Chemistry Update

Newsletter 326, 30 October 2020

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Calendar of Events

Inorganic Early Career Seminar
Speakers: Dr Lisa Miller, University of York;
Dr Jennifer Garden, University of Edinburgh;
Dr Timothy Barendt, University of Birmingham;
Dr Rebecca Musgrave, King's College London;
Date: Wednesday 4 November
Time: 1pm—3.35pm
Location: Virtual

Organic Seminar
Speakers: Dr Michael James, University of York;
Prof John Murphy University of Strathclyde
Date: Wednesday 18 November
Time: 2.30pm—4pm
Location: Virtual

Physical Chemistry Seminar
Speaker: Dr Rebecca Caravan, Argonne National Laboratory (US Dept of Energy)
Date: Wednesday 25 November
Time: 2pm—3pm
Location: Virtual

Date of Next Issue:
27 November 2020

Department wins grant to understand the experiences of BAME staff and students

The under-representation of BAME (Black, Asian and Minority Ethnic) individuals is a longstanding problem in chemistry and represents an enormous loss of talent. To help address this urgent problem, the Department of Chemistry has recently been awarded £5000 by The Royal Society of Chemistry to survey the lived experiences of BAME chemistry students and staff.

Demonstrating the seriousness of the problems faced by BAME chemists, a recent Royal Society of Chemistry study demonstrated that the UK chemistry pipeline loses almost all of its BAME chemists after their undergraduate studies. As such, the Departmental Equality and Diversity Group, chaired by Professor Caroline Dessent, wanted to take action to understand and address this problem.

The Department of Chemistry at the University of York has been a pioneering department in Equality, Inclusion and Diversity. For example, through the policies and practice developed in York, gender equality has been embedded in the Department's culture to the benefit of all of its members, as reflected by the award of Athena SWAN gold status, held continuously since 2007. The Department is now planning to use this experience to build the best possible environment to support BAME students and staff.

In the early years of our work on gender equality, the key activity was listening to the lived experiences of women and allowing them opportunities to talk. These discussions provided a space for individuals to be honest about any problems they faced, individually or with the Department itself. This new project will therefore carry out a broad listening exercise with BAME staff and students in the Department.

Dr Sean McWhinnie an external consultant, who understands the chemistry context having been an inorganic chemistry lecturer and worked in Science Policy and Diversity for the RSC, and is himself BAME, will be employed to carry out the survey. In this way, consultations will be conducted in a manner that allows individuals to be as honest as possible. This work will allow us to identify the ways in which individuals experience racism, understand career aspirations and bottlenecks, and identify practical actions that any department could put in place to encourage individuals to continue with chemical careers.

Dr McWhinnie commented: "I'm delighted to be working with York Chemistry to explore this important topic. Although nationally, the representation of BAME people in undergraduate chemistry is broadly what one might expect, representation at more senior levels remains very low."

In particular, we hope to understand the lived experiences of BAME staff and students and the actions they believe would encourage them to continue in chemical careers. We also hope to learn whether there are differences in the experience of UK and non-UK BAME chemists. The results will be compiled in an openly-available report that will be disseminated across the chemical community.

Professor Dessent said: "We were delighted to receive support for this project from the RSC Inclusion and Diversity Fund and hope that our students will welcome the opportunity to contribute their experiences. We want to ensure the Department enables all of its staff and students to thrive, and think this is an important step in helping us achieve this goal."

Dr Avtar Matharu, member of academic staff in the Chemistry Department, and Chair of the University Staff Race Equality Forum said: "This will be an important study, and I hope it provides rich information. The environment experienced by individuals in York will likely be very different from other universities, particularly those with higher current percentages of BAME students and staff. We hope our project will stimulate similar work in other institutions and we plan to share all of our developed resources to facilitate this. In the longer term, it will be particularly important to understand how the lived experiences of BAME chemists change from department to department across the UK, and identify best practice in the widest possible terms".

The Royal Society of Chemistry Inclusion and Diversity Fund provides financial support for innovative products, activities and research projects that foster inclusion and diversity in the chemical sciences. The survey of BAME experiences will run during the early part of 2021 and should report later in the year.

