

Bradford ChemBio

What's been going on in our school for the past three months...
June – August 2019



Welcome from your Newsletter Editors...



The start of a new semester is upon us, and it is great to see lecture theatres full of enthusiastic new and returning students. If this is your first experience of the School of Chemistry and Biosciences newsletter, welcome! This edition represents the start of our third year, and we believe we've gone from strength to strength in terms of staff and student engagement with the finished product, but also with the amount of great content (science related and otherwise) that you all contribute. So firstly we'd like to thank you for this continued support, but also encourage any of you who haven't contributed yet (or have ideas about things you'd like to see within these pages) to get in touch with us!

We would like to take this opportunity to welcome not only our new students (both undergraduate and postgraduate), but also our new lecturer in Molecular Microbiology, **Dr Conor Meehan**. Conor looks set to be a really fantastic addition to the team. Sadly, we would also like to extend our best wishes and fond farewell to **Prof Vladimir Botchkarev** who is unfortunately leaving us. Vlad made fantastic contributions to both our School and the University, so I'm sure you will join us in wishing him well.

In big news, **Dr Julie Thornton** has been nominated for a **Times Higher Education Award** for the quality of her supervision. To be nominated for this award is a really big deal, and we'd like to congratulate Julie on a success well deserved!

Finally, we hope you enjoy reading this edition of the newsletter, and keep the contributions coming.

Dr Kirsten Riches-Suman and Dr Andrew Tedder

Athena SWAN

News from the EDOC

We hope you all had a great summer and we would like to welcome all new students and new members of staff to our School.

With a few members of staff leaving, we have recently reviewed our EDOC (Equality, Diversity and Opportunities Committee) membership. **Dr Richard Telford** has taken over as co-chair for the EDOC and we would like to thank **Dr Steve Hickey** for his commitment over the last year. We welcome **Dr Conor Meehan** who has recently joined the team. If you want to get involved please get in touch, we are particularly interested in recruiting PhD students, undergraduate students and part-time staff. The EDOC meets about every 6 weeks, minutes are available at our shared One-drive space for your information. If you want more information or have questions, please contact g.helfer@bradford.ac.uk.

Over the next coming months, we have some exciting things coming up. We will run another Athena SWAN seminar and workshop (details to follow) and we are currently in the process of organising the next family-friendly Open Day. We are working closely with the Faculty Equality and Diversity Team to role this out for the whole faculty. And of course, it is the time of the year when we will be launching the next staff and postgraduate student survey. The surveys will help us to identify the impact of our actions that we have recently implemented and, as in previous years, we hope for a good response rate.

Dr Gisela Helfer, Chair of Equality, Diversity and Opportunities Committee



New Lecturers



I'm **Conor Meehan** and I started at the University of Bradford in June as a lecturer in molecular microbiology. My career journey has taken me to many interesting cities and many different fields of research. I started with a degree in computational biology and genetics at the University of Maynooth, Ireland followed by a Ph.D. at NUI Galway, Ireland on HIV drug resistance and transmission. I then switched to human gut microbiome and bacterial genetics research with a postdoctoral fellowship at Dalhousie University in (the other) Halifax in Canada for 3 years. Then in 2014 I moved to Antwerp, Belgium, to become a research fellow at the Institute of Tropical Medicine, Belgium, working on genomics of pathogenic mycobacteria. In my 5 years at the ITM I developed expertise in the transmission dynamics and underlying genetic mechanisms of drug resistance in *Mycobacterium tuberculosis* and worked extensively on the evolution and taxonomy of the entire *Mycobacterium* genus.

Starting my research group here at the University of Bradford, I hope to continue working on whole genome sequencing and transmission studies of *Mycobacterium tuberculosis* in high burden countries such as Rwanda, as well as here in Bradford, where tuberculosis incidence is one of the highest in the UK. I am also heavily involved in teaching and developing workshops and capacity building programs in Africa and South America, trying to increase bioinformatics and genomics expertise in these regions.

Outside of work, I am looking forward to getting back into hiking (flat Belgium didn't really allow much for this!) and discovering Yorkshire more. Suggestions of things to do/see are very welcome!

New PhD Students



Sumaia Sabouni started her PhD (UoB's International Development Fund) in June. Her interdisciplinary project (with **Prof Anne Graham**, computing's **Prof Rami Qahwaji** & Psychology **Prof Abi Locke**) is entitled **Health Opportunity for Patient Empowerment in Gestational Diabetes (HOPE-GDM)**. This study will

develop and pilot smartphone technology to enable gestational diabetes patients to improve their pregnancy and diabetes outcomes with less clinical intervention in Dhaka, Bangladesh. She will be based between H37 PhD room and the computing PhD room.

Shabana Akhtar had her PhD viva 10 days before her baby boy was born and the independent Chair (**Prof Gwendolyn Bradshaw**) said not to worry as she was a trained midwife. Shabana also has a five year old daughter. To earn some pocket money whilst she is writing her papers, she comes in to the department early in the morning, before her husband has gone to work, to act as a technician in the Genetic and Reproductive Toxicology Laboratory, now that Emtiaz has taken on his new teaching role.

New Undergraduate Students

We would like to offer a warm School welcome to all of our new students who started their undergraduate adventures with us recently. This is the start of a very exciting journey that all staff are looking forward to taking with you. Enjoy the science, enjoy the social life, and take advantage of everything that being a student offers you!



Congratulations!

On 30th August 2019 **Dr Clare Towse** married Mr Mark Peyton at Waterton Park Hotel. A beautiful sunny day was full of magic and smiles as we watched Clare marry her dream who she has known since school where they would compete to be top of the class. They were accompanied by family and friends who danced and celebrated in style all night long including playing a few board games along the way!

Congratulations to Dr Clare Towse, now **Dr Clare Peyton** and Mr Mark Peyton may the rest of your lives together are happy and wonderful.



In memorium



In honour of our colleague **Alan Hague**, who sadly passed away recently we will be naming the refurbished J8 laboratory after him. Alan was involved with its design and project management until his retirement but still kept a

close eye on its progress (see plaque). Once the plaque is in situ we will invite Alans family to come and view the laboratory.

PGC (HEP) Success

Dr Anaïs Pitto-Barry successfully passed her PGCHPEP and has achieved the status of Fellow of the Higher Education Academy. Well done Anaïs!

Farewells



Prof Vladimir Botchkarev

has left our department and started a new position in Boston. Vlad started at Bradford in 2007 and over the following years made a massive contribution to the Centre for Skin Sciences, publishing in prestigious journals including *PLoS Genetics*, *Journal of Investigative Dermatology*, *Journal of Cell Biology*, and *Development* as well as securing substantial funding from the MRC. We wish him all the best in the States!



The **Barry** group said goodbye and farewell to **Hélène Sandron**. Hélène is a 3rd year undergraduate student from **ESCOM** (Ecole Supérieure de Chimie Organique et Minérale) in Compiègne (1 hour north of Paris, France; famous town in France because on the 23rd of May 1430, Joan of Arc was captured by the Burgundians while attempting to free Compiègne. The Burgundians then sold her to the English). Hélène undertook a three-month internship in the Barry group. Her project involved the synthesis of new ligands, their coordination to metal complexes, and the study of their biological activities. Thank you for your hard work!



