The Mole

The IMI-er

UNIVERSITY OF BIRMINGHAM | IMI INSTITUTE OF MICROBIOLOGY AND INFECTION

School of Biosciences and Institute of Microbiology and Infection

Combined Newsletter, Spring 2022

Introduction from the Editors

Welcome to this special combined Spring Newsletter, jointly produced by the editors of the Mole and the IMI-er, led by Steve Busby and Alison Iboro Offong. Both newsletters regularly bring you the latest on current happenings, views and opinions, and, this time, the Mole was due to focus on Microbiology. So what better reason could there be to put our heads together, pool our resources, and try something new? We are enormously grateful to all our colleagues for producing copy on time for this issue. *Alison & Steve*

Note from the editors: is this a move to study the feline microbiome or a bid to be the next Bond villain?

A word from Willem van Schaik, Director of the IMI

As I write this introduction to the combined IMI/Mole Newsletter, I am very close to hitting the five-year mark for my career in Birmingham. To be honest, when I applied to the job here, I knew that microbiology was an area of excellence at UoB, but I only had a vague understanding of the structure of the IMI and the wider University. The past five years have been a steep learning curve for me in gaining an organisational understanding of our place-of-work. Although I am sometimes still struggling with the insane number of acronyms that are thrown around, I now have a much better understanding of how microbiology has been an important part of research and education in the University of Birmingham, over many decades, with important discoveries in enzymology, bacteriology and virology along the way. Indeed, 'everything in biology starts with microbiology' as the famous (at least in the Netherlands) cancer researcher Piet Borst once said. Microbiologists have indeed led the way in elucidating the fundamental mechanisms of life. They have also often been the first to develop and implement novel technologies in their field, with genome editing through CRISPR-Cas9 and the implementation of high-throughput DNA sequencing technologies being just two recent examples.

At the University of Birmingham, through the IMI and our close links with colleagues in the School of Biosciences, we have collectively created a unique environment that has become one of Europe's leading research institutes in microbiology. I cannot predict what exciting discoveries will result from our work, but I am sure that we will continue to be at the forefront of discovery science in our field.

In this issue

Neil Hotchin, Head of the School of Biosciences adds: **everyone in Biosciences benefits from our association with the IMI, as an Institute that spans Schools and Colleges, and fosters inter-disciplinary research, so it's great to focus on it here in this issue. The new year has brought big changes in School leadership, notably with the appointments of Chris Bunce and Julia Myatt as Heads of Research and Education respectively. Having recently taken the difficult decision to stand down as Head of School, this will be my last HoS editorial, so I'd like to take the opportunity to thank all of you for the support you have given me during what has been a challenging time for everyone, and also to thank you for all the lovely messages after the announcement. I know the School is in great hands with Rob Jackson as Interim Head of School and I know you will all give him the same level of support that you gave me.**

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Chris Bunce writes: First of all I want to take this opportunity to thank Susannah Thorpe and Mike Tomlinson for all their hard work in the really challenging period of both COVID and preparing our REF submission. It's exciting to be appointed as Head or Research, alongside the appointment of Julia Myatt as our Head of Education. Julia and I worked together on the team developing the Human Sciences degree programme, and we now want to work with you all to bring together an integrated School Research and Education strategy that will help us play our part in the University's ambition to become a global top fifty institution. One ambition in this plan will be to grow the size of the School over the coming years, in order to create greater resilience and to be more competitive with Schools and Departments larger than ourselves. However, whatever our size, winning grants will always be key to our success so please think about which grants you can apply for in the coming months and contact me (c.m.bunce@bham.ac.uk), Jasmine Penny (j.r.penny@bham.ac.uk) or, if its via an overseas funder, Stefano Tommasone (s.tommasone@bham.ac.uk) for support.

Julia Myatt writes: The school has seen many changes over the years, even in my relatively short (compared to some!) 15 years here. I, myself, have gone from a forest-dwelling, orangutan-watching PhD student to a mum of two young daughters (continuing my studies of primate behaviour from the comfort of my home!). The change has never been more pronounced, perhaps, than in the last two years. We have rapidly had to adapt to a new way of working and a new way of educating. Whilst it has not been without many challenges, it has also opened-up new ways of doing things. I am excited to be able to take over as the Head of Education at this point of change. As we all get used to operating in a world of flipped, blended, face-to-face, but also online sessions, we can focus on offering the solution that best fits our needs. My experience with the Liberal Arts and Natural Sciences programme has also shown me some of the exciting avenues we can explore to offer even more flexibility and variety for our students. I am looking forward to the next phase in the life-cycle of Biosciences, and I am looking forward to working with everyone to meet the needs of the next generation of students - who could one day be our colleagues as well! By the way, it really was great to see so many staff face-to-face (rather than zoom-to-zoom) at the recent Staff AwayDay at the Exchange, the new UoB Downtown Hub (pictured above).

Arrivals

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Dr Archana Sharma Oates (left), who recently joined us writes: I completed my undergraduate degree in Biochemistry, followed by a master's in bioinformatics. I then pursued a PhD studying gene regulation in the nematode *Caenorhabditis elegans.* After my PhD, I worked as a post-doctoral research fellow at the Universities of Leeds and Birmingham for a number of years, working on transcriptomics, whole genome/exome sequences and methylome analysis applied to cancer research, muscoskeletal and ageing research, and more recently to COVID-19 research.

I started in my current role as Lecturer/Assistant Professor in October last year. My particular research interest right now is focused on determining the underlying mechanisms behind the earlier onset of diseases in minority ethnic groups (with a focus on autoimmune diseases), specifically to determine the contribution of the environment versus the genetics.

Teaching: MSc Bioinformatics (Dubai and Distance learning) module lead on Computational Biology for complex systems. Academic tutor of all modules led by Biosciences on MSc Bioinformatics (Distance learning). I currently contribute lectures and practical classes to the Genomics & Next Generation Sequencing module on MSc Bioinformatics (Edgbaston and Dubai) as well as BSc module Omics for Biomedical Research.

Dr Yawei Sun (left) has joined as a visiting researcher. He says 'I'm very pleased to be a visiting academic with the IMI (School of Biosciences). I am an associate professor in the College of Animal Science and Veterinary Medicine, Henan Institute of Science and Technology in Henan province, China, and I'm here on a scholarship funded by the China Scholarship Council.

I've been working on the multidrug resistance mechanism of efflux pumps in *Salmonella* Typhimurium for ten years. The research during my visit will investigate the role of indole on efflux pumps and demonstrate its molecular regulation mechanism, which is a very interesting scientific question.

I'm really looking forward to obtaining some new ideas and experimental techniques in Dr Jess Blair's research group during my stay.'

New Wolfson Advanced Glasshouses Ready for Research

The Wolfson Advanced Glasshouses on the UoB campus are now fully open and research-ready! The state-of-the-art facility is designed to enable vital research into plant science and food security.

The facility consists of seven environmentally controlled compartments - fully automated lighting, temperature control and irrigation with shading and supplementary specialised lighting options and it is capable of CO2 enrichment and class II plant pathogen exposure experiments on plant systems. There are also two laboratory areas, a waste processing area and ancillary soil and lab stores.

To find out more and to visit the facility, contact Facility Manager Jude Williams at J.Williams.7@bham.ac.uk
www.birmingham.ac.uk/glasshouses

Research Matters

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News from the Bhatt lab

Congratulations to Charlotte Cooper (right) on the publication of her paper in PNAS titled ‘MadR mediates acyl CoA-dependent regulation of mycolic acid desaturation in mycobacteria’. The paper was the result of work done by Charlotte as part of her PhD thesis with Rebeca Bailo as a co-author. The study shows how a mycobacterial repressor acts as a molecular switch, controlling the desaturation and biosynthesis of mycolic acids, key lipids of the cell envelopes of mycobacteria. https://www.pnas.org/content/119/8/e2111059119

Charlotte is an alumna of the University of Birmingham for a Midlands Integrative Biosciences Training Partnership (MIBTP) PhD programme, and is currently a postdoctoral research fellow at the University of Warwick researching nutrient acquisition in Mycobacterium tuberculosis.

Congratulations to MSc Microbiology & Infection student, **Veronica Rozek** (left), who has been accepted for an oral presentation at this year’s MicroSoc Conference in Belfast. The oral presentation is based on work that Veronica did during her summer studentship with Mike Brockhurst and Rosanna Wright at the University of Manchester, and focuses on the ecological and evolutionary interactions between bacteriophages and their hosts in phage cocktails that are currently considered one of the viable approaches to tackling the issue of AMR. Veronica was also successful in getting a travel award from MicroSoc.