New starters

Paven Kisten , Marie Skłodowska-Curie Early Stage Researcher
Room: CHym 113; Ext: 8890; Email: paven.kisten@york.ac.uk

Daniel Day, Green Chemistry PDRA – CHAMPION Project
Room: C/F111; Ext: 4547; Email: dan.day@york.ac.uk

Katriona Harrison, Teaching Laboratory Demonstrator
Room: C/B103; Ext: 5872; Email: kat.harrison@york.ac.uk

Jennifer Gibbard, DTP Administrative Manager
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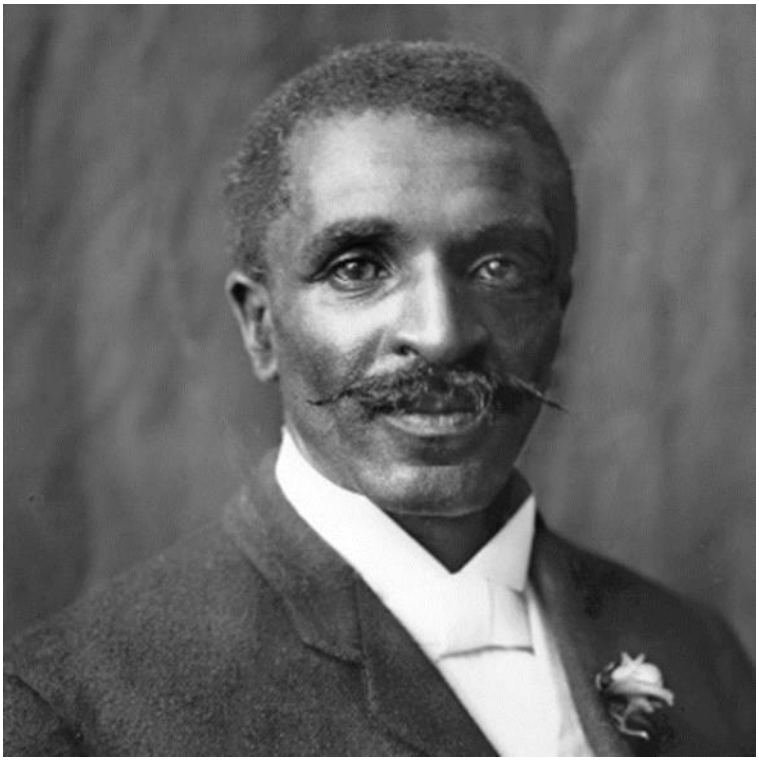
Navod Angelo Amaratunga, Teaching Laboratory Demonstrator
Email: naa538@york.ac.uk

Black History Month: Scientist of Substance

George Washington Carver by Avtar S Matharu and Jordan Dialpuri



(photo credit: Photo: Frances Benjamin Johnston [Public domain], via Wikimedia Commons)

"*This article came about as a consequence of lockdown, specifically at the end of academic year 2019/20 during the summer vacation. I was contacted by Jordan Dialpuri, then MChem Year 2 and now Year 3, who asked if there was a possibility for an internship in the Green Chemistry Centre of Excellence. As this was not possible, I gave Jordan a challenge to co-research the life and works of George Washington Carver. I was aware of George Washington Carver and his impact in what we now call Green Chemistry. I am grateful to Jordan in producing a poster and we are now writing an article for A-level students to be published in Chemistry Review in due course. We have extended our research to famous Indian scientists and look forward to sharing our findings on the life and works of Raman and Bose*." - Dr Avtar Matharu

"*I had never heard of George Washington Carver before Dr Matharu suggested this topic. The more I read the more I became fascinated by this eminent scientist and the contributions he made. My initial naivety has turned into positivity. Working over the summer whilst in lockdown was very rewarding and mentally-stimulating*" - Jordan Dialpuri

October marks Black History Month but also this year it saw the launch of the Earthshot Prize by Sir David Attenborough and HRH Prince William to protect the future of our planet. Already touted as the "Nobel Prize for Environmentalism", the Earthshot Prize will award £50m over the next few years towards innovative solutions that help i. protect and restore nature; ii. clean our air; iii. revive our oceans; iv. build a waste-free world and iv. fix our climate. These challenges also reflect the needs of a global society for all within the context of the 2015 United Nations Sustainable Development Goals (UN SDGs). But, what's new in all of this, if anything?

George Washington Carver, unknown to many readers, championed the UN SDGs and the Earthshot Prize over a century ago. He researched ways to protect and restore nature, use waste as a resource, alleviate poverty, provide jobs and create a fairer society for all. Today, he would be a worthy recipient of a 'Nobel Prize for Environmentalism'.