Dr Julie Thornton has been nominated for **Outstanding Research Supervisor of the Year** at the prestigious **Times Higher Education Awards**. Dubbed the 'Oscars' of higher education, the awards recognise talent and dedication across all aspects of university life.

Julie, senior lecturer in biomedical science and recently appointed Director of the Centre for Skin Sciences, is one of just eight people shortlisted for the prize. "I was absolutely delighted to have been nominated for this award by my PhD students, and overjoyed to have been shortlisted for this prestigious award. It is truly rewarding to inspire, shape and invest in our future scientists and doctors. My PhD students have come from a diverse range of backgrounds and I have endeavoured to provide an approachable, supportive, but challenging environment that has allowed them all to flourish and establish their own successful careers. I am so proud of them all."

The winners will be announced at the THE Awards ceremony in London on Thursday, November 28 – we wish Julie the very best of luck, and look forward to hearing all about the ceremony in the next newsletter!

Julie's students were full of praise for their supervisor.



Even though she is very busy with both academia and research, Julie always makes time to have meetings with me about my work and how I am getting on in general. She cares about her students and both encourages her students academically as well as ensuring they are taking care of their wellbeing. She has attended all my talks and poster presentations and always allows me to present my own data, an experience which I am grateful for. - Rachael Sedman, current PhD student

Julie was very hands on with teaching and helping with developing the methods I was working with. The guidance I received early on in my project helped me enormously in being able to develop the project for myself. Julie was always available and supportive and looking back I can see how she developed my talents and confidence as a research scientist. I attended and presented at a number of conferences during my project, inspired and supported by Julie and the experience still helps me in my work today. - Dr Alison Merrick, Pain Injury and Surgery Recovery Therapist and Julie's first PhD student

Research

I am a plastic surgery trainee with minimal experience in basic science research. However, Dr. Julie Thornton had been extremely supportive of my research at the Plastic Surgery and Burns Research Unit at University of Bradford. Our plastic surgery and burns research unit is solely funded by charity. Hence, my job as a research fellow entails participating in a lot of fundraising events. As my supervisor, she recognised the time commitment needed outside my research time and provides me with all the support needed including attending some of the fundraising events herself on my behalf even though it's outside her normal working hours. She also actively engaged with the local community by giving regular talk and presentation about the research work done by our research unit. Even though I have completed my PhD, she actively encourages me to proceed on doing clinical trials so that our laboratory results could have clinical translation and implications which will benefit the patients (especially the burns patients)'. Dr Jing Tay, Plastic Surgery Registrar



Dr. Thornton contributed to improve my scientific development with new skills in endocrinology and cell biology of skin, producing work of highest standard. Her attendance and behavior were exemplary to me. Dr. Thornton was a very popular, well-liked and respected member of the Centre. Her passion and strong commitment to work were qualities that make me a capable young scientist. I completely endorse Dr. Thornton' outstanding abilities for the best supervisor I had''. - Elena Pomari, now Head of the Technology Transfer Office in IRCCS Sacro Cuore Don Calabria Hospital, Italy



Commonwealth Scholarship

We are delighted to announce that Muhammad Nasir Hussain from Quaid-i-Azam University (QAU), Islamabad has been successful in his application for a **Commonwealth Split-site Scholarship Award** and will be joining us soon, to be supervised by **Dr Stephen Hickey**. QAU, which is the premier seat of learning in Pakistan, known for its research and excellence in teaching is consistently ranked top academic institution by the Higher Education Commission (HEC) of Pakistan.

The Commonwealth Scholarship and Fellowship Plan (CSFP) is one of the largest and most prestigious international scholarship schemes in the world. Since it was established in 1959, 35,000 individuals have held a Commonwealth Scholarship or Fellowship – 27,000 of them were funded by the UK government, through the Commonwealth Scholarship Commission in the United Kingdom (CSC).

Nutrafol

Dr Julie Thornton has secured a 9 month research grant with **Nutraceutical Wellness**, LLC, (Nutrafol) a NY-based nutritional supplement company that aims to help men and women experiencing thinning hair through a multi-targeted approach. The collaboration between CSS in the Faculty of Life Sciences and Nutrafol will bring together science and expertise to research human hair biology, hair thinning, and the connection between molecular mechanisms and hormonal signals in many cell types.

BBSRC

Prof Stephen Rimmer won a **National Biofilms Innovation Centre** (BBSRC) grant to study disruption of bacterial biofilms using branched polymers, in collaboration with 5D Ltd. This will fund a research worker and consumables for 12 months with biofilm work occurring at 5D.

Beam Time

Dr Bev Stewart has won a **Central European Research Infrastructure Consortium** grant for neutron and SAXS beam time and travel to both the Budapest Neutron Centre and the SAXS facility at Graz to carry out a piece of work on small angle scattering from polymer solutions.

University Research Development Funding

The School has again enjoyed success in securing university funds through the **Research Development Funding** streams described below.

PhD Studentships:

- **Dr Nicolas Barry**, **Dr William Martin**, and **Dr Steven Shnyder** were successful in their application for an RDF PhD studentship. The title of their project is "Influencing the chemistry and biology of electron-deficient organometallics".
- **Dr Julie Thornton**, **Dr Chien-Yi Chang** and **Dr Maria Katsikogianni** were successful in their application for an RDF PhD studentship. The title of their project is "Effective removal of antimicrobial resistant bacteria from chronic wounds".

Writing retreat grants:

- An RDF writing retreat grant has been won by **Dr Sanjit Nayak** (PI) and **Dr Thomas Swift**, **Dr Beverley Stewart**, and **Dr Colin Seaton**. The grant will help the team to focus on finalising a grant application.
- **Dr Anaïs Pitto-Barry** attended a three-day writing retreat organised by the Research and Innovation Services at Eaton Mount, to escape from the distractions of the University campus. Support from the University's Research Team was available, to help researchers complete research writing task either as individuals or as small groups.

Northern BUG

Following on from hosting Bradford's first Northern Bioinformatics User Group meeting in April, **Dr Amber Leckenby** and **Dr Krzysztof Poterłowicz** were recently involved in a successful cross-university bid to the **Genetics Society** to provide funding for the Northern BUG sectional interest group. The Northern Bioinformatics User Group hosts three symposiums annually and has a friendly and informal atmosphere. The meetings are affordable and enable junior researchers and/or attendees from smaller and/or less research-intensive institutions to participate free of charge.

The funding bid was supported by the Universities of Bradford, Sheffield, York, Huddersfield, Newcastle, Leeds and Hull. Monies will be used to keep these meetings free and open to all applicants for the 2019/2020 academic year, as well as providing childcare funding, with the view to reapply for funding to continue support of this group.