More news from the Blair lab

Congratulations to Hannah Pugh (left) on passing her PhD viva with minor corrections! The title of Hannah’s thesis was ‘Diversity and conservation of RND efflux pumps across Escherichia coli’

Congratulations to Dr Amanda Rossiter’s group on the award of a £100,000 Cancer Research UK Early Detection and Diagnosis Primer grant entitled, 'Development of a patient-derived, mucosoid-microbiota model to identify novel gastric adenocarcinoma biomarkers triggered by the intestinal metaplasia-associated microbiota'.

Research Matters

Henry Dale Fellowship for Dr Lucy Crouch

Lucy writes: The fellowship will look at how gut microbes prevalent in babies use N-glycans in breast milk. I am hoping that figuring out a bit more about this ecosystem will provide new ideas for making infant formula more like breast milk. Arriving at IMI soon will be a new anaerobic cabinet, a new type of high-performance liquid chromatography, and a new post-doc! We will be studying the growth of these bacteria and the enzymes that they produced to breakdown N-glycans. Thank you to everyone who read my drafts and listened to my ideas. I am also just back from maternity leave, so a photo including the baby (Coen) seems appropriate considering the nature of the project.

There are two main projects in my lab at the moment. The first involves determining how infant gut microbes use N-glycans in breast milk as a nutrient source. In terms of the infant gut microbiota, breastfeeding is the most significant factor on composition. Breast milk promotes the growth of *Bifidobacterium* species that feed on human-type glycans. These particular microbes have been linked to better long-term health outcomes. This is in contrast to formula-fed infants, which promotes the growth of microbes that feed on plant-type glycans as formula contains these. The second project is characterising how human gastrointestinal pathogens degrade mucin O-glycans. Mucin in mucus is 80 % O-glycan and identified virulence factors include enzymes that breakdown these glycans. We are characterising the glycobiology taking place at this host-pathogen interface for a number of pathogens.

Keeping us safe

Andy Lovering writes: First, thank you all for continuing to make the School and the IMI a safe and pleasant place to work during the past few months, and for being responsive to the changing conditions we work under. It's important to heed the recommendations from the University, and we appreciate that the Covid guidance recently is somewhat open to interpretation. With the rise in cases in recent weeks, please monitor and read any updated advice that is sent in the coming period.

Note that It will soon to be time for the annual "walk around" safety inspections, organized to check and maintain standards throughout the labs – take the time to ensure that your area and those around you are compliant. Best wishes and a safe progression into spring.

Andy, on behalf of the Safety Committee

News from the Grainger Lab

Congratulations to Professor David Grainger (right) and Dr David Forrest (far right). David Grainger was recently awarded a BBSRC grant for the project titled "*Redefining the rules - widespread bidirectional transcription from prokaryotic promoters*" (£547K). Dr David Forrest, a post-doc in the Grainger Lab, was successful in his application for Biosciences Pump Priming funding for the project titled *"Mollicute Transcription: RNA polymerase adaptions in minimal, A-T rich DNA organisms"* (£3.5K). Read about their latest publication on the next page.

Recent publication highlight: polymerase promiscuity

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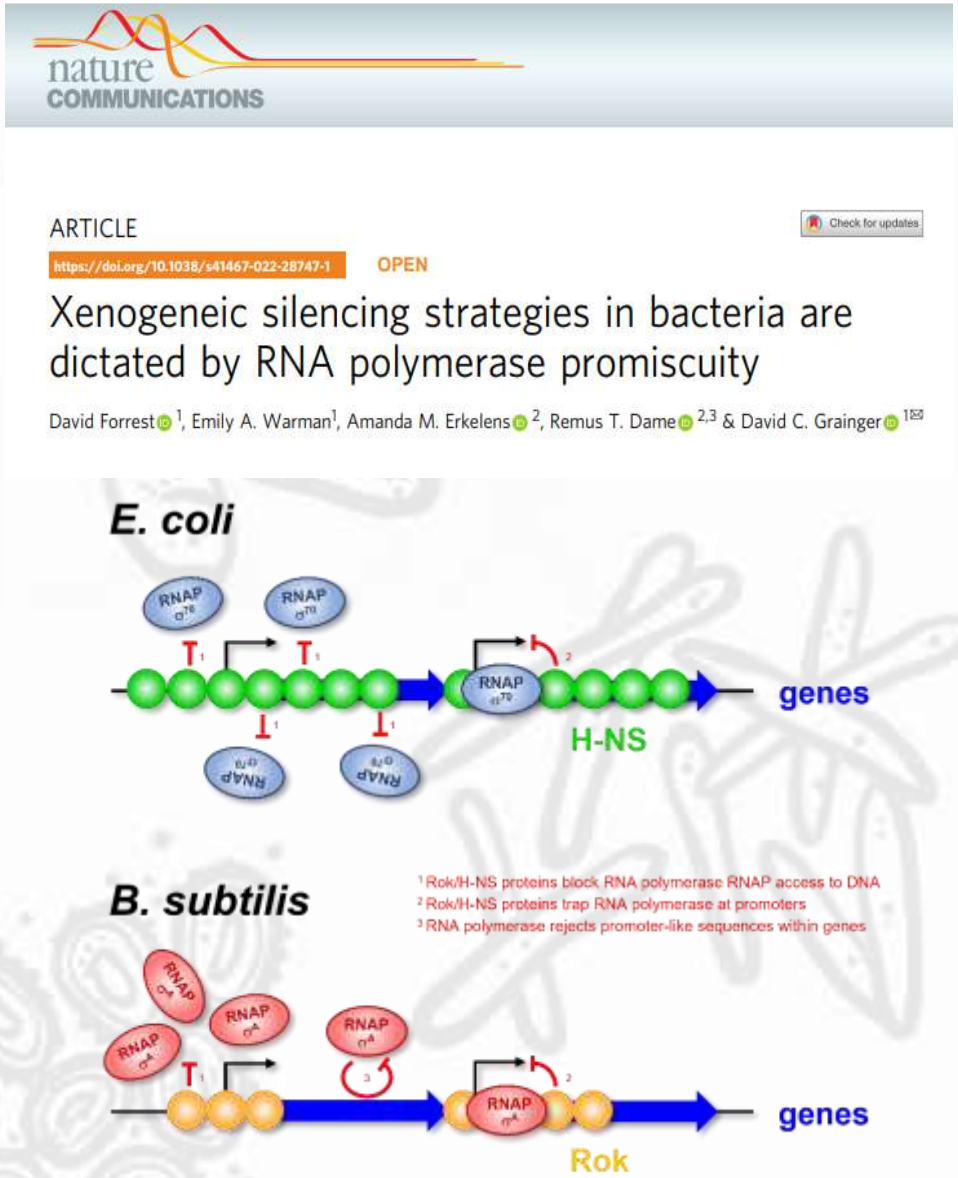
David Forrest explains the work: Transcription, carried out by the DNA-dependent RNA polymerase enzyme , is the first step of gene expression in all living organisms. In this process, the information encoded within a gene's DNA sequence is copied into a transient molecule called RNA that acts as a blueprint for protein synthesis.

In bacteria, RNA polymerase is told where to start transcription by a protein called sigma (σ) factor. This sigma factor associates with RNA polymerase whilst also recognising specific DNA sequences called a promoters. The main σ factor shared by all bacteria recognises DNA sequences closely matching the best sequence, TATAAT. However, DNA composition varies across genomes and between bacteria. This means some genomic regions are richer in A and T bases and are full of accidental TATAAT promoter-like sequences. RNA polymerase using accidental promoters instead of genuine ones results in transcriptional chaos, which is undesirable. *E. coli* prevents this by coating its A-T rich DNA with the protein H-NS. This stops RNA polymerase and its σ factor from recognising accidental promoters. Bacteria related to *E. coli* use similar mechanisms.

In our lab's latest paper, we uncover a new way whereby bacteria prevent unwanted transcription on A-T rich DNA. *Bacillus subtilis* is an important organism for understanding related pathogenic bacteria, bacterial spore formation, and plant root colonisation. *B. subtilis* is only distantly related to *E. coli* and, as such, is different in many ways including having a more A-T rich genome. For the last decade, it was thought the *B. subtilis* Rok protein functioned like H-NS. However, when we removed Rok, we did not see an increase in unwanted transcription. This led our investigation to the *B. subtilis* major σ factor, σ^A.