George Carver was born in 1864 into slavery in Diamond, Missouri, USA, and from a young age was fascinated by plants and flowers. In 1891 he enrolled at Iowa Agricultural College – their first ever black student, where he excelled, gaining his BSc in Agriculture (1894) and his Master's in Plant Physiology (1895). In fact, George was the first black student in America to gain a Bachelor's in Science.

George adopted the name George Washington Carver later in life, in honour of Booker T. Washington who offered him his first academic position in 1896 as Departmental Head of Agriculture at Tuskegee Institute (now Tuskegee University), Alabama. During the period 1901-1943, George Washington Carver focused on extracting useful products from plants (renewable resources). Farms at the time were becoming increasingly inefficient due to the soil depletion caused by farming cotton continuously. Washington Carver promoted alternative crops to poor farmers as a way to resupply the soil with nitrates whilst also advising the US Department of Agriculture. He encouraged farmers to become more self-sufficient by farming crops such as sweet potatoes, soy and peanuts. He invented numerous products derived from sweet potatoes and peanuts, including edible products like flour and vinegar and non-food items such as stains, dyes, paints and writing ink. He dedicated his research to finding additional uses for these crops and published 44 practical bulletins aimed at farmers containing recipes and instructions on how to increase farming efficiency.

During his career, George Washington Carver had numerous scientific discussions with Henry Ford, who had an interest in both using waste renewable resources to produce bioethanol and also using agricultural fibres for the construction of cars. He also advised Mahatma Gandhi on the nutritional benefits of vegetal proteins, in particular soya, to vegan diets. Carver died in 1943 and his legacy was honoured by The George Washington Carver National Monument which now stands in Diamond. President Franklin D. Roosevelt signed legislation for Carver to receive his own monument, an honour previously only granted to Presidents George Washington and Abraham Lincoln. A few years prior to his death, his scientific works were placed in a museum, part-funded by Henry Ford in his honour – the George Washington Carver Museum.

George Washington Carver was not only a 'Scientist of Substance' and a green and sustainable chemist but, importantly, a person of the world who strived for equality, diversity and inclusivity.

Chemistry First Aiders List

Message from Jing Wood: The chemistry first aiders and emergency contact lists have now been updated on the intranet. Please feel free to download and display relevant copies for your area.

Research fellowship to explore tuberculosis treatments

Pioneering research at the University of York could help us understand how the latest new antibiotics against tuberculosis (TB) work - and pave the way for improved treatments in the future.

Dr Jamie Blaza, from York's Department of Chemistry, has been awarded a Future Leaders Fellowship from UK Research and Innovation (UKRI) to study the role of newly developed antibiotics in tackling the infection.

Advanced

Dr Blaza and his team will use advanced biophysical methods to measure the energy flow in living bacterial cells and how these parameters change in response to antibiotics.

He will combine these measurements with high-resolution imaging of key bioenergetic enzymes using an advanced electron microscope. This new cutting-edge instrument will be installed in the Eleanor and Guy Dodson Building, a new facility currently under construction as part of the York Structural Biology Laboratory in the Department of Chemistry.

The fellowship project will run for four years, with the possibility of a three-year extension.

"For the first time, a number of biophysical techniques will be brought together to allow us to measure key cellular molecules without needing to break open or disrupt the bacteria," said Dr Blaza.

Unique

"The research will give us a unique window into the workings of the bacterial cells. Once we have that understanding in untreated bacteria, we will add clinical antibiotics to observe how different drugs work to disrupt the cell. By clarifying their mechanism of action, we should be able to offer insights into how to make more effective antibiotics to tackle TB."

TB is one of the top ten causes of death worldwide - in 2017, 10m people developed the disease causing 1.6m deaths. It is caused by the infectious mycobacterium Mycobacterium tuberculosis and current treatment strategies rely on a combination of drugs over an extended period with unpleasant and damaging side-effects.

Antibiotic-resistance is threatening the effectiveness of these treatments.

Dr Blaza said: "The challenge is to develop drugs that remain effective and have fewer side effects. By understanding the complicated interactions between tuberculosis biology and antibiotics we aim to aid the development of new compounds."