Aveda

Dr Julie Thornton and Rachael Sedman visited Aveda in Minneapolis where they both gave presentations and discussed the proposals to renew the grant for another year for £158,000.



RSC

Dr Tom Swift has been awarded a **Royal Society of Chemistry Research Fund** of £4,500 for a project to study the fluorescence cascade of dyes along a polymer backbone

Travel Grants

Dr Joan Soldevila-Barreda secured a competitive **Royal Society of Chemistry** Travel grant to travel to Japan for the 15th International Symposium on Applied Bioinorganic Chemistry (ISABC15) held in Nara in June.

Dr Gisela Helfer has received £623.00 travel grant from **The Physiological Society** to attend the Physiology 2019 meeting in Aberdeen in July.

Prof Anne Graham was awarded a **Biochemical Society** travel grant to partially fund attendance at the FEBS2019 meeting in Krakow from 6-11th July.

Grow MedTech

Dr Tom Swift has won and is now commencing a £20,000 research project funded by **Grow MedTech** on shape memory polymer materials for bone repair. This is a collaboration between the Chemistry and Brian Thomson from the Polymer Engineering group.

Dr Martin Brinkworth has been awarded £5,000 Proof of Market funding from **Grow MedTech** to clarify the market potential of a non-invasive infertility diagnostic that could replace testicular biopsies.

Book Chapters

Swift T. **pH dependence of acrylate-derivative polyelectrolyte properties.** In: **Acrylates.** Online first doi:10.5772/intechopen.82569

Habas K, Brinkworth M, Anderson D. **Sensitivity of spermatogenic cells to the induction of DNA damage by oxaliplatin in vitro.** In: Leon V. Berhardt, **Advances in Medicine and Biology.** Volume 147. ISBN: 978-1-53616-062-8.

Laubenthal J, Gdula MR, Dhawan A, Anderson D. **Multicolor laser scanning confocal immunofluorescence microscopy of DNA damage response biomarkers.** In: Dhawan A, Bajpayee M (eds) **Genotoxicity Assessment. Methods in Molecular Biology.** Volume 2031. ISBN: 978-1-4939-9645-2

Anderson D, Dhawan A, Laubenthal J. **The Comet Assay in Human Biomonitoring.** In: Dhawan A, Bajpayee M (eds) **Genotoxicity Assessment. Methods in Molecular Biology.** Volume 2031. ISBN: 978-1-4939-9645-2

Papers in Press...

Ahmed MI, Pickup ME, Rimmer AG, Alam M, **Mardaryev AN**, **Poterlowicz K**, **Botchkareva NV**, **Botchkarev VA**. **Interplay of microRNA-21 and Satb1 in epidermal keratinocytes during skin aging.** *Journal of Investigative Dermatology* 2019

Bachmann JA, **Tedder A**, Laenen B, Fracassetti M, Désamoré A, Lafon-Placette C, Steige KA, Callot C, Marande W, Neuffer B, Bergès H, Köhler C, Castric V, Slotte T. **Genetic basis and timing of a major mating system shift in *Capsella*.** *New Phytologist* 2019

de Jong BC, Gaye BM, Luyten J, van Buitenen B, André E, **Meehan CJ**, O'Siochain C, Tomsu K, Urbain J, Grietens KP, Njue M, Pinxten W, Gehre F, Nyan O, Buvé A, Roca A, Ravinetto R, Antonio M. **Ethical considerations for movement mapping to identify disease transmission hotspots.** *Emerging Infectious Diseases* 2019;36(7)e1

Hossain SI, Gandhi NS, **Hughes ZE**, Gu YT, Saha SC. **Molecular insights on the interference of simplified lung surfactant models by gold nanoparticle pollutants.** *Biochimica et Biophysica Acta: Biomembranes* 2019;1861(8):1458

Li H, Yang C, Yin Y, Wang F, Chen M, Xu L, Wang N, Zhang D, Wang X, Kong Y, Li Q, Su S, Cao Y, Liu W, Ao Z, Dai L, Ma C, **Shang L**, Han D, Ji F, Li H. **An extravascular fluid transport system based on structural framework of fibrous connective tissues in human body.** *Cell Proliferation* 2019

McGrath K, Rowsell K, Gates St-Pierre C, **Tedder A**, Foody G, Roberts C, Speller C, Collins M. **Identifying archaeological bone via non-destructive ZooMS and the materiality of symbolic expression: examples from irquoian bone points.** *Scientific Reports* 2019

Melo P, Tarrant E, **Swift T**, Townshend A, German M, Ferreira AM, Gentile P, Dalgarno K. **Short phosphate glass fibre - PLLA composite to promote bone mineralization.** *Materials Science and Engineering: C* 2019;104:109929

Ng KCS, Ngabonziza JCS, Lempens P, de Jong BC, van Leth F, **Meehan CJ**. **Bridging the TB data gap: in silico extraction of rifampicin-resistant tuberculosis diagnostic test results from whole genome sequence data.** *PeerJ* 2019

Robles-Martinez P, Xu X, Trenfield SJ, Awad A, Goyanes A, **Telford R**, Basit AW, Gaisford S. **3D printing of a multi-layered polypill containing six drugs using a novel stereolithographic method.** *Pharmaceutics* 2019;11(6):E274.

Sanoussi CN, de Jong BC, Affolabi D, **Meehan CJ**, Odoun M, Rigouts L. **Storage of sputum in cetylpyridinium chloride, OMNigene.SPUTUM, and ethanol is compatible with molecular tuberculosis diagnostic testing.** *Journal of Clinical Microbiology* 2019

Magazine Articles

Hair cloning, scalp microbiome and melanin color transcription. *Cosmetics and Toiletries* 2019;134(6):10

Dr Gill Westgate gave an interview on the recent World Congress on Hair Research to *Cosmetics and Toiletries*, the international magazine of cosmetic technology. An excerpt from the interview can be found on p10 in the issue, with the full interview in the podcast. Follow the link here:

http://cosmeticsandtoiletries.texterity.com/cosmeticsandtoiletries/june_2019/MobilePagedRepli

Shepherd J, **Swift T**, **Chang C-Y**, Boyne J, **Rimmer S**, **Martin W**. **Highly branched poly (N-isopropyl acrylamide) functionalized with an inducer molecule suppresses quorum sensing in *Chromobacterium violaceum*.** *Chemical Communications*, 2019; 55: 9765

Silant'yev AS, Falzone L, Libra M, Gurina OI, Kardashova KS, Nikolouzakis TK, Nosyrev AE, **Sutton CW**, Mitsias PD, Tsatsakis A. **Current and future trends on diagnosis and prognosis of glioblastoma: from molecular biology to proteomics.** *Cells* 2019;8(8):E863

Tortolia E, **Meehan CJ**, Grottol A, Serpini GF, Fabio A, Trovato A, Pecorari M, Cirillo DM. **Genome-based taxonomic revision detects a number of synonymous taxa in the genus *Mycobacterium*.** *Infection, Genetics and Evolution* 2019;75:103983

