UNIVERSITY of York

Chemistry Update

Newsletter 270, 26th February 2016

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Calendar of Events

UCAS Days
Date: 1 & 7 March
Time: 12.30pm—4pm

RSC Award Symposium
Speaker: Prof. Stephen Clarke, University of Glasgow
Date: Wednesday 2 March
Time: 1pm—2pm
Location: A101

Chemical *Inter*Actions: Networking Event
Date: Wednesday 9 March
Time: 3pm—5pm
Location: B101

Chemical *Inter*Actions: Smartphone Quiz
Date: Tuesday 15 March
Time: 6.30pm—8.30pm
Location: A122
See Page 18 for more info

Organic Chemistry Research Seminar
Date: Wednesday 16 March
Time: 3pm—5pm
Location: A101

Johnson Matthey Poster Competition
Date: Friday 18 March 2016

Physical Chemistry Seminar
Speaker: Dr Carole Morrison, University of Edinburgh
Date: Wednesday 23 March
Time: 2pm—3pm
Location: A122

Organic Chemistry Research Seminar
Date: Wednesday 30 March
Time: 3pm —5pm
Location: A101

Date of Next Issue: 25th March 2016

Chemists Discover how Sulphur is Used by Organisms

A critical discovery about how bacteria feed on an unusual sugar molecule found in leafy green vegetables finally reveals how sulphur is harnessed by living organisms. The work may inform strategies to boost our ‘good’ gut bacteria and promote digestive health.

Each year, leafy green vegetables – such as spinach – produce the sugar sulfoquinovose on an enormous scale globally. Picture credit: AgriLife Today

A team of researchers including scientists from the Department of Chemistry at the University of York identified a previously unknown enzyme used by bacteria, fungi and other organisms to feed on the unusual but abundant sugar sulfoquinovose – SQ for short – found in green vegetables.

Each year, leafy green vegetables – such as spinach – produce the sugar on an enormous scale globally, comparable to the world’s total annual iron ore production.

The research, supported by Biotechnology and Biological Sciences Research Council and the European Research Council, was led by Professor Gideon Davies of the York Structural Biology Laboratory (YSBL), Dr Ethan Goddard-Borger from the Walter and Eliza Hall Institute and Professor Spencer Williams from the Bio21 Institute and University of Melbourne. It is published today in the journal *Nature Chemical Biology*.

Professor Davies said: “Plants make about ten billion tons of SQ annually. We finally know the key chemical steps in the assimilation of the sulphur and we can now see that these pathways are far more widespread than originally thought."

Dr Goddard-Borger said the discovery could be exploited to cultivate the growth of ‘good’ gut bacteria. “Every time we eat leafy green vegetables we consume significant amounts of SQ sugars, which are used as an energy source by good gut bacteria,” he said.

“Bacteria in the gut, such as crucial protective strains of *E. coli*, use SQ as a source of energy. *E. coli*provides a protective barrier that prevents growth and colonisation by bad bacteria, because the good bugs are taking up all the habitable real estate,” Dr Goddard-Borger said.

“*E. coli* is a key bacterial coloniser needed by our gut. We speculate that consumption of this specific molecule within leafy greens will prove to be an important factor in improving and maintaining healthy gut bacteria and good digestive health.”

Professor Williams said the team had revealed how bacteria extract the sugar from plants in order to fuel their growth. “We discovered the enzyme YihQ, which is used by bacteria to absorb and metabolise these sulphur-containing sugars as food,” he said.

“Sulphur is critical for building proteins, the essential components of all living organisms. SQ is the only sugar molecule which contains sulphur, and ‘digestion’ of the molecule by bacteria releases sulphur into the environment, where it re-enters the global ‘sulphur cycle’ to be reused by other organisms.”

Professor Williams said that the pathway was unusual, but abundant in biological organisms.

“This work answers a 50-year mystery that has surrounded how sulphur – an element essential for life on Earth – was used and recycled by living organisms,” he said. “What is remarkable is that the YihQ enzyme was hiding in plain sight and is produced by the humble bacterium *E. coli*, present in nearly every biologist’s laboratory.”

Professor Dame Carol Robinson Anniversary Lecture

Professor Dame Carol Robinson FRS of the University of Oxford gave the Chemistry Anniversary Lecture entitled “Changes of State and Mind” on Tuesday 16th February in the National Science Learning Centre.

The Anniversary Lecture series began in the last academic year with the first lecturer being Professor Sir John Holman, whose presentation coincided with the 50th anniversary celebrations.