Understanding

Professor Duncan Bruce, Head of the Department of Chemistry, said: “I am delighted that Jamie has been awarded this fellowship. His understanding of the biochemical pathways combined with the insight he will gain from the use of the new electron microscope promise to provide a unique insight into this awful disease.”

The Future Leaders Fellowships scheme helps universities and businesses in the UK recruit, develop and retain the world’s best researchers and innovators, regardless of their background. They can apply for up to £1.5m to support the research and innovation leaders of the future, keeping the UK at the cutting edge of innovation.

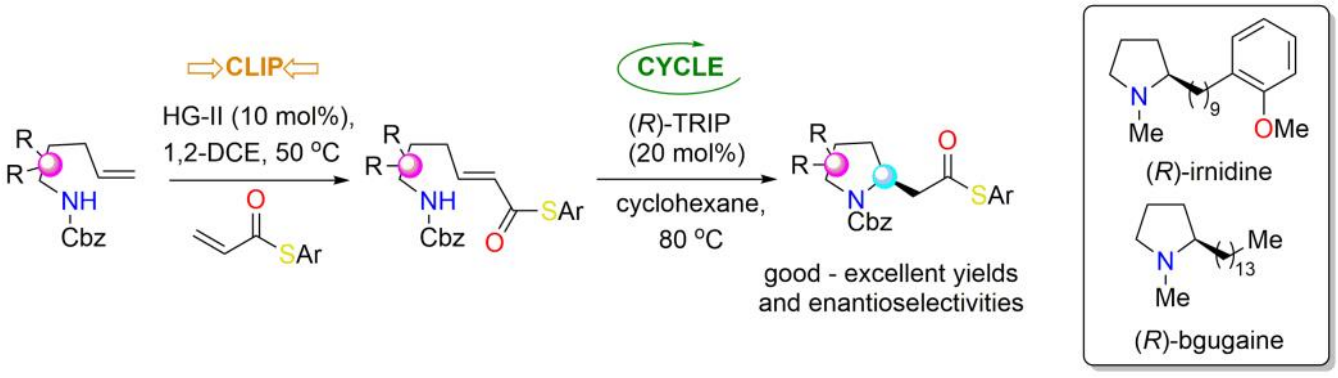
Announcing the awards today, UK Science Minister Amanda Solloway said: “We are committed to building back better through research and innovation, and supporting our science superstars in every corner of the UK.

“By backing these inspirational Future Leaders Fellows, we will ensure that their brilliant ideas can be transferred straight from the lab into vital everyday products and services that will help to change all our lives for the better.”

Clarke Group news

We welcome Molly James and Bohdan Sosunovych who have joined the group for PhD and MSc(Res) studies respectively. Molly will be investigating the application of 'clip-cycle' chemistry to the asymmetric synthesis of nitrogen heterocycles and Bohdan will be investigating the scope of asymmetric amino imidate catalysed reactions.

The group's latest publication is the work of Chris Maddocks with his development of the asymmetric 'clip-cycle' reaction for the synthesis of pyrrolidines and spiropyrrolidines, and its application to the total syntheses of alkaloids (R)-irnidine and (R)-bgugaine. This work was carried out in collaboration with former group member Kristaps Ermanis who is now a Leverhulme Trust Research Fellow at the University of Cambridge. The work has been published in *Org. Lett.* 2020, 22, 8116.



Congratulations are due to Chris Maddocks who has secured a job in Nijmegen, the Netherlands working on new approaches to the treatment of TB. He starts his new position in November. Good Luck Chris!

Highly cited work from the GCCE

The journal *ACSCatalysis* (impact factor 12.35) is currently running a series of editorials highlighting the most highly cited papers published in *ACSCatalysis* from various countries/regions. The latest such editorial (*ACSCatalysis* 2020, 10, 19, p11663–11664) focuses on the United Kingdom and the second most highly cited paper comes from the Green Chemistry Centre of Excellence (GCCE).

In 2016, Professor North along with just two co-workers (Dr Jose Castro-Osma and Dr Katie Lamb) published a paper entitled 'Cr(salophen) Complex Catalyzed Cyclic Carbonate Synthesis at Ambient Temperature And Pressure' (*ACSCatalysis* 2016, 6, p5012–5025). The editorial which is based on data collected from Web of Science on 14 September 2020 lists this paper as receiving 141 citations in just four years.