Wittouck S, Wuyts S, **Meehan CJ**, van Noort V, Lebeer S. **A genome-based species taxonomy of the *Lactobacillus* genus complex.** *mSystems* 2019;4:e00264-19

Zegke M, Spencer HLM, **Lord RM**. **Fast, facile and solvent-free dry-melt synthesis of oxovanadium(IV) complexes: simple design with high potency towards cancerous cells.** *Chemistry* 2019

Zhang X, **McElwee KJ**. **Allergy promotes alopecia areata in a subset of patients.** *Experimental Dermatology* 2019

Zhang X, Shen X, Dong J, Liu WC, Song M, Sun Y, Shu H, **Towse CL**, Liu W, Liu CF, Jin X. **Inhibition of reactive astrocytes with fluorocitrate ameliorates learning and memory impairment through upregulating CRTC1 and synaptophysin in ischemic stroke rats.** *Cellular and Molecular Neurobiology* 2019

Zimbitas G, Jawor-Baczynska A, Vesga MJ, **Javid N**, Moore BD, Parkinson J, Sefcik J. **Investigation of molecular and mesoscale clusters in undersaturated glycine aqueous solutions.** *Colloids and Surfaces A: Physicochemical and Engineering Aspects* 2019;579:123633

Academy of Medical Sciences

In June, **Dr Gisela Helfer**, **Dr Nicolas Barry** and **Prof Diana Anderson** went to the **Academy of Medical Sciences Springboard Award Holders** meeting in London. The first day of the meeting focused on scientific competitions and Gisela and Nicolas presented their research to their fellow Springboard awardees. Gisela gave a pitch on her plans over the next two years, while Nicolas presented his findings as a poster summarising some recent group results. The second day focussed on career development training. The meeting was very inspiring and it was great to get to know fellow Springboard awardees and swap notes.



ISABC 15

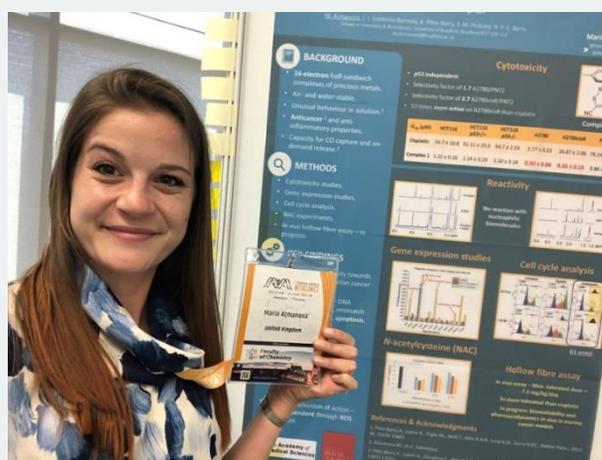
Dr Joan Soldevila-Barreda travelled to Japan to attend the **15th International Symposium on Applied Bioinorganic Chemistry (ISABC15)** held in Nara in June. Joan secured a competitive Royal Society of Chemistry Travel grant and presented his work as an oral presentation entitled "Searching for new anticancer drugs: the potential of electron-deficient organometallic complexes". **Dr Rianne Lord** also presented her work entitled "Organometallic iridium(III) complexes: Understanding the intracellular modes of action in cancer cells".



Dr Tom Swift was an invited speaker at this year's Royal Society of Chemistry **Macro Group Young Researcher's** meeting in June. He delivered a talk to an international selection of early career (PhD and early postdoctoral) polymer chemists at the University of Kent.

Dr Conor Meehan gave a presentation at the **European Society for Mycobacteriology** in Valencia, Spain in early June. The title was 'Reconstituting the genus Mycobacterium' and Conor was awarded best oral presentation for his contribution.

Metallomics 2019



Maria Azmanova presented a poster with the results of her first year as PhD Student in the Barry group at the Metallomics 2019 conference in Warsaw, Poland on 30th June- 3rd July.

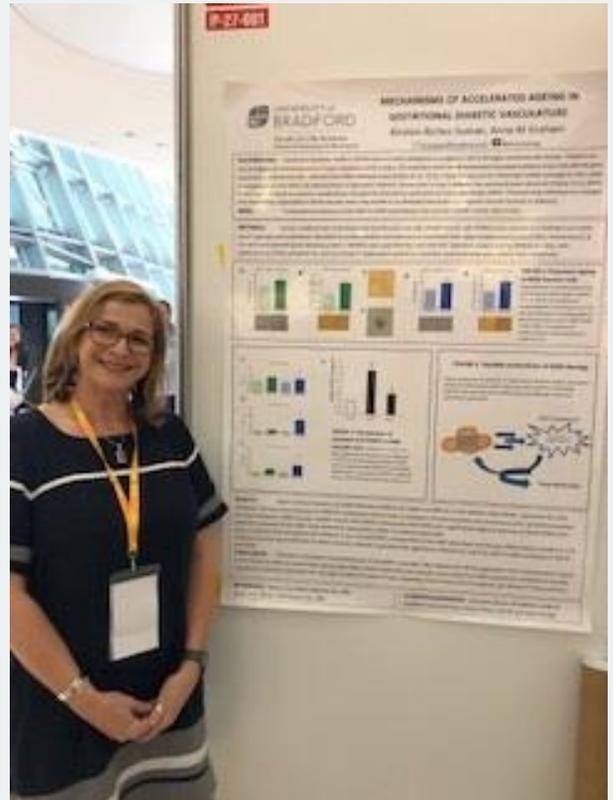
Physiology of Obesity and Diabetes

Dr Gisela Helfer attended the **Physiology of Obesity and Diabetes Symposium** (PODS) in July in Aberdeen. The PODS was organised by the British Society for Neuroendocrinology and The Physiological Society. The symposium brought together breaking research advances from the basic science and clinical realms with the objective of sharing novel insights relevant to human obesity, type 2 diabetes and cardiovascular disease. Gisela gave a talk on her recent results in obesity research and presented a poster. She was also invited to chair a session on the latest advances in behavioural contributions to body weight.



FEBS2019

Prof Anne Graham presented a poster at the **FEBS2019** meeting in Krakow from 6-11th July. The poster generated a lot of interest. The Biochemical Society provided a travel grant to partially fund attendance at the meeting.



GCC2019

In July 2019, Dr Krzysztof Poterłowicz attended **The 2019 Galaxy Community Conference (GCC2019)** in Freiburg. Krzysztof was a member of the Scientific Committee of the meeting and he organized and ran the workshop 'EWAS data analysis for population epigenetics integrated into Galaxy'. Krzysztof's Lab developed software and online training used it in the session with the associated publication under review.