Compared to σ^{70}, the major σ factor in *E. coli*, σ^A has a stricter preference for promoters. Compiling all the promoter sequences in *B. subtilis*, we noticed that the TATAAT sequence is more conserved than in *E. coli*. Furthermore, the short DNA sequence between the promoter and transcription start site, the discriminator, is more A-T rich in *B. subtilis*. These observations suggested σ^A is more adapted to identifying genuine promoters in A-T rich DNA and less prone to transcribing from accidental promoters. We demonstrated this with *in vitro* transcription, i.e., transcription in a test tube. *E. coli* RNA polymerase initiated transcription less on A-T rich DNA when given σ^A. The opposite was true for *B. subtilis*, its RNA polymerase transcribed more when using σ^{70}.

The 'bottom line' is that *E. coli* RNA polymerase is more promiscuous than the *B. subtilis* RNA polymerase, and, hence, *E. coli* needs to use H-NS to avoid transcriptional chaos. In contrast, due to the strictness of the *B. subtilis* RNA polymerase, Rok, rather than H-NS, is sufficient just to repress specific promoters, as and when needed.



More publication highlights

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Escherichia coli **has produced several successful pandemic clones in recent years that are resistant to many antibiotics and cause serious infections in humans. Rebecca Hall and colleagues looked at the evolutionary history of different pandemic clones to see whether there were common processes in the formation of these clones. We identified similarities in certain stages of clone evolution that may be important for identifying the emergence of the next multidrug-resistant 'superclone'.**

Available online at www.sciencedirect.com

ScienceDirect

Current Opinion in Microbiology

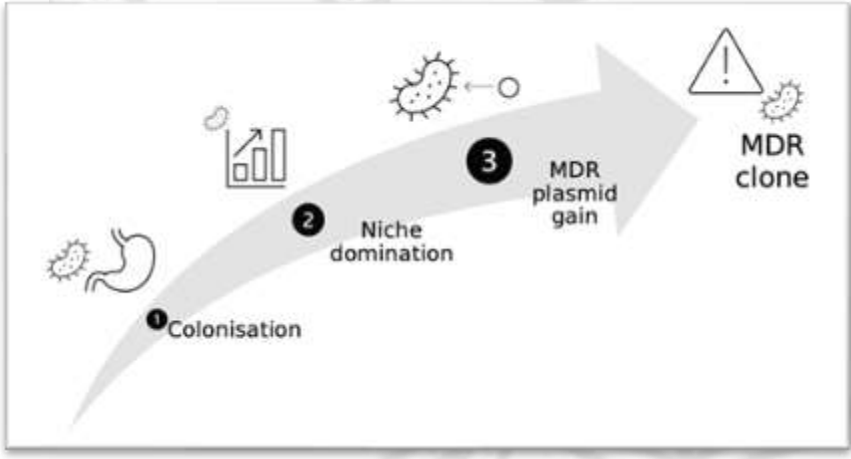
ELSEVIER

Prokaryote pangenomes are dynamic entities

Elizabeth A Cummins[1,3], Rebecca J Hall[1,3], James O McInerney[2] and Alan McNally[1]

Prokaryote pangenomes are influenced heavily by environmental factors and the opportunity for gene gain and loss events. As the field of pangenome analysis has expanded, so has the need to fully understand the complexity of how eco-evolutionary dynamics shape pangenomes. Here, we describe current models of pangenome evolution and discuss their suitability and accuracy. We suggest that pangenomes are dynamic entities under constant flux, highlighting the influence of two-way interactions between pangenome and environment. New classifications of core and accessory genes are also considered, underscoring the need for continuous evaluation of nomenclature in a fast-moving field. We conclude that future models of pangenome evolution should incorporate eco-evolutionary dynamics to fully encompass their dynamic, changeable nature.

pangenomes. Multiple models of pangenome origin and maintenance have been proposed [3–5] that consider different evolutionary mechanisms and account for different variables such as random drift, effective population size, selection coefficients, and HGT. Contributions of adaptive and neutral evolution in pangenomes, based on neutral and nearly neutral population genetic theory, and how they can account for extensive accessory genomes have been discussed in detail [4–10]. Some research suggests that accessory genomes are largely under the influence of neutral evolution [8]. The presence of accessory genes at the tips of trees, reflecting their transience, would be consistent with their expected distribution under the neutral model. Alternatively, others suggest that pangenomes are instead the result of adaptive evolution due to the acquisition of beneficial genes [5], with



PLOS GENETICS

RESEARCH ARTICLE

The widespread nature of Pack-TYPE transposons reveals their importance for plant genome evolution

Jack S. Gisby[1]*, Marco Catoni[1,2]*

1 School of Biosciences, University of Birmingham, Birmingham, United Kingdom, **2** Institute for Sustainable Plant Protection, National Research Council of Italy, Torino, Italy

Transposable Elements (TEs), also called "jumping genes", are genetic DNA sequences able to move across the genome, and their transposition activity is associated with genome plasticity and gene evolution. In this study, we designed a new informatic tool for automatic annotation of TEs with specific ability to for new gene variants (by "exon shuffling"). With our method, we reported several examples of coding genes with exons acquired as a consequence of TE mobilization in the maize and rice genomes.

Engagement and Impact

Here, Professor Jason Mercer talks about his contribution to British Science Week. British Science Week is a celebration of the sciences and their impact on all our lives. It provides children of all ages and backgrounds across the UK with the opportunity to meet and talk with career scientists, technologists, engineers and mathematicians. They get the chance to take part in a variety of activities such as performing experiments, building and testing model structures or designing their own little habitats in a jar. For science week Eva Frickel and I took our science "on the road" to the local primary school. As everyone knows what a virus is now, our theme was Microbes: what are they and how can we see them? We talked about how magnifying very small things enables us to see them, and brought in a fluorescent microscope for looking at skin cells before and after virus infection. There were literally gasps and wows at "how cool the cells look". We talked to children in Years R-4 about what scientists do and how being a scientist is a fun and exciting job. We also engaged the older year groups in "scientist training" with a pipetting relay race. What struck both Eva and I most was their excitement and curiosity. All the students had a question or an experiment-gone-wrong story to share. Science week was a fun and rewarding experience that we would encourage others to take part in and not just for the welcome reminder that science is actually "cool".

Our alumni create impact every day. Here, Nan Zhang, who graduated in 2019 with a Molecular Biotechnology MSc updates us on what she is doing now

I am grateful for my experience of studying abroad, and my time at UoB was unforgettable. The professors were enthusiastic and patiently answered our questions in – or after – class. The students at campus pursued their dreams, conscientiously fulfilling their responsibilities as students, and developed their hobbies in their 'down time'. I was affected by the wonderful atmosphere of the School, and soon blended into the unfamiliar environment…

I am now working at Yisheng Biopharma Co., Ltd in Beijing, China as a project manager, and I am currently participating in the research and development of 3 vaccines: COVID-19, rabies and Hepatitis B. My work mainly focuses on project application, preclinical immunity studies and project progress management. This is a great working experience which allows me to understand the complicated process of vaccine development, from the research phase to the drug registration phase. YishengBio is a global biopharmaceutical company with fully integrated research, manufacturing and commercialization capabilities, developing innovative biotherapeutics for cancers and infectious diseases. By exploiting our proprietary PIKA® immunomodulating technology platform, we have built a pipeline of diverse novel candidate biotherapeutics with first- and best-in-class potential. Our candidates include YS-ON-001 for the treatment of solid tumours, YS-HBV-001 vaccine for hepatitis B prevention, YS-HBV-002 for chronic hepatitis B therapy and the PIKA rabies vaccine for accelerated post-exposure prophylaxis.

Yisheng focuses on the development and commercialization of innovational biological macro-molecular drugs for antiviral infection and tumour immune therapies. Yisheng has research centres in Beijing, Singapore and Maryland, and a large scale GMP vaccine production base in Shenyang, China. The company continues to focus on innovative R&D investments.

Microbiology Society: a message from the President

In the last issue, we announced that Professor Del Besra has been appointed as President of the Microbiology Society, one of the largest and most active learned societies that promotes all aspects of microbiology. Here, Del writes an open letter to all of us:

Dear IMI-ers

I was delighted to be elected as the new President of the Microbiology Society last summer, but, to be honest, perhaps a little anxious in terms of what was to come! However, I've already spent a few days officially in my role as President at the Microbiology Society office in London, this year. I've met the Society staff, and I am learning all about the great things the Society is currently doing and planning for the near future, plus I attended and chaired my first in person Council Meeting. Hopefully, many of you will be attending the Annual Society meeting in Belfast in person – we have nearly 1000 delegates and over 700 posters (from what I've been told).