Brzozowski Group Publishes Insulin Click-Chemistry Breakthrough

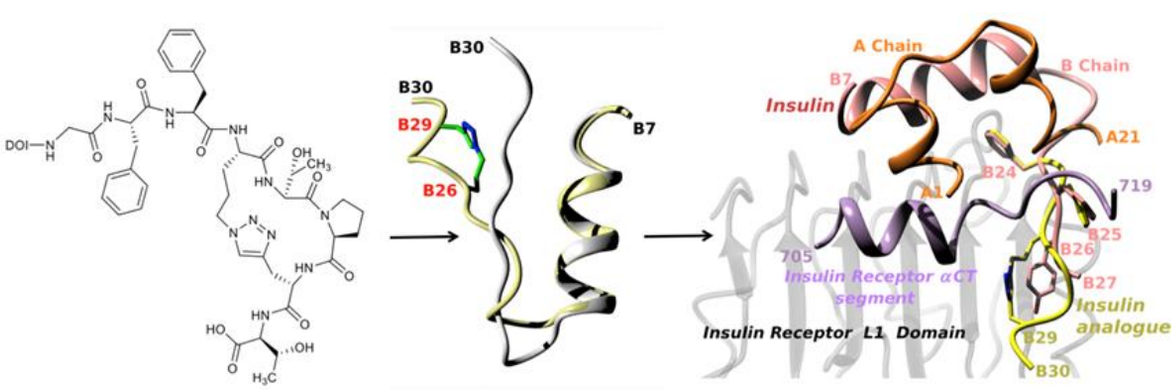
In YSBL, Professor Marek Brzozowski's group and his collaborators from Dr Jiři Jiráček's lab in the Institute of Organic Chemistry and Biochemistry (IOCB) of the Czech Academy of Sciences (Prague) have just published a paper in Scientific Reports (a *Nature* group online journal) entitled "Rational steering of insulin binding specificity by intra-chain chemical crosslinking".

This is the first intra-protein application of click-chemistry to steer protein functionality.

Insulin is a key hormone of human metabolism, with major therapeutic importance for both types of diabetes. There is a need for new insulin analogues that would mimic the physiological profile of this hormone, and which would assure much better glycemic control. There are two isoforms of insulin receptor in humans: IR-A and IR-B, where the IR-B form signals the main metabolic responses to insulin. Therefore insulin analogues that preferentially bind to the metabolic B-isoform of the IR are particularly needed.

The aim of our work was to stabilize and modulate the receptor-compatible conformation of insulin by the covalent intra-chain crosslinking within its B-chain, using click-chemistry (CuI-catalyzed Huisgen 1,3-dipolar cycloaddition reaction of azides and alkynes). Fourteen new systematically cross-linked insulin analogues were obtained, and their functions and structures were extensively characterized and correlated using NMR and X-ray. One of the analogues was highly active at binding to both IR isoforms, with a very significant preference for IR-B.

These results, obtained by a broad combination of organic and protein chemistry, structural biology and complex cell-based assays, demonstrate the potential for chemistry-driven modulation of insulin function. They also indicate new directions for the introduction of novel, desired functionalities into this hormone, with potential clinical applications.



From a click-modified insulin analogue precursor (left), to the full insulin analogue (middle), to its analysis in the Insulin Receptor molecular context (right).

Web link to the paper:
http://www.nature.com/articles/srep19431

$(NY)^3$ New Year, New York, New You

On 5th February the Department launched the $(NY)^3$ campaign and raised £597.75 with a cake sale in A block, D block coffee room and in the Biology Atrium (with donations and support from YSBL). Thank you to everyone who took part in wearing red, baking cakes and biscuits and buying and eating them.

Please see our Just Giving site: https://www.justgiving.com/teams/YorkChemistryNY3 for information about the campaign and the staff and students who have committed to an activity for 8 weeks which leads to a better work-life balance and improved physical and mental well-being.

We are raising funding for three causes to fit with the $(NY)^3$ theme; Cancer Research UK, Cystic Fibrosis and British Heart Foundation have been chosen to support colleagues in the Department who have personally been affected by these illnesses.

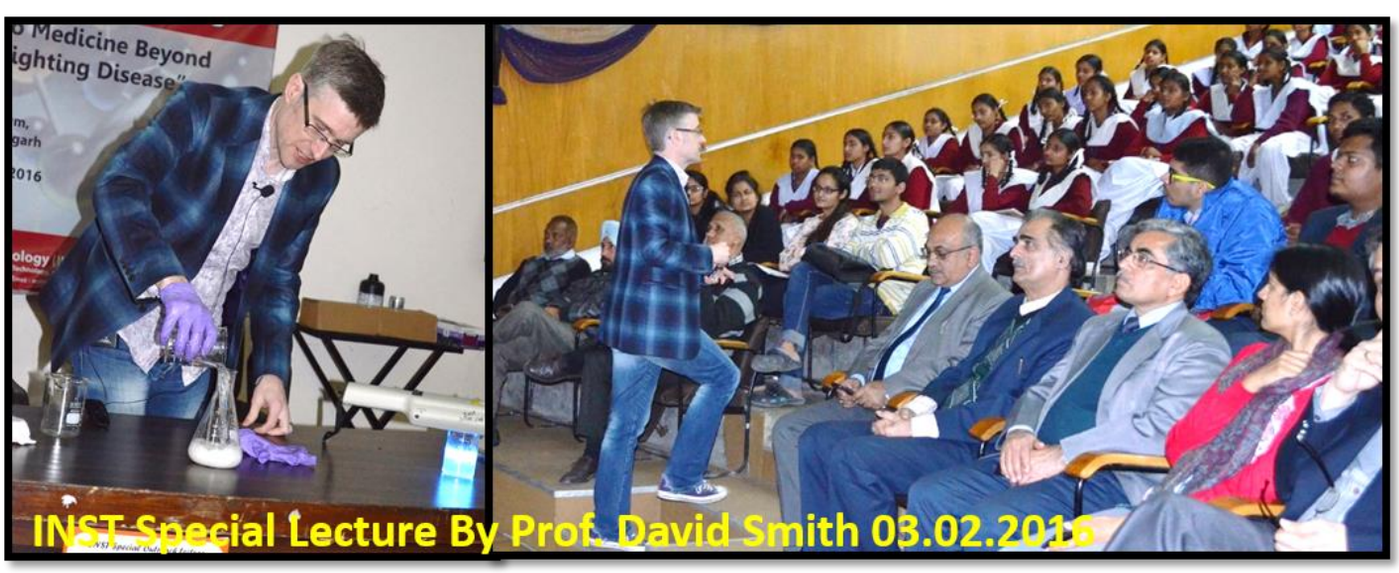
Thank you to everyone who has taken part, 5 weeks to go!