<https://galaxyproject.github.io/training-material/topics/epigenetics/>



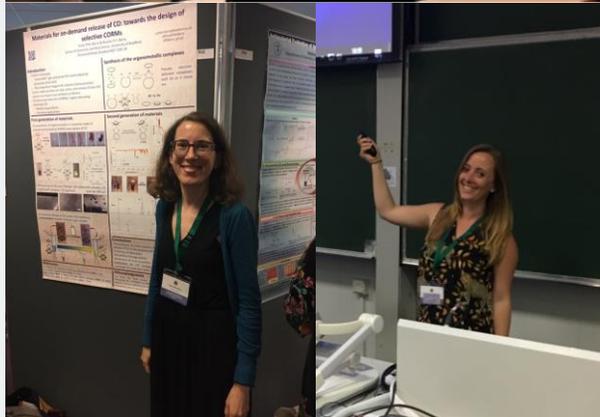
ACS

Dr Tom Swift presented 3 contributed talks and 1 poster to the **American Chemical Society** National meeting in San Diego in August - delivering these to both the Polymer Chemistry, Polymeric Materials Science and Engineering and Analytical Science divisions respectively. His PMSE poster was picked for the prestigious Sci-Mix session and shown off for interest across all divisions of the ACS.



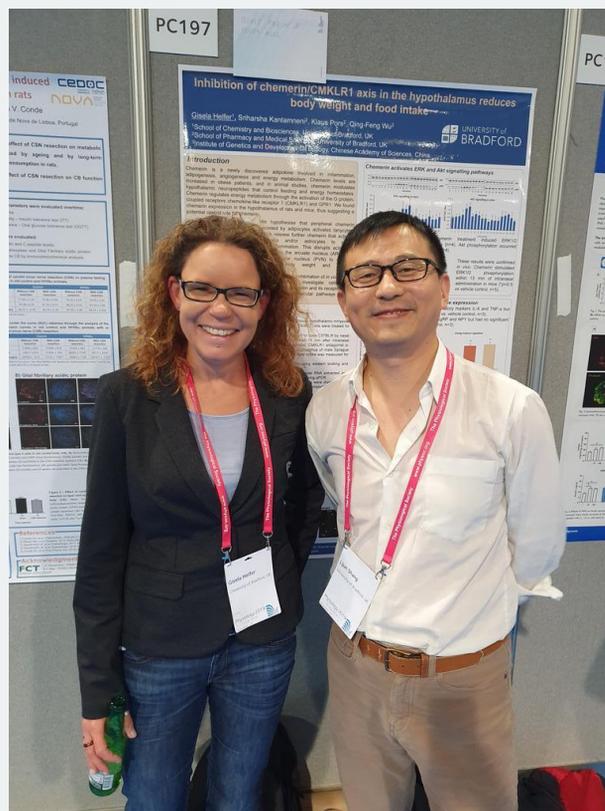
International Symposium on Bioorganometallic Chemistry

The Barry group attended the 9th International Symposium on Bioorganometallic Chemistry (ISBOMC'19) in York in late July. **Dr Anaís Pitto-Barry** presented her latest work on Carbon Monoxide Releasing Molecules, which the University of Bradford Research and Development Fund acknowledged for their support via the "high-quality research publication" award Anaís received earlier in the academic year. **Dr Nicolas Barry** gave an invited lecture entitled "Influencing the chemistry and biochemistry of electron-deficient organometallics". This conference was an excellent opportunity to discuss with colleagues from all over the world, during the working day or at the after-work activities including pub quiz, and a tour of York city centre.



Physiology 2019

Dr Gisela Helfer and **Dr Lijun Shang** attended **Physiology 2019** meeting in Aberdeen this July. Gisela presented two posters on her latest work. She presented a poster on new findings on the inhibition of chemerin/CMKLR1 axis in the hypothalamus, a project that was recently funded by the University RDF together with Harsha Kantamneni and Klaus Pors from the School of Pharmacy and Medical Sciences. Her second poster discussed work from a new collaboration with Dr Sam McLean (School of Pharmacy and Medical Sciences) on the effect of photoperiod and high fat diet on the cognitive response in photoperiod-sensitive F344 rats. At the conference, Gisela and Lijun had the opportunity to hear the latest in physiology research and learn about novel approaches in physiology teaching developments. The highlight of the conference was, without a doubt, a motivational and highly entertaining lecture delivered by Kevin Fong from the University College London on Extremes: Life, death and the limits of the human body. Turns out that the human body copes with quite a lot when tested in extreme environments!



Board Memberships

Dr Gisela Helfer and Dr Andrei Mardaryev have been invited to join the **University's Animal Welfare and Ethical Review Body (AWERB)** after review of its membership. The AWERB, chaired by Prof John Bridgeman, critically evaluates all ethical, scientific and welfare issues related to any research projects using animals. Both will join the AWERB as scientific members with responsibilities under the Animals (Scientific Procedures) Act.

Dr Sanjit Nayak has been selected as one of the RSC Research Fund Working Group Members for the period of 2019-2021 and will be assessing grant applications through this.

ELIXIR-UK Consortium

ELIXIR is a distributed international research infrastructure for life science information, building on existing data resources and other services within Europe. It is an inter-governmental organisation with a single Hub and National Nodes model, with a growing number of Nodes located at centres of excellence throughout Europe.

The UK ELIXIR Node ("ELIXIR-UK") is a consortium of UK research organisations committed to support and deliver FAIR Data Infrastructure in the Life Sciences.

Membership of ELIXIR-UK brings access to a range of UK and European (through our engagement with ELIXIR) forums for collaborating with others to achieve this goal. As part of this, it provides access to small funding calls for collaborative projects.

For more information about ELIXIR activities please contact **Dr Krzysztof Poterłowicz**

- Krzysztof Poterłowicz (University of Bradford)
- Chris Rawlings (Rothamsted Research)
- Gabriella Rustici (University of Cambridge)
- Susanna-Assunta Sansone (University of Oxford)
- Michael Sternberg (Imperial College)
- Ralf Weber (University of Birmingham)
- Anil Wipat (Newcastle University)
- Currently Not Represented (University of Edinburgh)



Invited Seminar

Dr Julie Thornton gave an invited talk in the **Charles Institute Seminar Series** at University College Dublin, at the Charles Institute of Dermatology, where Des Tobin is now Director.



Ireland's National Dermatology Research & Education Centre



UCD Charles Institute of Dermatology

The Charles Institute Seminar Series:
Charles Seminar Room,
Wednesday 5th June 2019 @ 12-1PM



Can sunshine heal your wounds?

Dr. Julie Thornton, BSc PhD
Director of Centre for Skin Sciences
University of Bradford, Britain

Biography: Dr Julie Thornton is Director of the Centre for Skin Sciences, a large academic centre for fundamental and translational skin and hair follicle research at the University of Bradford where she is also a Senior Lecturer in Biomedical Sciences.

She has B.Sc. in Biochemistry and a Ph.D. on androgen action in dermal papilla cells from human hair follicles. Julie has a well-established research career in skin and hair follicle biology, predominately based on developing relevant human skin and hair follicle ex vivo models to study ageing, inflammation and wound healing, particularly regulation by sex steroids, principally estrogen and post-menopausal skin ageing.

Research Interests: Skin and hair biology, wound healing, ageing, steroid hormones (estrogens, androgens, vitamin D), inflammation, photoreceptors and circadian regulation.