As the new President, I am aiming to champion the mission of the Society and promote its policies to key stakeholders. During my term, I would like to explore several areas that I feel are especially relevant to the business of the Society and its membership. For example, I feel we need to grasp opportunities to engage with industry, in particular, as the microbiology of infectious diseases and emerging genomic technologies all seem to be inter-connected. COVID has highlighted the great strides that the UK biotechnology community has made in this regard, and we should be promoting microbiology within these communities, with even greater interactions with academic and clinical microbiologists (who probably have been neglected in the past), thereby promoting our discipline towards key societal impacts. Also, I am eager that we continue with the excellent work that the Society is doing towards Equality, Diversity and Inclusion (EDI), and I feel that we should be leading from the front for UK-science in what can be a difficult but important discussion. I look forward to Championing our current plans, and, notably, the Society recently joined the Equality, Diversity and Inclusion in Science and Health (EDIS) forum. We also face key challenges in terms of our journals, Open Access and Publish and Read models in the future and we will need to work together collectively to tackle these.

We are a vibrant and interactivity community of microbiologists and I think, together as a Society, we can promote our discipline, and I look forward to working with you all – if anyone would like to chat with me, about the work of the Society, please feel free to contact me, you can find me in my N105 (if you want to pop-in) or E-mail. Note that the 'Microbiology Roadshows' will continue during my term as President – we already have Bristol, Cambridge, Glasgow, Leicester and Northumbria on my list of places to visit.

Best regards

Professor Gurdyal S. Besra FMedSci FRS
President of the Microbiology Society

Like many learned Societies, the Microbiology Society is member-driven, and it is well worth considering joining up, especially if you are a student or an early career researcher. For more details, visit https://microbiologysociety.org/membership.html

For the love of fungi

Dr Megan McDonald joined the IMI as a Birmingham Fellow during the height of the pandemic in November 2020. Megan has brought her passion for fungi and plant science to Birmingham, and is looking forward to 'sharing the love' with year 12 students at the IMI Summer School in July amongst other things. Here, she talks to Alison about getting started as a group leader and the joys of working with a pathogen that is so skilled at outwitting evolution.

Where are you from, Megan? I am originally from a very small town in Arizona. My father is a veterinarian, so I grew up in an animal hospital really! I studied Biology at the University of Arizona in Tucson. As an undergraduate, I worked as a technician in a plant pathology lab, with aspergillus flavus which is a pathogen known for contaminating food with aflatoxin. It was whilst working on a biocontrol for aflatoxin contamination as an undergraduate that I fell in love with fungi.

What was it like moving from Tucson to Zurich? Essentially, I wanted to get some experience by going abroad [after my first degree] but I could not afford to do so without a job. My undergraduate supervisor connected me with a scientist at ETH in Zurich; he was able to get me a job in a fungal plant pathology lab there, working as a technician for six months, and he then turned out to be my PhD supervisor. The Swiss are very quiet; I found that challenging [at first] because as an American, I talk a lot! But the lab environment is always very international and I really enjoy interacting with people from different countries, seeing what they eat, what they do for fun, their different traditions, so in that sense I've always felt at home in universities. And my PhD supervisor was actually an American – he even has the same last name as me!

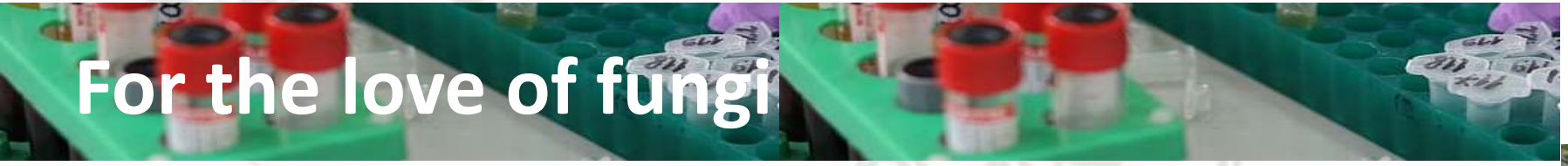
Moving on to Canberra: PhD graduates from Swiss universities are eligible for fellowships or postdoc positions, and I was able to get a [Swiss-funded] fellowship to move to the Australian National University in Canberra, working again on plant pathogenic fungi. My goal was to get some functional genetics skills; my PhD was very much oriented around sequences and phylogenetics and I wanted to do experiments with the fungi to confirm that the genes that I thought were interesting based on their sequence actually did something. I ended up working there for eight years as a postdoc, initially on my fellowship, then transferring to a long-term grant that was funded by farmers looking at the evolution of fungicide resistance.

What brought you to Birmingham? I was awarded a Birmingham Fellowship, which is a five-year independent position that then transitions into a permanent lectureship. It gives me the stability that I need to move forward and build a group. I am part of the IMI, but also very much part of Plant Sciences and BIFoR, and I'm trying to be the bridge between these different groups. I work on fungi that infect plants, but my focus is really fungi so there's also a lot of overlap with the HAPI lab's work.

What has been the biggest hurdle you've faced in terms of career progression so far? Making the transition from postdoc to lab leader was very challenging. My partner [Dr Florian Busch who is a lecturer in BIFoR and Biosciences, pictured here with me] and I applied for lots of jobs in many different places, but we were handicapped because we had this 'dual body' problem: two scientists at the same career stage looking to move together. We applied for jobs – Florian for about five years, I for two years – got interviews, in some cases getting offers but no position for the second person, and then having to say no which was very hard. We had to overcome this by being very resilient and very persistent…

Florian and Megan in their early Birmingham days

For the love of fungi



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And the highpoints? When I was in Australia, I won an award called the Peer Prize for Women in Science. I made a video of my work and it was voted for by peers who had to prove they were scientists by providing evidence that they had published.

Watching PhD students finish has been another highlight. I've supervised four students to completion in Australia, and it's been really satisfying to see them go through their final seminars, their exams, and defend their theses. Currently I have two students left in Australia, including one who's just submitted their thesis. I'm co-supervising four PhD students here, but except for one they're mainly projects where I'm a secondary supervisor. Going forward, I'm really looking forward to getting my first primary supervised PhD student.

What motivated you to take on the joint coordination of the IMI Summer School [with Dr Nicole Wheeler]? I've done very little public communication, but it's always been something that interested me, and the Summer School is a really good opportunity to interact with motivated students. I like the emphasis on equity and diversity, trying to get students into Biosciences, particularly those who wouldn't normally choose that field of study, or might not even have chosen to go to university. I'm looking forward to it because young people give you a lot of energy and remind you why you love science.

Final thoughts? Despite the pandemic, everyone has been really warm and welcoming in both Biosciences and the IMI; it's been a really nice collegiate environment to join. And the fact that my lab is upstairs and my office with Hung-Ji is elsewhere has actually helped me to network with both sets of people.

Megan's research: 'I'm interested in what makes fungi good pathogens of plants. Plants have sophisticated immune systems that defend themselves against lots of different pathogens, not just fungi, but also bacteria and viruses. The result is that through evolutionary time, pathogens have had to specialise, so the fungi that I work on – *Zymoseptoria tritici* - only infect wheat, but not other similar hosts such as barley. The other pathogen I work on – *Bipolaris sorokiniana* - can infect wheat *and* barley. I'm interested in discovering what genes enable them to infect these hosts, and those genes are often specific to those specialist pathogens. I use whole genome sequencing to try and identify candidate genes and then I use reverse genetics tools to see if it has an effect on its ability to infect the plant or not.

I've recently been awarded a Royal Society seed grant worth £20,000, and I hope that this will provide the preliminary data to support a BBSRC Responsive Mode grant application in due course. The goal is to generate a genome wide single-gene knockout library. Then I'll use Manuel [Banzhaf's] spotting robot to screen all of those individual mutants under different conditions, and try to identify mutants that either lose – or maybe gain - the ability to grow on a particular drug. We can use this information to design better fungicide targets, ideally that will kill fungi and not be toxic to us or other animals (including bees and insects). Developing fungicides for agricultural use is really challenging as these are sprayed across hundreds of hectares. So finding something that inhibits the growth of fungi, a eukaryote, that does not negatively affect other organisms is really challenging (insects and other animals).