Table 1. Selected Highly Cited Papers Published in *ACS Catalysis* with Corresponding Authors Working in the United Kingdom[a]

authors	title	year	volume	pages	citations[a]
Leitch, Jamie A.; Bhonoah, Yunas; Frost, Christopher G.*	Beyond C2 and C3: Transition-Metal-Catalyzed C−H Functionalization of Indole	2017	7	5618−5627	147
Castro-Osma, José A.*; Lamb, Katie J.; North, Michael*	Cr(salophen) Complex Catalyzed Cyclic Carbonate Synthesis at Ambient Temperature And Pressure	2016	6	5012−5025	141
France, Scott P.; Hepworth, Lorna J.; Turner, Nicholas J.*; Flitsch, Sabine L.*	Constructing Biocatalytic Cascades: In Vitro and in Vivo Approaches to de Novo Multi-Enzyme Pathways	2017	7	710−724	134
Pirez, Cyril; Caderon, Jean-Michel; Dacquin, Jean-Philippe; Lee, Adam F.; Wilson, Karen*	Tunable KIT-6 Mesoporous Sulfonic Acid Catalysts for Fatty Acid Esterification	2012	2	1607−1614	129
Parlett, Christopher M. A.; Bruce, Duncan W.; Hondow, Nicole S.; Lee, Adam F.*; Wilson, Karen	Support-Enhanced Selective Aerobic Alcohol Oxidation over Pd/Mesoporous Silicas	2011	1	636−640	119
Yang, Bo; Burch, Robbie; Hardacre, Christopher*; Headdock, Gareth; Hu, P.*	Origin of the Increase of Activity and Selectivity of Nickel Doped by Au, Ag, and Cu for Acetylene Hydrogenation	2012	2	1027−1032	104
Bidal, Yannick D.; Lazreg, Fäima; Cazin, Catherine S. J.*	Copper-Catalyzed Regioselective Formation of Tri- and Tetrasubstituted Vinylboronates in Air	2014	4	1564−1569	78
Polidano, Kurt;Allen, Benjamin D. W.; Williams, Jonathan M. J.; Morrill, Louis C.*	Iron-Catalyzed Methylation Using the Borrowing Hydrogen Approach	2018	8	6440−6445	73
Wang, Xiaodong; Yiu, Humphrey H. P.*	Heterogeneous Catalysis Mediated Cofactor NADH Regeneration for Enzymatic Reduction	2016	6	1880−1886	37
Dourado, Daniel F. A. R.; Pohle, Stefan; Carvalho, Alexandra T. P.; Dheeman, Dharmendra S.; Caswell, Jill M.; Skvortsov, Timofey; Miskelly, Iain; Brown, Rodney T.; Quinn, Derek J.; Allen, Christopher C. R.; Kulakov, Leonid; Huang, Meilan*; Moody, Thomas S.	Rational Design of a (S)-Selective-Transaminase for Asymmetric Synthesis of (1S)-1-(1,1′-biphenyl-2-yl)ethanamine	2016	6	7749−7759	24

[a]Based on Web of Science data gathered on September 14, 2020.

Professor North commented that it is a testament to the quality and importance of the work carried out by Jose and Katie that their paper is more highly cited than work from other UK based groups, some of which was published as long ago as 2011 in the very first volume of *ACSCatalysis*.

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.

KMS Winners Seminar: An online experience

On 7 October, this year's KMS Winners' Seminar was, like all large events this year, held online, chaired by KMS Chair, Aneurin Kennerley. However, this did not detract from the event, with our four winners all delivering their brilliant presentations via Zoom to our departmental audience. Our winners and talk titles were:

Lucy Wheeler (Kirsty Penkman and Roland Gehrels)

Bringing amino acid geochronology of sea-level records up to date: investigating the intra-crystalline approach for foraminifera

Ben Tickner (Simon Duckett)

Improving the sensitivity of NMR using iridium-catalyzed magnetization transfer from parahydrogen

Natalie Wong (Caroline Dessent and Martin Cockett)

Illuminating sunscreens: laser photodissociation of deprotonated & protonated organic sunscreens

Anna Patterson (Dave Smith)

Supramolecular hydrogels for drug release

Many congratulations to all winners, as well as those nominated, and thanks to the KMS Panel.

Rainbows from D Block

This spectacular view of the double rainbow on Tuesday 6 October was taken by Adrian Whitwood from the second floor of D Block.