Please donate and help us to reach our targets!

Professor Dave Smith Visit to India

In early February, Professor Dave Smith took part in a Royal Society of Chemistry visit to Northern India. He gave plenary research lectures at Guru Nanak Dev University in Amritsar and at the 10th CRSI/RSC Annual Conference at the University of Panjab in Chandigarh. His talk, 'Hard Facts About Soft Matter - Self-Assembled Materials for High-Tech Applications' discussed his research group's recent studies of novel self-assembled hydrogels based on 1,3:2,4-dibenzylidenesorbitol and explored the potential applications of these industrially-relevant materials in environmental remediation, drug delivery and tissue engineering.

In addition to his research talks, Dave gave a schools outreach lecture, 'Chemistry Fighting Disease - From Traditional Medicine to Medicine Beyond the Molecule' to schoolchildren from isolated rural schools. This was the first of a series of 'special outreach lectures' organised by INST (Institute of Nanoscience and Technology, Chandigarh) featuring guest speakers. The institute has a very thriving outreach programme - indeed, Dave was lucky enough to see PhD students from the university taking their own science out onto the streets in a shopping centre in Chandigarh.



During his week in India, Dave was also lucky enough to enjoy a cultural excursion to the Golden Temple in Amritsar - a truly spectacular and spiritual place. This included participating in the free meal available at the temple's 'langar' - possibly the largest 'restaurant' in the world, serving up to 100,000 people a day and staffed wholly by volunteers.

During the conferences, Dave had the opportunity to speak to many Indian PhD students, and was impressed both by their industriousness and the very high quality of their research, with many having multiple publications in high impact journals. It was very evident that chemistry in India is thriving, and that Indian scientists are engaging the next generation with the importance of science for economic and cultural benefit.

Johnson Matthey Poster Competition

The annual PhD Poster Competition will be taking place on **Friday 18th March 2016**. Following several years of support from Bruker, we now welcome Johnson Matthey as our new sponsors of the event.

The poster competition involves all our 3rd year PhD students who are required to produce a poster about their research, and answer questions on it during the judging session. A panel of judges are involved in scoring all the posters, with the winners receiving a cash prizes courtesy of Johnson Matthey. We will also be joined by a guest from JM who will deliver a seminar that afternoon as well as announcing our winners.

To run successfully, the competition requires members of staff to join the judging panel and we still have some spaces to fill. If you are available on 18 March and would like to get involved, please email chemgrad@york.ac.uk to find out more. This is a great opportunity to get involved in a departmental event and find out about all the different research taking place. Post-docs are very welcome to be on the judging panel as well as academic staff so do get in touch if you are interested.