A further challenge is that all the mechanisms you see in antimicrobial resistance are also present in fungi. Fungi have efflux pumps [like bacteria] so they can pump the drugs out, making them resistant to intervention. They also respond in crazy ways by duplicating whole chromosomes or increase the copy-number of the targeted gene, or simply accumulate changes in the targeted amino acid sequence, which means that the drug can no longer bind correctly. The one difference is that fungi don't share plasmids like bacteria do; they do undergo horizontal gene transfer but in a different way.'

The Jeff Cole story

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Emeritus Professor Jeff Cole celebrated a landmark birthday recently and what better time to recognise his full and fascinating life? Although Jeff has been retired for some time, he has remained very active, and is often seen around the IMI, especially supporting IMI ECRs. Here is Jeff's take on his life, work and 53 years at the University of Birmingham

Jeff's early days My parents were from Essex: some of the Cole family perfectly matched the negative "Essex" stereotypes, but my father, one of 8 children, was a professional Surveyor of Lands who worked for the Admiralty. He was moved from Pinner, London to Devonport Dockyard when I was 6 years old. I left a small Church of England primary school in Shenfield to be dumped in a rough Plymouth primary school, from which I gained an 11-plus scholarship to Plymouth College. The same year my father died of lung cancer caused by smoking. My mother had to survive on a pension of £4 a week, so I learnt to use cash sparingly.

Both Hyde Park Primary School and Plymouth College had the highest standards, so I gained a scholarship to St. Peter's College Oxford to read Chemistry. Six of us, mostly a group of friends, opted for a "Diploma in Biochemistry", which, every Friday, involved lectures and practicals run by Hans Krebs and his colleagues. Chemistry was a 4-year course, the 4th year being a research project that I completed with David Hughes in Krebs's MRC Unit in the Department of Biochemistry. David Hughes then offered my girlfriend and me a D Phil on condition that, after a 5th year in Oxford, we would move to Cardiff where Hughes was to be the first – and last – professor of microbiology.

Hughes was an innovative "butterfly scientist", someone attracted by so many scientific possibilities that he rarely focussed on any of them for more than a few years. When I arrived in his laboratory, he was keen to determine whether ultrasonic energy could be used to cure Meniere's disease; whether membranes contain enzymes; whether polyphosphate is an energy source exploited by photosynthetic bacteria – and many other projects. My D Phil project was to determine why anaerobic bacteria make cytochrome *c*. David and my supervisor, Julian Wimpenny, had shown that *E. coli* makes "cytochrome *c*": I was asked to show it was involved in hydrogen production. On the contrary, I showed it was implicated in nitrate and nitrite reduction to ammonia.

It was expected that any Oxford D Phil would be followed by post-doctoral research in the USA. I therefore spent two years from 1967 – 1969 at UCLA, Los Angeles, working for Syd Rittenberg until his funding ran out. The Vietnam war was at its peak. Had I remained in the USA, I would have been drafted to serve in the USA army, so I applied for over 80 jobs in the UK, including approaching Harry Smith for a post-doctoral position in his laboratory. Instead, I was offered a lectureship in Biochemistry – without even an interview. Another long story here! For a month before (and after!) returning to the UK, I had nightmares about coming to Birmingham. I thought I would remain for one, perhaps two years, before moving back to the USA or Canada. The rest is history.

Keys to the longevity of Jeff's scientific career? Key factors were working with excellent colleagues that included Steve Busby, Ian Henderson and now, Amanda Rossiter; excellent PhD students, with over 60 supervised as first or joint supervisor (too many to name individually); and motivation by several excellent Heads of the Department of Biochemistry or the School of Biosciences. Deryck Walker started the turn-around from us being a second or third-rate department, lacking ambition, and with very poor funding. Daily he left his office to ask staff how their research was progressing, offering to read any grant application based on ideas they had mentioned in the coffee room. Ian Trayer then accelerated the pace by setting us the challenge to be a five-star department. Steve Busby and Bob Michell were key players in making a plan of action. Ian and Nigel Brown, then Head of Biological Sciences, agreed that neither of their Departments had sufficient clout to achieve five-star rating, so, in 2000, they agreed to join forces in a new School of Biosciences. For 24 years, as Head of Academic Programmes, I had the clear mandate from successive Heads that teaching must be research-led and high quality, but teaching bureaucracy must never conflict with research interests.

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Fred Griffith Prize Lecture 2011

Legless pathogens: how bacterial physiology provides the key to understanding pathogenicity

Jeffrey A. Cole

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The Jeff Cole story (continued).....

A few of Jeff's most memorable (research career) experiences so far…

- Collaboration with John Guest (Sheffield) in the discovery of how bacteria switch from aerobic to anaerobic growth. The key player is a protein known as FNR – the regulator of fumarate and nitrate reduction. We collated our independent results in a Brighton Chinese restaurant on a cold January night during a meeting of the Microbiology Society (formerly, "the SGM").
- Discovery of how bacteria reduce nitrate to ammonia by two parallel pathways that compete with denitrification.
- Demonstration of how some bacteria, especially *Neisseria gonorrhoeae*, survive in the human body by exploiting a compound in blood in a process known as molecular mimicry. The 'knack' is their ability to use a nucleotide, CMP-NANA, produced by the human body to sialylate bacterial surface oligosaccharides, and hence avoid complement-mediated killing.
- In research led by Steve Busby, discovery of the mechanism of how FNR activates gene expression during the switch from aerobic to anaerobic growth.
- Collaborative research that continues today on how bacteria avoid being killed by another human defence mechanism, the production of nitric oxide. A paper currently in revision will report a new biochemical pathway used by *E. coli* and related bacteria to reduce nitrite via nitric oxide to nitrous oxide.
- Current work with Amanda Rossiter, who is an extremely innovative scientist interested in host-pathogen interactions. This involves understanding the immune response that enables some gonococci to survive in the human body by inducing the host to produce "protective antibodies". This is definitely unfinished research.

The biggest challenges… When I arrived in Birmingham I was allocated a start-up grant of £110 – no zeros missing!! Staff did not have a telephone in their offices, and use of departmental telephones was discouraged. Grant applications were also not encouraged because of the extra work it caused the Head of Department, so lack of funding was a major challenge. In the 1970s the VC, University Secretary and Administration were totally out of touch with departmental staff, resulting in a culture of mutual hostility and destructive disrespect. Forty years later, the same destructive attitudes remained, despite strong leadership provided by one of two excellent VCs, Sir Michael Thompson (the second excellent VC was David Eastwood!). Any Institution that fails to value and work closely with its staff will remain, at best, second rate. I was nearly dismissed as Head of Academic Programmes for pointing this out to a Pro-Vice-Chancellor for Academic affairs in the early 2000s.

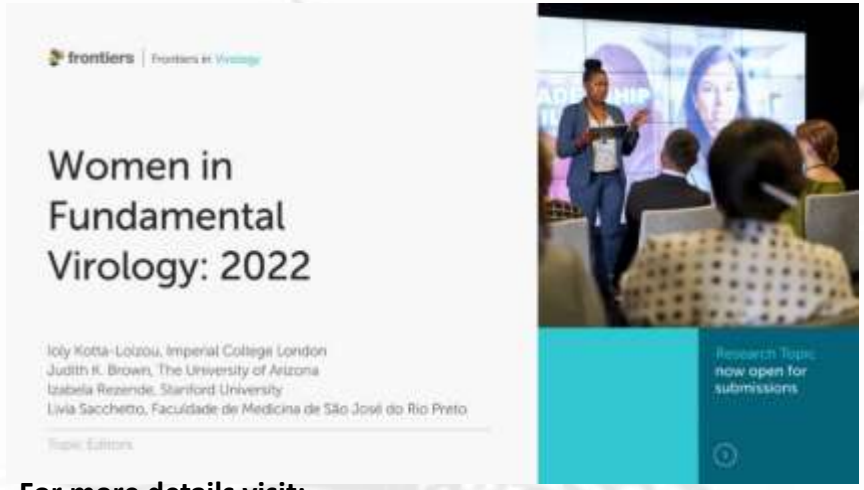
Jeff's current pursuits My greatest challenges since 2005 have been to rescue the European Federation of Biotechnology from successive self-inflicted financial crises – but this is a success story. For the last 18 years I have effectively run the EFB, for which I have been President since January 2021. We have a large Executive Board that, only 7 years ago, was dominated by elderly males. Two factors are enabling gender balance and teamwork to be achieved. Young and mid-career female biotechnologists are increasingly attracted to join us; and we have a small Central Office with excellent staff in Barcelona. Last year, we started a new Journal, the Bioeconomy Journal, and we published a position paper on genome editing regulations, which made a major impact with the European Commission that is moving to our mantra that regulations must be based on the best available science, not on superstition or prejudice.

