the Institute of Cancer Research.

AstraZeneca CheM62 Conference

Three members of the group, Nico Selling, Sophie Berrell and Kevin Kasten, attended the CheM62 meeting at AstraZeneca's Macclesfield site on 17 January. All three presented posters. Congratulations to Sophie (photo right) who won a prize for her poster on electrochemical synthesis!



Pharmaron Symposium on Chemistry for Life Sciences

Nico Seling and Hon Eong Ho (along with Tom Stephens from the Unsworth group) attended the 2nd Pharmaron Symposium on Chemistry for Life Sciences at Pharmaron's Hoddersdon site on 1 March. Nico presented a poster on the 'Lithiation-trapping of oxygen and sulfur heterocycles.' They met up with Taylor group alumni now based at Pharmaron, Matt Lloyd and John Liddon.

Dr Will Duckworth

Congratulations to Will Duckworth (photo right), jointly supervised by Professor Simon Duckett, who passed his viva without breaking sweat. Dr Duckworth is still a recognisable presence in the Department, spending his time shaping young minds in the teaching labs.

Invited Lecture at the University of Basel

Peter visited Basel to give a lecture, a trip hosted by Professor Olivier Baudoin.

The Admin Team Away Day

The Chemistry admin team participated in an "Away Day" on 20 March - in which we were all away from our desks, if not the Department, for a morning of cakes, chemistry and conviviality, followed by a splendid lunch at the Deramore Arms.

The morning began with a speed networking event led by Matthew Badham. The networking involved rotating round a table in pairs having four minute conversations with as many people as possible. There were some question prompts to help us find out all kinds of interesting things about each other; examples included If you were an animal which one would you be? Do you have any fears/phobias? What do you appreciate most about the place you're originally from? Some questions were quick to answer, but others sparked off very interesting conversations that could easily have lasted longer.

The Bake Off judges L-R: Anne Duhme-Klair, Alison Parkin and Lewis Gooch

Next was a break with the opportunity to admire the creations some of us had brought in for the Great Admin Bake Off. This was an informal event but there were some spectacular cakes, judged by Alison Parkin, Anne Duhme-Klair and Lewis Gooch. Third prize went to Matthew Badham for his amazing lemon bundt cake and second to Katrina Sayer for her fantastically sparkly cupcakes. First prize and title of "Star Baker" were awarded to Jo Eastwood for her sumptuous Victoria Sandwich. Lisa Mayer's deliciously moist lemon polenta won the rather dubious soggy bottom award! The judges commented:

"It was an absolute pleasure to judge the awesome baking of our admin team who, unsurprisingly, brought their typical care, attention to detail and creativity to bear in creating truly TV-worthy bakes. It was a very tough job to choose between the nine wonderful creations, and we were forced to carefully compare the attractiveness and flavour of each lovely cake, muffin and brownie. Well done to everyone."

L-R: Matthew's lemon bundt cake, Katrina's muffins and Jo's Victoria Sandwich

There was also a charity collection, with a suggested donation of £2 for cakes – a total of £65 was raised, and was added to Dave Smith's JustGiving page in memory of his husband Sam.

At the final event of the morning, led by Helen Coombs, the admin team were given a taste of what chemistry is all about, with a quiz based around the periodic table. Helen gave us an overview of the periodic table - what an element is and how elements combine to make molecules – followed by questions to ponder such as 'What is the most abundant element in the atmosphere?' and 'What is the most abundant compound on earth?'. More complex questions followed about the different forms of carbon and how ozone differs from oxygen. Helen explored the focus of the different research groups in the Department and went on to ask some questions linking individual academics to different elements. Everyone was fascinated to find out who researches what - although some strong hints were needed for some of the questions!

A lovely lunch at the Deramore Arms rounded off the Away Day perfectly.

Technician Commitment progress

The Technician Commitment is a university and research institution initiative, supported by the Science Council and the Gatsby Charitable Foundation's Technicians Make It Happen campaign. It aims to ensure visibility, recognition, career development and sustainability for technicians working in higher education and research, across all disciplines.

The Technician Commitment has "exceeded expectations" in its first year. Read the full news story and look out for the University of York colleagues featured on the Technicians Make It Happen website!

Lord Sainsbury presenting the Technician Commitment team (including Simon Breeden and Abigail Mortimer) with a plaque to recognise our progress as a signatory of the Technician Commitment in its first year.

Johnson Matthey Poster Competition

The Johnson Matthey Poster Competition took place this year on 26 March, and saw 30 of our third year PhD students presenting their work. The Competition requires participants to display a poster about their research, which is scored by a panel of judges who look at presentation, scientific content and student discussion. The judging panel consists of members of academic staff and PDRAs. The overall standard of the posters was high as usual, and after careful consideration, four winners were awarded £400 each to be spent on research activities/items.

Many congratulations to:

Tom Stephens (*WPU/MAF/PAOB*)

James Rossi Ashton (*WPU/ RJKT*)

Jennifer Lewis (*SBD*)

Mark Dowsett (*MN/AP*)

Winners were announced at a Departmental seminar in the afternoon, followed by a talk from our guest speaker Dr Martin Partridge from Johnson Matthey entitled:

Changing Mercury to Gold - Discovery, Development and Commercialisation of Gold Catalysts for Acetylene Hydrochlorination

Thanks go to Johnson Matthey for their sponsorship of the event, members of staff on the judging panel, and all the students for taking part.

Winners L to R : Jenny Lewis, James Rossi Ashton, Dr Martin Partridge, Mark Dowsett, Tom Stephens

Green Chemistry
Centre of Excellence

UNIVERSITY of York

2nd Microwave Commercialisation Club Workshop

Taking microwave technology from the lab to industrial scale

Thursday 9th May 2019, 10am—1.30pm

Biorenewables Development Centre (BDC), Dunnington, York

A free half-day symposium supported by the EPSRC Impact Acceleration Account (IAA)

The Microwave Commercialisation Club (MCC) is a multidisciplinary team including experts in microwave technology, chemical engineering, biomass chemistry and process management. Its aim is to support the transition of microwave technology into chemical and allied industries.

Join us for our second workshop, which will include talks from our club members, GCCE researchers and industrial end users, plus the opportunity to tour the facilities at the Biorenewables Development Centre (BDC). A free buffet lunch will be provided.

Followed by club members meeting

Who Should Attend?

- Microwave manufacturers
- Chemical and other manufacturing companies with an interest in green chemical manufacturing
- Food, agricultural and waste industries where biomass-rich waste can become valuable sources of renewable chemicals
- Energy companies in which biomass derived fuel sources are required to move towards more sustainable sources of fuel

We welcome proposals for short talks and posters.
Please contact hannah.briers@york.ac.uk if you wish to present at this event.

Find out more and register your place for free by 2 May 2019 at
https://mccworkshop2.eventbrite.co.uk

Small travel grants are available—please contact alice.fan@york.ac.uk