Abstract: In humans, epidermal keratinocytes are the key cells that synthesise vitamin D, which depends on the conversion of 7-dehydrocholesterol to cholecalciferol by exposure to UVB radiation. While vitamin D supplementation may improve wound healing, the molecular mechanisms are unknown. Our recent data highlights an important role for vitamin D in modulating the response of the dermal fibroblast in wound healing and scarring. Likewise, visible light (blue or red light-based therapy) may also have beneficial effects on cutaneous wound healing, yet the mechanisms are unknown. Our recent data has identified a potential role for photoreceptors (opsins and cryptochromes) in human skin, which may provide important targets for wound healing.

*The Charles Institute Seminar Series is kindly supported by Relife. Relife has no input into the content of the Series.



Seminars

Our seminar series are open for all to attend – please encourage your students and junior staff members to attend wherever possible. It's a great opportunity to keep up to date with the latest research going on both in our school and in the wider research community! All seminars take place between 12-1pm.

Date	Speaker / Title	Location
04-10-19	Dr Karl Keegan, CEO HOX Therapeutics Challenges of building a biotech company	Chesham B0.33
09-10-19	Dr Kirsten Riches-Suman, SCB Vascular consequences of Type 2 Diabetes Mellitus	Richmond F21
11-10-19	Ms Sidra Saeed, ICT Proteomic profiling of matched normal and tumour tongue biopsies from smokers and non-smokers	Richmond E59
16-10-19	Dr Rebecca Dumbell: MRC Harwell Of mice and men: forward and reverse approaches to deciphering genetic contribution to metabolic disease."	Richmond F21
25-10-19	Mr Francis Mprah Barnieh, ICT Discovery of novel tumour-selective APN/CD13 activated prodrugs of AZD6738	Richmond H33
01-11-19	Prof Sian Harding, Imperial College London Broken heart syndrome – biased agonism of adrenaline at the beta2-adrenoreceptor	Richmond E59
06-11-19	Dr Paul Kasher, University of Manchester: When blood hits brain - using zebrafish for haemorrhagic stroke research	Richmond H33
08-11-19	Dr Goreti Ribeiro Marais, ICT Synthetic challenges and insights from the Cancer Medicines Discovery projects	Richmond E59
13-11-19	Professor Colin Fishwick, University of Leeds Chemistry Society seminar	Richmond F21
15-11-19	Dr Don van Schalkwyk, London School of Hygiene and Tropical Medicine Not all malaria is the same: Implications for drug development	Richmond E59
20-11-19	External Speaker TBC European Antibiotic Awareness Week	Richmond H33
22-11-19	Dr Honorine Lebraud, Astex Pharmaceuticals Chemical biology: A click and play approach	Richmond E59
29-11-19	Dr Sriharsha Kantamneni, PET TBK1:SOCS3 interface, an opportunity to develop novel Motor Neuron Disease (MND) therapeutics	Richmond C7
04-12-19	Dr Ralf Weber, University of Birmingham TITLE TBC	Richmond F21
06-12-19	Dr Heather Mortiboys, University of Sheffield The mitochondrial phenotype in neurodegeneration; can this be targeted therapeutically	Richmond C7
13-12-19	Dr Ritchie Williamson, PET Investigating protein O-GlcNAcylation in health and disease – tools and models	Richmond C7

Summer School

Dr Stephen Hickey presented a series of lectures at the international summer school "**Exciting nanostructures: Characterizing advanced confined systems**" which was held from the 21 - 26 July, 2019, at the Physikzentrum in Bad Honnef, Germany.

Lectures were delivered by many of the top researchers in the nanomaterials field from a wide range of countries: Germany (TU Dresden, BAM Berlin, + University of Oldenburg), Switzerland (ETH Zurich), France (ESPCI Paris), Spain (IMDEA and CSIC both of Madrid), UK (University of Bradford), Belgium (University of Gent), and from outside the European union: Belarus (National Academy of Sciences of Belarus) and the USA (US Naval Research Laboratories).

The aim of the summer school was to impart the basics of the preparation of nanostructures, the resulting physical properties, their optoelectronic applications and the theoretical methods employed to understand the underlying physical processes. The summer school provided an ideal forum for Master and PhD students to become acquainted with the topic and to initiate further discussions. The PhD and master students were expected to present their own work in the form of posters which was a requirement for the applicants to be accepted. The school was very well received by all participants and the fact that at the attendance maximum was reached within two weeks of the opening of the registration period is testament to the popularity of the summer school and the vibrancy of the subject matter.

Programme Updates

The **chemistry apprenticeship program** has further developed as we are on track to double our intake in 2019/20 compared to our first year last year. We have attracted new companies from across the UK and had great interest from companies looking for new ways to train their workforce. The students will be on campus from September 9th - 23rd for their 2 week block release before returning to their companies for the remainder of the year. Similarly the proposed **MSc Research Scientists (Apprenticeship)** is progressing to phase 2 internally within the University so we can offer teaching on the level 7 apprenticeship from 2020/21 onwards. We will have more news when this passes phase 2.

C Floor Display Cabinets

The **Technical staff** recently took part in a competition to make over the School displays cabinets on C floor and we are delighted to say that the Chemistry display won. Well done to the Technical staff in both Chemistry and Biology who produced fantastic displays. Please do go take a look if you haven't already



Where My Bradford Degree Took Me

Our featured graduate in this issue is **Farazi Virk**, who graduated with 1st Class Hons in Biomedical Science in 2017. She is now following her dream to be a doctor by training at Brighton and Sussex Medical School

What did you do at Bradford?

I completed a Bachelor of Science degree in Biomedical Science with specialism in Medical Biochemistry and graduated in July 2017.

What are your lasting memories of your time here?

My three years at Bradford were some of the best years of my life! I gained many invaluable experiences including being highly involved in the student body and amongst staff in the Life Sciences department. I also formed lifelong friends who I am still in touch with and who constantly motivated me to achieve my goals.

My course provided me with an in depth understanding of the Foundations of Health and Disease and I had the opportunity to conduct a research project in the lab for 8 weeks during my final year. I thoroughly enjoyed the process of researching my area of interest, gathering results in the lab and finally submitting my write up! Throughout I was able to gain insight into many topics within Biomedical Science, through the variety of modules and engaging lectures.

One of the best parts of studying at Bradford was having an extremely supportive personal tutor, **Dr Kirsten Riches-Suman**, who was always happy to help me excel in all aspects of my education. At our very first meeting I explained how my long term plans were to apply to Medical School and from then on at every meeting we would discuss my progress. The encouragement and support from my tutor definitely formed a big role in achieving 1st Class Honours and gaining an offer to study Medicine in September 2017.

How do you think your studies here have played a role in the development of your career?

My experience during my undergraduate studies made me fully equipped to embark on my journey to Medicine. I am now a third year Medical Student at Brighton & Sussex Medical School and the scientific basis of medicine knowledge I gained during my Biomedical Science degree acted as a springboard to excel within my first two years of theory before starting my clinical years. I was also able to develop my revision techniques over the years, which supported me in my approach to exams.