My wife Sudesh and I share the enjoyment of walking, especially for birdwatching. We also have a small but productive garden with many types of fruit and flowers – plus the odd vegetable. We look forward soon to returning to fly-drive holidays in France, and elsewhere in Europe – and Sudesh wants us to spend time in New Zealand!

And finally, a few words of advice for early career researchers? Understand that there are no limits to what you can achieve in research. The only factors that will restrict you will be your confidence that you can solve whatever challenges you face; your ability to work with colleagues who can help you solve your problems; and your appetite for hard work.

Equality, Diversity and Inclusion

UNIVERSITY OF BIRMINGHAM | IMI INSTITUTE OF MICROBIOLOGY AND INFECTION



For more details visit:
https://www.frontiersin.org/research-topics/30204/women-in-fundamental-virology2022

Ramadan 2nd April 2022 to 1st May 2022

Ramadan is the holiest month of the year for Muslims. Did you know that one in ten of our student community at UoB are Muslim? How can we support our community/ensure we keep up with academic work when friends/we are participating in Ramadan this month? The University of Birmingham has collected some resources that can introduce you to, and/or help you/ your friends manage this period at the University. For more information see: https://intranet.birmingham.ac.uk/student/equality-and-diversity/ramadan.aspx

What is Ramadan: https://youtu.be/HGDANe-gJME

Ramadan top 10 tips: https://www.youtube.com/watch?v=LIEoO4mwcPI

Drs Eleanor Cull (above left) and Mary Blanchard (centre) are the People and Culture leads for the School of Biosciences, championing the EDI agenda. They welcome your ideas and suggestions for making our work environment a better place for everybody.

Dr Amanda Rossiter (right) is the MDS-IMI EDI Lead.

The IMI Cross College EDI Committee is chaired by Professor Willem van Schaik. Committee members are Professor Jason Mercer, Dr Amanda Rossiter, Dr Sara Jabbari (School of Maths), Dr Katherine Abrahams (currently on maternity leave), Lilly Cummins (IMI PhD student, MDS) and Alison Iboro Offong.

The IMI EDI team welcomes your ideas, feedback, challenges and questions. Please feel free to get in touch!

Equality, Diversity, Inclusion: a personal perspective

UNIVERSITY OF BIRMINGHAM | IMI INSTITUTE OF MICROBIOLOGY AND INFECTION

The Offongs at large in Digbeth

Alison Iboro Offong says 'I was delighted when Professor Willem van Schaik invited me to join the new IMI Cross College EDI Committee in 2020. It seemed like the perfect pairing: the synergies of working together with colleagues from other IMI-affiliated Colleges, and the chance to raise awareness around equality, diversity and inclusion. I have been working with researchers – both here and in West Africa - who live by the mantra 'excellent science for better health' for the last 20 years and it's always been a great privilege to support them, but I want the initiatives that we evolve here in Birmingham to pave the way for future generations of researchers from a much wider variety of backgrounds.

About me: I was born in Moseley (Birmingham) to a black mother and a white father, in the days before olive skin and wavy hair were 'fashionable'; on the contrary they marked you out as 'half caste'. I am a child of the Windrush generation; in the early fifties, my mother and granny made the long journey from Jamaica to the West Midlands full of hope for a new life in the 'mother country'. I enjoyed learning and did well, which clearly surprised some, not least the kid (male, white) I met on my first day at secondary school in north London, who asked me if I'd been streamed into the bottom set. I was actually in the top set where I remained for the next 7 years.

I've never felt a sense of 'Englishness' or even Britishness, as it was made clear to me early on that I didn't quite belong. However, I've always enjoyed my status as the perpetual outsider; I lived in West Africa for 21 years - in Sierra Leone, Nigeria and Gambia - and I've travelled in over twenty African countries. My four children all spent their formative years in West Africa, but live in various parts of the UK now. They are unanimous in the opinion that they became aware of their 'blackness' when they moved here, because suddenly they were defined by skin colour. Instead of being identified as the 'clever one', 'Balotelli haircut', or 'the cheeky one' they were reduced to one attribute in many situations: 'the black one'.

The dilemma: Many of us with family in the Caribbean find that the ones who stayed behind often did better than us. My aunty Del is an emeritus professor of microbiology at the University of the West Indies. My late aunty Kitty was also an academic. Several of my relations are doctors; one has recently retired as a professional tennis player. I would hazard a guess that being raised to have high expectations and not being burdened with the preconceptions that accompany many people of Caribbean descent in the UK had something to do with it. Meanwhile, my cousin, Des Walker, played for Nottingham Forest and England, thus fulfilling the stereotype of sport or music as the pinnacle of black British working class achievement. Needless to say, he experienced his fair share of racist abuse both here and when he went to play in Italy…

Why I sit on the EDI committee: Given all that I've said about not feeling English/British, I have an existential connection with Birmingham and it's one of my favourite places in the world because it melds cultures and kindness in a way that few other places can match. Sadly, the University still doesn't reflect the city's diversity, especially as you journey up the academic food chain. On the plus side, it's thrilling to be with a bunch of people who really believe that Equality, Diversity and Inclusion are, quite simply, 'good practice', and my hope, for starters, is that the relative homogeneity of microbiology and infection researchers in Birmingham will, one day, be a thing of the past.

Chris Green's personal reflections on COVID-19

Chris writes: we recently passed 2yrs since the first cases of COVID-19 were admitted to UK hospitals. It's been a difficult time for everyone, but thanks to everyone working together there is now a lot more to look forward to. But when Steve asked me to write a note of personal reflection for the newsletter, I hardly knew where to begin…

I normally spend half my time working in the NHS, as a front-line clinician and consultant in infectious diseases, and the rest of my time is divided between the University and NIHR. During the pandemic, as well as working extra emergency rotas to cope with the clinical workload, and in helping medical colleagues to work in new ways, it was abundantly clear that urgent translational health research was needed to make informed public-health decisions, to develop new treatments for severe disease, and perhaps most importantly, we needed the vaccines for a safe path to ending the pandemic.

First, several 'sleeper studies' developed from the lessons of the 2009 influenza pandemic were activated across the NIHR/NHS, which included ISARIC (a WHO clinical characterisation protocol) to rapidly understand hospitalisation with this new disease. Myself and others helped to set up the analysis pipeline for on-demand and real-time support to public health advisors, as part of the CO-CIN subgroup of SAGE, which was especially important for modelling the impact of COVID on the NHS. With over 90% of the NHS R&D workforce re-deployed into front-line care roles during the pandemic, with the help of David Adams and a small team at NIHR, over 80 medical student volunteers were trained to back-fill the essential research roles across hospitals in the West Midlands, and especially for ISARIC (over 13000 admissions at UHB alone). Next month, ISARIC (for the UK) will return to hibernation, and a deserved rest, ready for the next time we need it.

At the same time as starting ISARIC, the RECOVERY trial began, and this remains the world's largest randomised-controlled trial of drug treatments for hospitalised cases of COVID-19. Birmingham, and especially UHB Trust, was always going to have a great number of hospital admissions, and, so far, over 800 patients have been enrolled in this study. The table (right) summarises some of what we learned from RECOVERY, and the ease at which these lessons could be actioned globally to save many more lives has been reassuring. While leading RECOVERY at UHB, others from the University were conducting other key clinical trials, such as CATALYST, in a wonderfully co-ordinated approach to discovery and evaluation of other interventions that could help to treat patients. RECOVERY continues, and may soon expand to evaluate treatments for influenza.

No clinical benefit	**Hydroxychloroquine** Anti-malarial (host immune response)	
	Azithromycin Macrolide antibiotic (host immune response)	
	Apirin COX1 and COX2 inhibitor (host immune response)	
	Colchicine Microtubule inhibitor (host immune response)	
	Convalesent plasma Anti-SARS-CoV-2 antibody (anti-viral)	
	Lopinavir/ritonavir Protease inhibitor (anti-viral)	
Proven clinical benefit and entered routine clinical care	**Low-dose Dexamethasone** Corticosteroid (host immune response)	
	Casivirimab/Imdevimab Anti-Spike monoclonal antibodies (anti-viral)	→ Now redundant with the dominance of viral evolution (Omicron variant)
	Tolcilizumab Anti-IL6 monoclonal antibody (host immune response)	
	Baricitinib JAK enzyme inhibitor (host immune response)	
Currently under evaluation (UK)	**High-dose Dexamethasone** Corticosteroid (host immune response)	
	Epagliflozin Sodium glucose co-transporter 2 inhibitor (anti-viral)	
	Sotrovimab Anti-Spike monoclonal antibody (anti-viral)	
	Molnupiravir Ribonucleoside analogue (anti-viral)	
	Nirmatrelvir/ritonavir Protease inhibitor (anti-viral)	

Chris Green's reflections on COVID-19 (continued)

My research background is in vaccine development, and my DPhil was in developing viral-vectored vaccine technology for another respiratory RNA virus (called RSV) at the Oxford Vaccine Group. With world-class vaccine leaders in the UK and the NIHR vaccine taskforce, many COVID vaccine candidates were developed at speed and in parallel to one another.