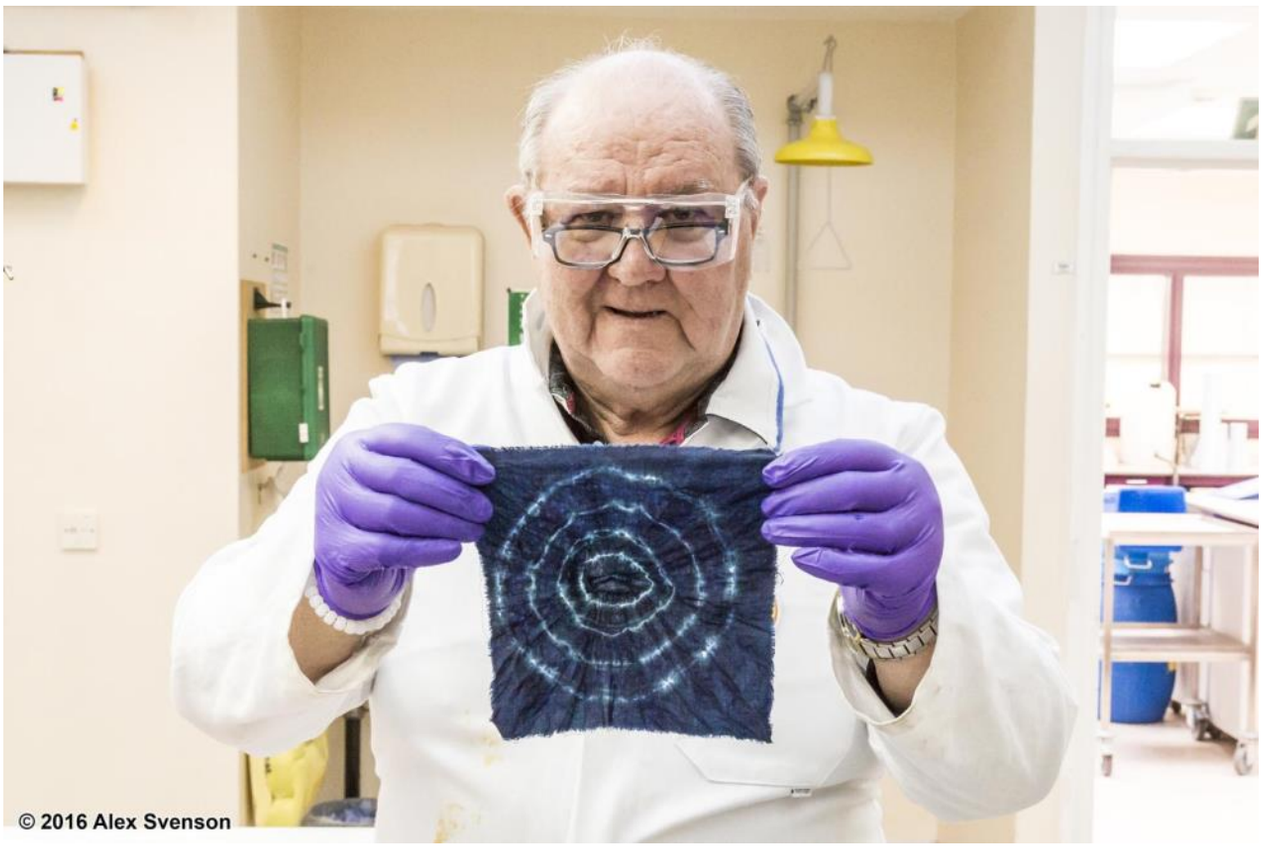
Chemistry for the Third Age

We are never too old to stop learning; we should seek to enrich our lives by discovering a new fact or developing a new skill every day. Members of the U3A (University of the Third Age*) embrace this ethos and I was delighted to welcome a group of 18 of them to the Department of Chemistry on 11th February to help broaden their chemical horizons. As members of the Sherburn U3A Science and Technology subgroup they have shared interests but, as I discovered, a wide range in backgrounds and levels of experience.

We had a joyful day exploring dyes and colours. The main activity, which was very popular, was to synthesise indigo in the YSOC labs then use this to create pieces of tie-dyed fabric. Another hit with everyone was the UV-sensitive beads, which change from white to an intense colour when exposed to sunlight or other sources of ultraviolet. U3A members enthusiastically threaded beads to make bracelets – and I don't think that all of them were for their grandchildren! I gave a couple of short talks about indigo and dyes, which led to extended periods of questions. Their curiosity and desire to learn more spilled over into the lunch and refreshment breaks, everyone ended the day enriched by the experience, including the team from York: Jing Wood, BSc Chemical Communications project student Katy Hollies and me.

As you will see from the selection of feedback comments (below) the U3A members thought it a very worthwhile day, and they very generously made a donation to support our outreach work for young people. The U3A are keen to spend more time engaging with the Chemistry Department, so if any of you fancy running an outreach event for a group of retired people, please let me know. I am sure that you would find the experience equally rewarding.

Annie Hodgson



- Absolutely fab. Made a difficult subject understandable and interesting.
- Fascinating afternoon. Theory was comprehensible and put everything in context. Practical was well organised and end result a pleasing success.
- Very well explained at the appropriate level and very well organised.
- A fun and informative day. I'd love to do more days like this.
- Had a fantastic day. Thank you. Thrilled to see the finished product. I'd come again. Really enjoyed it.

* "The University of the Third Age (U3A) movement is a unique and exciting organisation which provides, through its U3As, life-enhancing and life-changing opportunities. Retired and semi-retired people come together and learn together, not for qualifications but for its own reward: the sheer joy of discovery!" (Taken from their website: http://www.u3a.org.uk/)

Suggestion Box

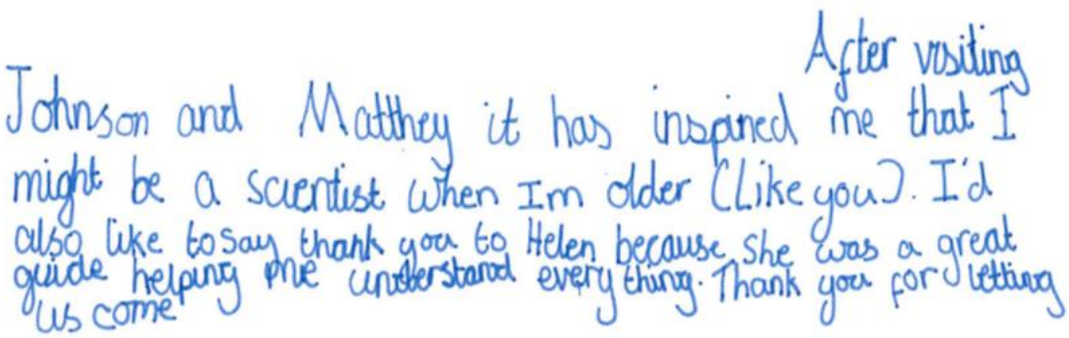
Reminder: There is a online anonymous suggestion box for staff under the Equality and Diversity section of the intranet: http://www.york.ac.uk/chemistry/internal/ and a physical suggestion box located outside Room K167 for YSBL staff. Suggestions from staff are most welcome. All suggestions are discussed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

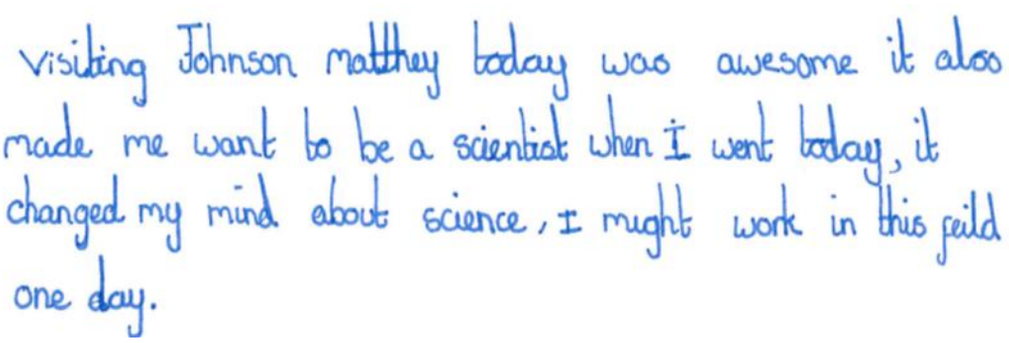
Primary School Learning in Letters

Jenny Harvey, CIEC Advisory Teacher for the North East, recently visited Billingham South Primary School to teach CCI science-industry activities with a follow up visit to the local Johnson Matthey site.