I was able to gain confidence through various forms of assessments including group posters, vivas and oral presentations. This better prepared me for Medical School examinations where I am tested through written exams as well as oral exams. Overall, I am truly grateful for my time at the University of Bradford and it taught me many invaluable skills.

What advice would you give students currently on your course?

I would advise all students to seize as many opportunities as possible during their time at university. There are lots of extra curricular activities you can get involved with!

Starting university can be daunting for many people and learning through lectures can often be difficult and daunting. However, as you progress through the years you are able to develop different learning techniques as well

as revision strategies that work for you. You will eventually find the best ways in which to take notes during lectures whether that is handwritten notes or on a laptop/iPad.

I recommend revising throughout the semester to make sure you are in a good position in the run up to exams. Personally, I used flash cards to learn lecture content and I am also a visual learner so I would make diagrams to help make the learning process easier. It is very important to ensure you make revision fun!

Never be afraid to ask for help, all of the academic staff are happy to help and offer further support. Form a good relationship with your tutor because often this is your first point of call if you are struggling, need a job reference or need advice.

Plan well, organise your time effectively and most of all enjoy every aspect of your time at university!



Admissions and Outreach

Admissions

Clearing has come and gone, and now is the time to reflect on the positives and negatives that have come out of that period, and the recruitment cycle as a whole. In general, I believe it has been a positive, with student numbers around where we expected them to be. I have had the opportunity to speak to many who were involved about how they thought the process went, but if you would like to give some feedback, be it directly on 'how the process went for us', or even more about the Universities new system, It'd be gratefully received. We are in the process of setting up a more comprehensive admissions committee which will be tasked to see how we can improve both UG and PG recruitment in general, and how the types of activities we currently offer (AED sessions, Taster days and outreach events) can be made as attractive and engaging as possible. Watch this space!

Fast on the heels of our recently completed recruitment cycle, comes the start of another, which will kick off with our two main open days in early October (**Friday 4th & Saturday 5th**). These days will likely represent our first real opportunity to interact with students potentially thinking about their career choices. Most won't have made UCAS applications by this point, and so it represents an excellent opportunity to showcase what we can offer, and where our courses can take them. For this reason, I think it would be great if we could be as interactive as possible, and I'm looking for people with ideas for hands-on, interactive activities we can offer one these dates. The Friday open day tends to be attended by large school groups, while the Saturday mainly by families. This could mean we tailor our offerings on the day to reflect these differences. In an ideal world, it'd be great to have activities from both our Chemistry and Biomed teams, although in the spirit of the School, it might be nice to also have something that represents how much crossover their truly is!

If you have some ideas, please let me know. Suggesting an activity doesn't commit you to attending both days, but the more activities we can build, the better placed we will be! I will be in touch via email with everyone soon to discuss the recruitment and outreach schedule, and how we can capitalise on these activities.

Chase the Dragon

In June, our Faculty's Drug Squad Team took part in the **Dragon Boat Festival 2019** in Saltaire. The festival was visited by around 20000 people, who came to watch teams from all over the region compete in the Dragon boat race. **Prof Anne Graham, Dr Gisela Helfer, Dr Martin Brinkworth, Dr Amber Leckenby** and **Dr Sarah Pike** from our School joined forces with colleagues across the Faculty of Life Sciences' and to the rhythmic beats of drummer Prof Alastair Goldman, they kept perfect cadence of their strokes (well more or less ...). The Drug Squad Team achieved their primary objective and they did not go for a swim! In contrast, they did extremely well and won the first two races and became second in the third race. Overall they ranked 17th place out of 45 boats.

The Drug Squad Team would like to thank all colleagues and students who supported them and helped to raise funds for the Lord Mayor's charities '**Sue Ryder Manorlands Hospice**' and '**Nightstop Bradford**'. Thanks to your help, they raised a whopping £1199.19! Also thanks to all colleagues who turned up on the day and cheered them on. By the way, they have already signed up for next year's Dragonboat Race and this time they aim to win! (Let's see about that ...)



Admissions and Outreach

Royal Society Summer Science Exhibition

Drs **Nicolas Barry**, **William Martin**, and **Anaïs Pitto-Barry** spent the first week of July at the **Royal Society Summer Science Exhibition** in London. Our exhibit "Molecular music: the sound of chemistry" was designed to encourage everyone to think of science in a more creative way. Indeed, we translated the vibrations of bonds within molecules into musical masterpieces. Students from **Ilkley Grammar School**, with their chemistry teachers Mr Aaron Hefferin and Dr Neil Garrido, were also present during the entire week to show the 12,653 visitors the work they have been doing during the last two years thanks to a **Royal Society Partnership** grant won by Nicolas Barry.

If you couldn't make it, you can still listen to the tracks on our website:

<https://nicolas-barry.com/molecular-music/tunes>.

There are also the chemical structures of the ten studied molecules, including caffeine for the coffee addicts!

The **Wharfedale Observer** wrote an article about the project on the 4th of June. Our work was also featured in **BBC Radio 4 Inside Science**, and in "Babbage: how tech is my valley?" from **The Economist Radio**, a weekly podcast on the science and technology making the news from The Economist, on the 10th of July

<https://play.acast.com/s/theeconomistbabbage/5a4dee76-ba9d-4d5c-a07e-c2e78a9ca151?autoplay=true>, from 17:34.

This was an extremely busy week with three evening events, including two special black tie guest events (journal editors, university vice-chancellors, Fellows of the Royal Society...). We still had time to visit the Parliament, discover the Royal Society archives, and enjoy a bit of London.

Dr Joan Soldevila-Barreda was involved in another exhibit at the Royal Society Summer Science Exhibition with colleagues from the UK and South Africa. As you may know, 2019 is the International Year of the Periodic Table (#YIPT) and the "In Your Element, a Periodic Table for Life" exhibit featured a giant illuminated periodic table.



Admissions and Outreach

Museum Lates

Drs Nicolas Barry and **William Martin** continued discussing how to relate chemistry and music at the **BCB radio** on the 8th July and at the **Lates Bradford Science Festival** hosted in the Media Museum. Next event for both of them is **Otley Science Festival** on 26th September at Otley Courthouse, Courthouse Street (7.30pm to 9.30pm). They will be very happy to see you there.



Don Whitley

Earlier in the year the School was saddened to hear of the news **Dr Don Whitley** had died on 28th February 2019 at the age of 89. Don was the founder of Don Whitley Scientific Ltd, a company now based in Bingley and renowned worldwide as a manufacturer and supplier of scientific instruments and equipment.

Both Don as an individual and the company were good friends of the University. The company continues to sponsor the prize for the best performing student on the final year Microbiology option of the Biomedical Science degree, and Don always took great pleasure in attending the graduation ceremony to personally present the prize at the reception, usually at least inviting the winner to tour the company site, and in one case this led to the offer of a job with DWS Ltd. Don himself was on the receiving end at the graduation ceremony in 2009 when he was awarded an honorary Doctor of Science degree by the University.