Trials of these vaccine candidates were intense and were delivered by both experienced and newly-trained research teams across the country, in the midst of all the uncertainties of an ever-changing pandemic. The figure on the right gives a snapshot overview of the work. This project required the generosity of over 1400 members of the public, who volunteered and entrusted themselves to me and the team in Birmingham (UHB), together with input from many other studies, performed at other sites in the West Midlands. Alongside all this, other important work in our University has advanced our understanding of immunity in the context of severe, co-morbid disease.

Vaccine science has now broken the link between infection and progression to severe disease for the general population, and, although many friends have recently been unwell with infection, it is noteworthy that, over the last month (when I've been looking after in-patients on the infectious diseases unit), there was not a single admission with the COVID pneumonitis that was so common in the waves of 2020/21.

The horizon now includes exciting projects that are using new vaccine technology, developed for COVID, but re-purposed for remaining global health targets for vaccine protection (such as malaria, TB and RSV). Also, with some of our non-medical colleagues at the University, we are partnering to take important steps in global health on vaccine equity and health infrastructure. These are distinctly better problems than where we were 2 years ago. There will always be too many people to thank in getting where we are today, so I'll sign off by saying that I hope you are all looking forward to the future as well.

FMT: discovery science and beyond

Faecal microbiome transplantation (FMT) is one of the more accessible areas of research to the lay audience and has attracted media attention (and curiosity) in recent years as a result. England's only licenced Microbiome Treatment Centre (MTC) was set up four years ago at the Queen Elizabeth Hospital Birmingham (QE) and is led by Professor Tariq Iqbal; the senior team also includes Dr Nabil Quraishi (left) who is a Consultant Gastroenterologist at University Hospitals Birmingham. Nabil is an honorary senior clinical lecturer at UoB and clinical and scientific advisor at the MTC. Here he provides a glimpse into this fascinating work and its future potential.

About the MTC: Our main business at the Centre is to manufacture FMT for the treatment of patients with C.Diff infections. We supply thirty to fifty FMT treatments every month for syndication across the UK, and we've been doing this for the last four years. The MTC was also set up to deliver clinical trials, and Stop Colitis is one of them. Furthermore, we're starting a clinical trial around primary sclerosing cholangitis (PSC, a liver disease) using FMT, and there are ongoing discussions about using FMT for treating immune mediated gastrointestinal conditions. So that's where we are currently: we look at FMT both in terms of translations around findings from these clinical studies and towards the development of next generation therapies.

Nabil's FMT trajectory: We've had an interest in FMT for more than a decade, and it was our discussions around using it to treat ulcerative colitis that led to the Stop Colitis trial. My PhD used the Stop Colitis trial to gather mechanistic data, specifically the host and microbiome mechanisms that are associated with response to FMT. The trial was done over three centres: Birmingham, Glasgow and London, with Birmingham being the main one. I had some really interesting findings that hadn't been shown before, demonstrating changes in immune cell function, specifically an increase in regulatory T-cells and a decrease in pro-inflammatory T-cells following FMT. My PhD also looked at primary sclerosing cholangitis and explored potential mechanisms of disease in PSC, and again we made some findings which have since been published. Since my PhD, we've had a few other grants, including a study using oral lincomycin, a gut-acting oral antibiotic for the treatment of inflammatory bowel disease (IBD) that you get in PSC.

The aim of that study is to understand mechanisms of disease that lead to colonic inflammation in PSC/IBD, and we received about £80,000 through the European Crohn's and Colitis Organisation (ECCO) for that study. About a year ago we got a grant with Dr Palak Trivedi looking at FMT for the treatment of PSC (the FARGO trial). We've also got a few other studies in progress including an understanding of the microbiome basis of ulcerative colitis in Crohn's disease, and we have an inception cohort IBD service that's set up to collect multiple samples, again run jointly through the MTC and the University.

Discovery science and a gateway to new therapeutic interventions: FMT is a very crude way of discovering mechanisms of disease and understanding potential therapies. Its main role is in treating C.Diff, but for safety reasons amongst others, FMT is less feasible and sustainable to use long term for diseases outside of C.Diff. So the general trajectory of FMT over the next few years will be to understand the mechanisms of success for a specific disease, using that to develop novel therapies such as a consortia of bacteria pill…There have been lots of clinical trials, all of them giving mixed results for various indications and there have been various reasons why FMT has been stopped and re-started across services (and globally), including the pandemic. But for the time being there are lots of studies ongoing, including the FARGO trial, which we hope will evolve into more targeted therapies through our findings.

Final reflections: I think that we need to streamline our thinking in how we use microbiome science. Institutes working together, along with commercial companies, can help build on the success of the MTC and this is key to driving things forward. We were the first, and currently there are not many other centres using FMT, but we run the risk of losing the race, so I think that there needs to be more support for FMT research and its translation into microbiome therapies [from the University].

BactiVac

BactiVac, the Bacterial Vaccines Network, brings together members based in academic, industry and policy sectors to accelerate the development of vaccines against bacterial infections relevant to low and middle-income countries (LMICs). The BactiVac Network delivers this through catalyst project and training awards to encourage cross-collaboration between academic and industrial partners in developed and developing nations.

see https://www.birmingham.ac.uk/research/immunology-immunotherapy/research/bactivac/index.aspx

CATALYST PUMP-PRIMING PROJECTS: We are delighted to announce our intention to launch another round of funding for pump-priming projects by the end of March 2022, with a closing date in July 2022. Full details of the launch of Round 6 will be notified shortly and further information will also be available on our website very soon. To date BactiVac has awarded 50 projects through our pump-priming programme. The outcomes of completed projects have been published and as you will see there have been some outstanding results achieved so far! We are also pleased to see the continuing outputs from these funded projects with more publications and securing of substantial funding awards.

The purpose of these catalyst funds is to promote **new collaborations**, in particular involving **LMIC partners and/or industrial partners**, resulting in the preliminary data necessary to attract further, more substantial, funding leading to long-lasting and beneficial partnerships that grow bacterial vaccinology. It is worth reminding all Network members to utilise our Network Directory to facilitate new collaborations. If you have any questions about our catalyst funding programme ahead of the formal launch, please do get in touch with the BactiVac Admin Team who will be very happy to help you. For more details and regular updates, please follow BactiVac on Twitter @BactiVac using the hashtag #BactiVacFunding.