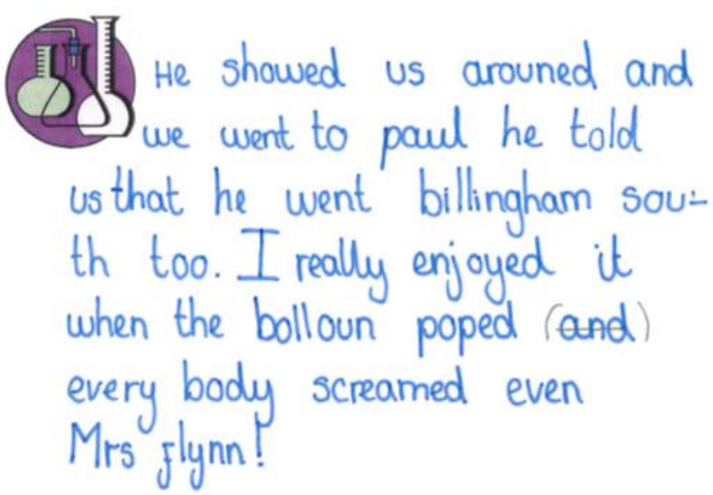
It is clear from the thank you letters written by the children to thank Johnson Matthey for the visit that it was both an enjoyable day and a very worthwhile learning experience too.

Several children expressed a desire to become a scientist as a career:

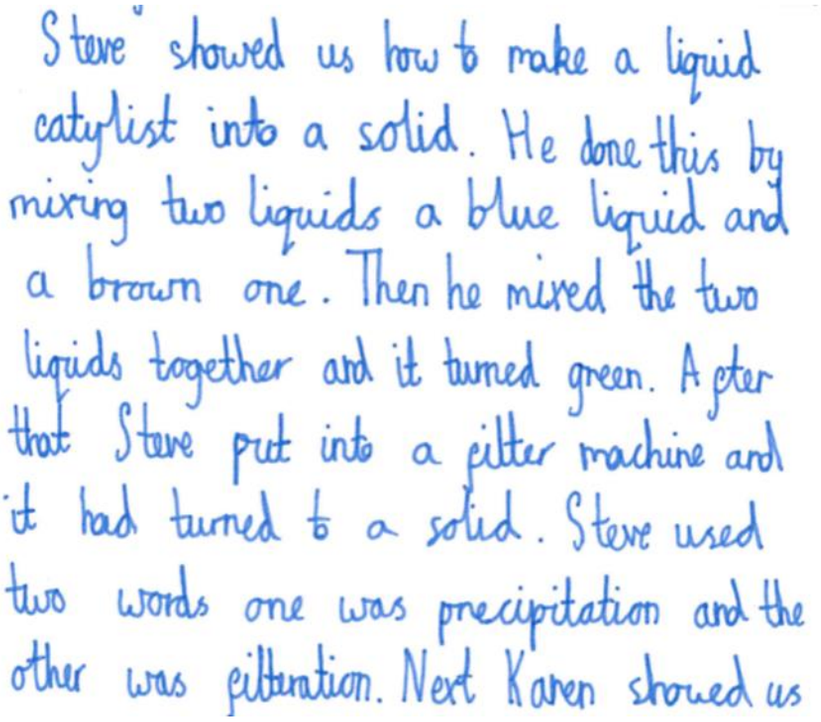

After visiting Johnson and Matthey it has inspired me that I might be a scientist when Im older (Like you). I'd also like to say thank you to Helen because she was a great guide helping me understand every thing. Thank you for letting us come


Visiting Johnson matthey today was awesome it also made me want to be a scientist when I went today, it changed my mind about science, I might work in this feild one day.

Meeting one of the tour guides, Paul, who had attended their school, also demonstrated the career possibilities to the class:


He showed us arouned and we went to paul he told us that he went billingham sou-th too. I really enjoyed it when the balloun poped (~~and~~) every body screamed even Mrs flynn!

Some children demonstrated that the visit had reinforced science vocabulary they learn about at school, whilst being introduced to some new scientific terms:


Steve showed us how to make a liquid catylist into a solid. He done this by mixing two liquids a blue liquid and a brown one. Then he mixed the two liquids together and it turned green. After that Steve put into a filter machine and it had turned to a solid. Steve used two words one was precipitation and the other was filtration. Next Karen showed us

However, although the class certainly learned a lot about science and industry in regards to gender equality, some pupils have a way to go!


Thanck-you once again and tell Garry boys are smarter than girls.