There was no funeral service for Don, as characteristically he had donated his body to medical research, but an event to celebrate his life was held on Saturday 29th June at the company's new premises. Over 150 people were present, with the School being represented by **Dr Jonathan Fletcher**.

School Visits

Dr Gisela Helfer was invited to visit **Ingrow Primary** and **Long Lee Primary** (both in Keighley) where she met excited young scientists eager to learn about the wonders of

biology. During the school visits, the kids extracted DNA from bananas using common household products to break apart the cells in a banana and extract out the DNA. The activity was in relation to their curriculum work on evolution. During the session they discussed genetics, dinosaurs and Jurassic Park but also what it is like to be a scientist in general. It was a great day and all (particularly Dr Helfer) had lots of fun mashing up bananas and making an absolute mess in the classrooms!



Dr Andrew Tedder and **Dr Amber Leckenby** lead Genomics workshops for year 13 pupils from **Burnley college** and **Nelson & Colne college**, with students tasked with getting to grips with next-generation sequencing technologies, and understanding important aspects for the future of the Human genome and personalised medicine.

Dr Tedder and **Dr Rianne Lord** were also invited to give a panel talk about their journeys in science, and where Chemistry and Biology can take you at **Bolton College**.

Dr Tedder, **Dr Clare Towse** and **Dr Alex Surtees** also met with senior teaching staff from the newly opened **New College, Bradford** to forge closer links between our school and the college. We are all looking forward to staging some events with them in the near future!



Graduations

In July it was one of our favourite times of the year – Graduation! We had a bumper crop of **Chemistry, Biomedical Science** and **Healthcare Science** graduands, and all staff were immensely proud to celebrate their successes. We wish all of our students the best of luck for the future, and congratulate them on their achievements!

Graduation was followed by our Prize Giving ceremony which recognised the highest achieving students and those who have overcome challenges to secure their degrees. Congratulations to all!

Chemistry Prizewinners

The Nufarm Prize Final Year Prize: **Aniqah Anjum**
The Christopher Bardwell Prize for Excellence in Practical Chemistry: **Nathan William Fenwick**
The Philippa Tucker Prize for Excellence in Organic Chemistry: **Kaspar Uuselu**

Biomed Prizewinners

The Cancer Biology Prize: **Wojciech Wojcik**
The Don Whitley Scientific Microbiology Prize: **Ashley Pickering**
The Haematology Prize: **Fanila Shahzad**
The Institute of Biomedical Science President's Prize: **Priscilla Bonsu**
The Medical Cell Biology Prize: **Paul-Alberto Popescu**
The Microbiology Society Prize: **Zubeda Khatoon**
The Professor Michael Gardner Biochemistry Prize: **Zubeda Khatoon**
The Royal Society of Biology Prize: **Fanila Shahzad**
The Dr Sue Perkin Prize: **Priscilla Bonsu**
The Terry Baker Prize: **Haleema Aqeel**



"I am honoured to have received the Don Whitley Scientific award; medical microbiology has been my favourite area of biomedical science since my first year at The University of Bradford. My passion for the subject grew over the duration of the course, due to my enthusiastic lecturers - who are pioneers in their fields - implementing cutting-edge research into teaching sessions. This exposure to topical areas in medical microbiology is what I believe has nurtured my desire to pursue a career in scientific research and higher education lecturing. I especially enjoyed undertaking the final year project, where I gained invaluable experience in research regarding bacterial pathogenesis and antimicrobial resistance - topics which are becoming increasingly more crucial in the 21st Century. I am pleased to have been recently accepted into a Russell Group University to study these topics at Masters level, which will facilitate progression onto a PhD where I can train to become a part of the next generation of problem solvers." **Ashley**, winner of the **Don Whitley Scientific Award for Microbiology**.

Graduations



The Chemistry Prize-winners accepting their awards



A selection of the Biomed Prize-winners accepting their awards



Chemistry and Biomed staff enjoying the entertainment that the University put on!

PhD Successes

Emmanuel Eni Amadi passed his PhD viva voce on July 1st in Biomedical Sciences. The title of his PhD was '**Effects of graphene oxide *in vitro* on DNA damage in human whole blood and peripheral blood lymphocytes from healthy individuals and pulmonary disease patients: asthma, COPD, and lung cancer**' and his supervisors were **Prof Diana Anderson** and **Dr Mojgan Najafzadeh**. Emmanuel is now moving to the USA to complete a post-doc in Translational Medicine at the University of Montana.

Whilst he did his PhD, he also ran his own chemist's shop in Manchester. He had a locum run it on the days he came to the University. He sold it just before he completed his PhD. En route to the University of Montana, he called in at the University of Haverd to do a strategic leadership programme.

He is very ambitious, but always succeeds. Congratulations to all and best of luck for the future!



VOLUNTEERS NEEDED!!!



Are you interested in helping out with the newsletter? Do you want to quiz your professors on how they reached their positions? If so, then we would like to hear from you! We are looking for volunteers from either Chemistry or Biomedical Science (or indeed both) who would be interested in conducting the 'Meet Your Professor' interviews that are normally found at the end of this newsletter. All it takes is a ~1 hour timeslot with yourself and the professor, and then a write up of what you discussed. It's easy, and our two roving reporters from last year (**Absari Choudhury** and **Ridha Ali**) really enjoyed the experience. If you would like to volunteer, please contact **Dr Kirsten Riches-Suman** (k.riches@bradford.ac.uk) or **Dr Andrew Tedder** (a.tedder@bradford.ac.uk) – we're looking forward to hearing from you!

Student Societies

We have two societies for our students – **ChemSoc**, and the **Biomedical Science Society**. Did you know you can even join both if you fancy it? Please keep an eye out as to how to join and all the different events that they put on – it's a great part of being an undergraduate. While you're at it, why not follow the School on twitter - @UoBBio and @UoBChem to find out all our latest developments.



Student Ambassadors

The University are currently recruiting for student ambassadors, who play a key role in supporting recruitment activities. Student ambassadors act as advocates for the university and their degree programmes, working on events such as Open days and UCAS fairs, as well as acting as role models, helping to raise aspirations and awareness of higher education. Outbound calling ambassadors help to encourage attendance at events such as open days, as well as supporting enquirers and applicants with any questions they may have about university life.

If you are interested, you can fill out an application form [here](#)!

We are also asking all staff to please help us in promoting this opportunity to ensure we have the best advocates for our courses and the university. You can do this by encouraging students to enquire by emailing ambassador@bradford.ac.uk before the application **deadline of 23:59 on Thursday 17th October**

Join our LinkedIn Groups

LinkedIn is a great tool for building your professional network, showcasing your skills and can even lead to employers contacting you, rather than the other way around. Here at Bradford we have our own LinkedIn groups so please, sign up for your free LinkedIn profile at www.linkedin.com and join the community!



Bradford University School of Biomedical Sciences
Bradford University School of Chemistry