New Starters

Dr Darshita Budhadev, PDRA (working with MAF)
Room: B018; Extension: 2533; Email: darshita.budhadev@york.ac.uk

Denise Woodhouse, CHyM Administrator (covering Lyndsay Muschamp's maternity leave)
Room: CHM/005; Extension: 8886; Email: denise.woodhouse@york.ac.uk

Dr Philip Norcott, PDRA (working with SBD)
Room: CHM/101; Extension: 8892; Email: philip.norcott@york.ac.uk

Green Impact

Clothes Banks at Every College

Don't throw away old clothes/shoes – put them in the British Heart Foundation clothes banks which are located at every college.

Sustainable Shopping

Look at the 'Ethical Consumer' website www.ethicalconsumer.org – this is a treasure-trove of information on buying sustainable products – click on the product guides and you can select sub-categories and click on the products you are interested in – each product will be given a rating out of 20 – you can drag the sliders for which area you are most interested in, the environment, animals, people, politics, product sustainability. The higher the rating the better!

Why buy new books? Simply buy second hand books online:

www.worldofbooks.com (currently free delivery)

www.abebooks.co.uk (can be very good value)

Charity shops are a good way of purchasing things a lot cheaper:

For example, there are several charity shops in Goodramgate (Oxfam No. 7, BHF No. 11, Save the Children No. 23, Mind No 25, Sue Ryder No. 28, Scope No 57A, BHF, etc.)

Support your local shop! www.yorkonline.co.uk/dir/Shopping/ is a good website for information about which shops to go to in York (it also contains reviews and recommendations).

For Students – the following University website is very good (tips for everybody as well):

www.york.ac.uk/students/campus-city/sustainable-york/sustainable-shopping

Click on the below link to access the Sustainable York Guide:

www.york.ac.uk/digital-editions/york-sustainability-guide/files/html5/index.html

Buy FSC certified wood products, Rainforest Alliance certified products (www.rainforest-alliance.org/shopthefrog) Consider buying environmental cleaning products, such as Ecover.

Eat Seasonably

eatseasonably.co.uk/what-to-eat-now/calendar

Best to eat in February - Leeks / Cabbage

Best to eat in March – Spring Green Cabbage

Consider also growing your own vegetables – you don't need much space – see above Eat Seasonably website on what to grow, when.

ISC3

The new International Sustainable Chemistry Collaborative Centre (ISC3) is being been set up by the German Federal Environment Agency.

Its purpose it to ensure:

- Existing expertise is networked and bundled in order to exert a positive influence above all on the interface between science and politics
- The further development of Sustainable Chemistry from its basic principles to methods and applications to business models is fostered at international level
- Fundamental Sustainable Chemistry principles and strategies are further pushed and penetrate the economies in industrialized, emerging and developing countries
- ISC3 is expected to run from 2017 with a launch event in Berlin.

Dr Avtar Matharu was Invited International Chair and Co-ordinator for Education in Green and Sustainable Chemistry at a planning meeting last September in Berlin. Avtar led high-level discussion and debate on the current global position of green chemistry from primary to higher education. The results of which were forwarded to ISC3. At the first meeting of the ISC3 Advisory Council which has 35 representatives and stakeholders from numerous agencies and international organisations, Professor James Clark was elected as Chair. The website is not yet publicly available but we will keep you informed of progress until it is!

Equality and Diversity Group Meeting

The Equality and Diversity Group met mid-January and topics of discussion included:

The Eleanor Dodson Fellowship: It was agreed that for future vacancies of this nature extra clarification should be given regarding the 'unusual/non-traditional career path' element of the advert and how this element impacts on the recruitment & selection process.

Feedback on AS Submission: EDG noted that representation of women on departmental committees must be done without adding additional pressure to female colleague workloads. This is particularly important to bear in mind if the committee member is someone who works part-time. A way to support all part-time staff who sit on departmental committees is to ensure that both the frequency and length of all committee meetings are reviewed to ensure that they are useful and not excessive. Use of positive chairing should also be considered by all committees including use of a co -chair.

Equality and Diversity Group Membership: Terms of office and processes for election of Chair, Deputy Chair and members and observers to be drawn up.

Use of Wiki for sharing E&D information

Departmental Culture Surveys: Issues discussed included: surveys to be anonymous, clarity on when positive action is appropriate to be sought, need to include discussion of other characteristics (not just gender), separate questions for ART and professional staff, need for approval by ethics committee, donation to charity for every survey completed.

Recruitment Issues: First question to be sent in advance for all interviews, including those for PhD studentships, strapline on all adverts to be re-considered and work on improved candidate briefs ongoing with HR.

Joliot-Curie Conference: possible speakers discussed for the conference on 6 & 7 September 2016.

Pay Gap Review: The Department should specifically state its commitment to support staff as part of the widening of the AS remit to include this staff group. The group identified the need for all staff to understand the role grading and review process.

Simpson's Paradox or the **Yule–Simpson** effect: a paradox in probability and statistics, in which a trend that appears in different groups of data but disappears or reverses when these groups are combined. It is sometimes given the impersonal title reversal paradox or amalgamation paradox.

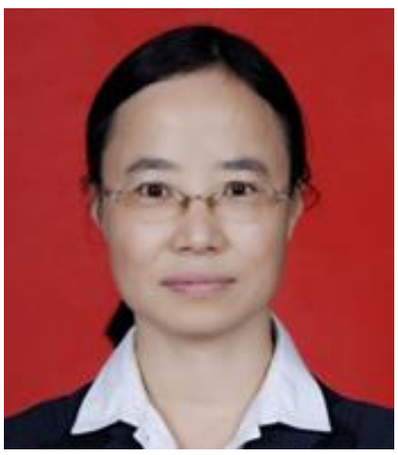
More information can be found under Equality and Diversity at:
http://www.york.ac.uk/chemistry/internal/

Visiting Scientists at the Green Chemistry Centre

Every year, the Green Chemistry Centre of Excellence (GCCE) welcomes several visiting scientists from all over the world.

At the moment, there are 4 visitors at the GCCE: Professor Yinjuan Bai and Yiping Luo from China, Professor Mark Mascal from the USA, and Dr Alexandra Inayat from Germany. Mitchell Rossou has just finished his visit at the GCCE and returned to the Netherlands few weeks ago.

The purpose of this article is to introduce the visiting scientists who are working in the GCCE with main focus on their motivation to join the GCCE and what their experience is so far.



Prof. Yinjuan Bai

Stay: Dec 2015—Dec 2016

Background

I am from the Key Laboratory of Synthetic and Natural Functional Molecule Chemistry of Ministry of Education, College of Chemistry & Materials Science, Northwest University, Xi'an, Shaanxi, China.

My research interests are: 1) synthesis and application of novel fluorescein probes and 2) green organic synthesis

Research Topic / Occupation at the GCCE

Bio-based polymer from itaconic anhydride and furfuryl alcohol.

Funding for the visit

China Scholarship Council (CSC)

Prof. Mark Mascal

Stay: Jan 2016—Mar 2016

Background

I am a professor of chemistry at the University of California Davis. Trained as a synthetic organic chemist, a strong focus of my current research program is the conversion of biomass into platform chemicals and the use of these chemicals to unlock key derivative markets traditionally dominated by petroleum.

Research topic/occupation at the GCCE

Working in collaboration with scientists at the Centre on the valorisation of the lignin by-product of the biomass to 5-(chloromethyl)furfural (CMF) process, and the use of CMF and its derivatives to prepare novel renewable polymers.

Yiping Luo

Stay: Oct 2015—Oct 2016

Background

I am from Key Laboratory of Green Chemistry and Technology in Sichuan University (one of China's top universities). My main research interests are the conversion of biomass to value-added chemicals via solvent-thermal methods, especially for the conversion of hemicellulose in biomass.

Research topic/occupation at the GCCE

I will be in GCCE for one year as a visiting scientist working with Professor James Clark, Dr Vitaly Budarin and Dr Alice Fan in the Microwave Technology Platform on the controlled decomposition of bamboo. We hope that it can provide a new route for the production of value-added chemicals from bamboo.

Funding for the visit

China Scholarship Council (CSC)

Dr. Alexandra Inayat

stay: Aug 2015—Jul 2017

Background

After studying chemistry I joined the Institute of Chemical Reaction Engineering at University of Erlangen-Nürnberg in Germany where I specialised in the synthesis, characterisation and catalytic application of porous materials and got involved in the setup and teaching of a new study course on sustainable chemical engineering. My research interest is especially in the green conversion of renewable molecules into useful products as well as in sustainable technologies in general.

Research topic/occupation at the GCCE

Working with Dr Tom Farmer on the conversion of the bio-derived platform molecule isosorbide into potential monomers and solvents; gaining insight into the MSc course "Green Chemistry & Sustainable Industrial Technology".

Funding for the visit

Scholarship from the German National Academy of Sciences (Leopoldina)

Mitchell Rossou

Stay: Sep 2015 —Jan 2016

Background

I study chemistry at Fontys University of Applied Sciences in Eindhoven, Netherlands

Research topic/occupation at the GCCE

Bio-oil research, optimisation, qualification and quantification

Funding for the visit

Erasmus scholarship from my institute and study finance from the government

All the visitors share a passion for green chemistry which led them to the GCCE. Yinjuan says: "*As a researcher, I like to go abroad for further study and research to enlarge my academic mindset and improve my research capacity. The GCCE has a generous number of distinguished researchers and made a series of significant academic achievements, which was an attraction for me. With the help from Prof. Michael North and the China Scholarship Council I am privileged to be here. I appreciate all the support I have so far from the GCCE members and I am very much impressed by the lab facilities and management. I believe that the experience of continuing working here will be wonderful and beneficial. "*

Alexandra also joined the GCCE in order to deepen her knowledge of green chemistry and to gain hands-on experience with green synthesis. She states: "*For me, the GCCE is the ideal place to see green chemistry in practice as well as in academic education. Here, it is already normal to use "green" solvents like dimethylcarbonate in the daily lab work and to think about "greener" alternatives in every synthesis planning. I am surrounded by colleagues who have a vast knowledge in and passion for green chemistry, which they generously share with me. I am very thankful that I am allowed to be part of this group for two years, which will surely not only have a long-term influence on my research but also on how and what I will teach my future students back in Germany."*

Mark describes his motivation to visit: "*Taking sabbatical here in York gives me the opportunity to reinforce collaborative links with the Centre and experience it in day to day operation, as we consider establishing a Green Chemistry consortium across associated disciplines at UC Davis."*

For Yiping the visit is part of the program to develop a collaboration between the GCCE and the Key Laboratory of Green Chemistry and Technology in Sichuan University. She says: "*Personally, I really enjoy doing research in the GCCE: Good experimental environment, advanced technologies, nice people. I am very thankful for the support from China Scholarship Council, and also thank Prof. Changwei Hu who gave me the opportunity to go abroad to do research. With the help from Prof. James Clark, Dr Vitaly Budarin, Dr Alice Fan and Dr Mario De Bruyn in the GCCE, I gain a lot every day that I am here. I acknowledge all the members in the GCCE who help me in experiments and life; I cherish every day here. I believe my visit will be meaningful and also have a great influence on my further research when I come back to China. Besides, I hope the visit can further promote the development of collaboration between the GCCE and my home university."*

Mitchell spoke of his stay as follows: "*My interest always lied in sustainable energy and alternative fuels, so when I found the Green Chemistry Centre at York, I was pleasantly surprised. I have had a really good time the past 5 months. I learned a lot and have had a great time getting to know new people and expanding my network. I have been working with Dr Vitaliy Budarin on the development of the pyrolysis setup and have been developing an analytical plan for the oils. I had a great time and will keep contact with everyone I met."*

All visitors would like to thank the GCCE and the whole Department of Chemistry at the University of York for their kind support and hospitality. This article will frequently be followed by further introductions of visiting scientists joining the GCCE in the future.

Chemical *Inter* Actions

Social Group Open to All in the Department of Chemistry

Email team name and number of players to chemical-interactions-group@york.ac.uk

Tuesday 15th March
6.30pm - 8.30pm, A122

General Knowledge and Trivia
BYO drinks and nibbles

www.facebook.com/ChemInteractions

1 **Grab your phone**
One smartphone or tablet required per team

2 **Download the app**
Search for SpeedQuizzing Virtual Buzzer

3 **Tell some friends**
Maximum 8 players allowed per team

4 **Get down !!**

See it in action

This event is powered by the incredible SpeedQuizzing quiz game platform. Find out more at..

speedquizzing.com

Practical Aspects of Green Chemistry in the Pharmaceutical Industry

CHEM21 Workshop & Symposium

13th -15th June 2016, RSC Burlington House, London, UK

www.chem21.eu

Cost: Free

This highly interactive workshop will be delivered by a blend of CHEM21 academics and industry experts in the field, involving group work and problem solving exercises alongside seminars to explore a broad range of cutting-edge case studies and industrial examples on greening the synthesis of Active Pharmaceutical Ingredients (APIs).

The workshop is open to students, academics and industrialists. Places are limited and will be allocated on case by case basis. If you are interested in attending please complete the registation form at https://chem21-greenchemistry-workshop.eventbrite.co.uk including a brief supporting statement explaining your reasons for applying.

19:00 – 21:00 13th June **Reception and Pre-Workshop Networking Event**

- Keynote Presentation – Green Chemistry & Sustainability for the 21st Century Industry (Prof. James Clark, University of York)
- Introduction to CHEM21, IMI and aims of the workshop
- Launch of the CHEM21 online Education and Training platform

9:00-17:00 14th June & 9:00-13:00 15th June **Workshop & Symposium**

This will consist of a blend of lectures, interactive small group exercises and whole group discussions on the following subjects:

- Metrics and Route Selection (Prof. Andy Wells, CTC Ltd and Dr John Hayler, GlaxoSmithKline)
- C-H activation (Prof. Bert Maes, University of Antwerp (tbc))
- Biocatalytic Retrosynthesis (Prof. Nick Turner, University of Manchester)
- Solvents Lecture (Dr Denis Prat, Sanofi)
- Solvents (Dr John Hayler & Dr Helen Sneddon, GlaxoSmithKline)
- Fluorination (Prof. Graham Sandford, Durham University)
- Flow chemistry (Prof. John Blacker, University of Leeds)
- Synthetic Biology (Prof. Anton Glieder, Technische Universität Graz & Dr Claus Lattemann, Sanofi)

CHEM21 is Europe's largest public-private partnership dedicated to the development of manufacturing sustainable pharmaceuticals and brings together six pharmaceutical companies (GlaxoSmithKline, Bayer, Janssen, Orion, Pfizer and Sanofi), 13 Universities and four small to medium enterprises from across Europe (www.chem21.eu). CHEM21 has received funding from the Innovative Medicines Initiative Joint Undertaking under grant agreement n°115360, resources of which are composed of financial contribution from the European Union's Seventh Framework Programme. (FP7/2007-2013) and EFPIA companies' in kind contribution. www.imi.europa.eu

24th International Symposium on Gas Kinetics and Related Phenomena

17th - 21st July 2016 at the UNIVERSITY of York

Invited Speakers:

Polanyi Medalist

Professor James G. Anderson (Harvard)

Benson Lecture

Professor Jürgen Troe (MPI Göttingen)

Plenary Speakers

David Glowacki (Stanford and Bristol)

Mark Blitz (Leeds)

Luc Vereecken (Forschungszentrum Jülich)

Lucy Carpenter (York)

Adam Trevitt (Wollongong)

Annele Virtanen (Univ. East Finland)

Alison Tomlin (Leeds)

Claire Vallance (Oxford)

Contributions welcome on a range of topics:

- **reaction dynamics; elementary processes**
- **atmospheric and combustion chemistry**
- **modelling of complex systems**
- **nanoparticles & aerosols; experimental methods**

Important dates:

- **Abstract submission - Tuesday, 5th January 2016**
  - **Friday, 15th April 2016**
- **Early bird deadline for registration payment**
  - **Monday, 4th April 2016**
- **Registration deadline**
  - **Friday, 1st July 2016**

ROYAL SOCIETY OF CHEMISTRY

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For more info **www.gk2016york.com**

Contact local organisers via **GK-2016@york.ac.uk**

GK York 2016