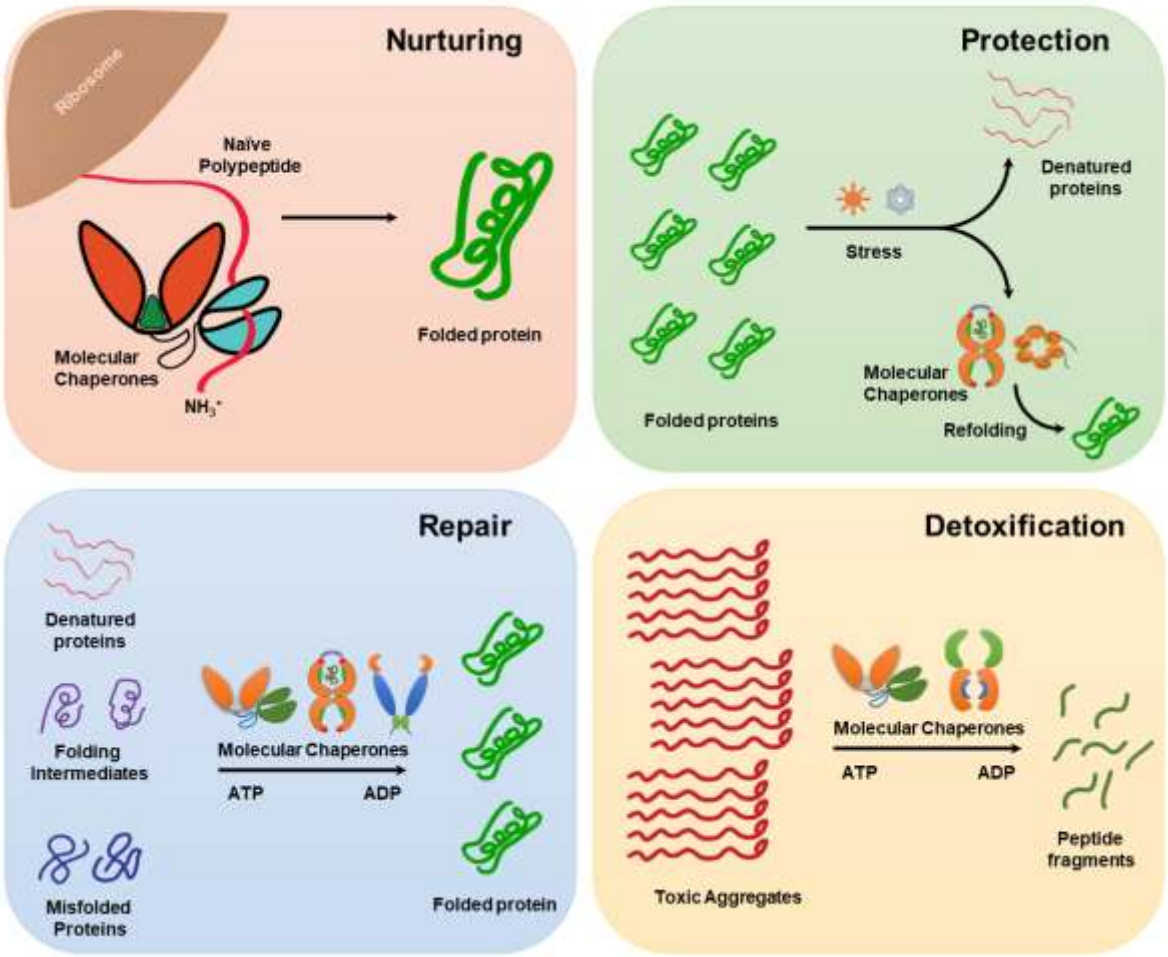
Predatory publishing: a hot topic…

The journal 'Nature' has highlighted this issue: "Predatory journals are a global threat. They accept articles for publication — along with authors' fees — without performing promised quality checks for issues such as plagiarism or ethical approval. Naive readers are not the only victims. Many researchers have been duped into submitting to predatory journals, in which their work can be overlooked." Everyone needs to be aware of this issue: read more here: https://media.nature.com/original/magazine-assets/d41586-019-03759-y/d41586-019-03759-y.pdf

Talking about molecular chaperones

Santosh Kumar (pictured below) writes about the "messiahs" of proteins: The central dogma of molecular biology concerns the flow of genetic information, encoded in nucleotide base sequences. This information is translated into polypeptides, which then fold into proteins to perform biochemical functions. Rogue intermolecular interactions caused by the crowded cellular milieu can disfavour correct folding, thereby either limiting protein availability, or causing the accumulation of toxic protein aggregates, as observed in some degenerative disorders. A sophisticated network of about twenty ubiquitous proteins, collectively known as molecular chaperones, functions to overcome these problems. Molecular chaperones, initially identified as heat shock proteins (Hsps), bind to the unfolded substrate (*aka* client) proteins by their exposed hydrophobic patches (which subsequently become buried upon correct folding). This binding sequesters the client proteins away from unfavourable conditions, thereby preventing their misfolding and aggregation. Hsps are classified by their molecular masses and by their function; simple substrate binding is known as *holdase* function (usually ATP independent), whilst ATP-dependent folding-inducing interaction is known as *foldase* function. Apart from their role as folding catalysts, molecular chaperones are involved in many other biological processes (see figure on the right), including the disaggregation of protein aggregates, the assembly of multi-subunit proteins, protein transport across biological membranes, proteolysis, and several organism-specific moonlighting functions, that all contribute to cellular homeostasis.

Initial research on molecular chaperones focussed on bacteria, especially exploring their applications in biotechnology. However, the discovery of their role as key regulators of signalling pathways, and growing interest in debilitating protein misfolding diseases, such as Alzheimer's Parkinson's and Huntington's, has prompted massive research efforts directed to eukaryotic and human chaperone proteins. The overarching aims are to understand their actions, and the pathways they affect, in alleviating or aggravating these diseases. This research has enormous potential for developing therapeutic strategies.



Molecular Chaperones Aiding Proteostasis: the figure illustrates the roles of molecular chaperones in key stages of proteostasis; **nurturing** naïve polypeptides into native folded proteins, **protecting** proteins from stressful conditions (Ex.: heat or cold shock), **refolding (repair)** the denatured or misfolded proteins and folding intermediates, and **disaggregating the toxic aggregates** of the misfolded proteins. Notably, different molecular chaperone classes function in different proteostasis stages.




News from IMI Central…

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Rachel Howes (above left) writes……..the last few months have been very busy as we have been preparing for the VCIR submission (VCIR= vice-chancellor's integrated review). I'm pleased to say that this has now been submitted and we await the outcome after the meeting in May. I am positive about the future of the IMI, and will continue working with Willem and Jason to deliver the cross-College strategy and support the IMI's continuing development.

We (Nicole Wheeler, Megan McDonald, Alison Iboro Offong and I) are currently working on planning for the IMI Summer School which will take place during the week commencing 4th July. This year's cohort is being drawn from the University of Birmingham School, an excellent example of Birmingham's ethnic and socio-economic diversity. We're really excited about the prospect of welcoming the Year 12s into the Biosciences labs and we hope to gain as much from the students as they do from us. Look out for requests to help out in that week – it really is a lot of fun!

Planning for the Molecular Microbiology Conference (details on the right) is also gaining momentum as we get closer to the conference dates (15th and 16th September). Please note that the early bird tickets are only available until the 13th May; you can purchase them via this link: https://www.birmingham.ac.uk/research/microbiology-infection/events/index.aspx

The Conference schedule is also available at the same web address.

That's it for now, enjoy the spring sunshine and feel free to pop into the office should you need any help with anything..

Best wishes

Rachel

Mol Micro 2022

Following the postponement of the conference due to the pandemic, we are now eagerly looking forward to hosting the event in person on **15th to 16th September 2022** at the University of Birmingham.

Confirmed speakers include:

- Kristina Jonas (Stockholm University)
- Klas Flardh (Lund University)
- Tom Santangelo (Colorado State University)
- Thorsten Mascher (Technical University of Dreiden)
- Dirk Schüler (University of Beyreuth)
- Julia van Kessel (Indiana University, Bloomington)
- Angelika Grundling (Imperial College London)
- Eva Frickel (University of Birmingham)

Mol Micro 2022 Scientific Coordinating Committee: David Grainger, Liz Ballou, Manuel Banzhaf and Andy Lovering, **Organising Committee**: Rachel Howes, Alison Iboro Offong

IMI cross-College team: Rachel Howes, IMI Operations & Development Manager (Biosciences); Alison Iboro Offong, PA to the IMI Director & Administrator (Biosciences); Hannah Grover, IMI Deputy Institute Manager (MDS); Helen Matthews, IMI Institute Manager (MDS); Julie Wade, PA to Prof Alan McNally (MDS IMI Director) and Administrator; Ruth Perry, IMI Research Lab Manager (Biosciences); Vikki Harrison, Doctoral Training Programme (DTP) Coordinator (MDS); Carol Benham, IMI Technical Manager (MDS)

the BioCup and BioSoc

BioCup update: Biochemistry 30 – 25 Biology

The Pub Quiz on Monday 21st March, at a packed Indie Lounge in Selly Oak, marked a turning point. Team Biology turned up in high spirits, holding a 20-10 lead over Biochemistry, after strong showings in last year's Pub Quiz and Bake-off competitions. But it was Team Biochemistry who turned the tables, and finished the night with a 30-25 lead. The Quiz was expertly organised by BioSoc President Tommy Siddall and his team. The challenging music and popular culture questions had the likes of Steve Busby, Klaus Futterer, Rob Jackson and Mike Tomlinson rather flummoxed and they will be asking for a formative session before any future quiz. The evening ended with a 'Capsaicin Challenge' for 10 brave volunteers. Armed with an extensive knowledge of capsaicin receptor pharmacology, Sam Reyna's Biochemists outdid Rob Jackson's Biologists, who knew a little too much about the physiological effects of chilli peppers for their own good. Remarkably, 7 out of 10 competitors completed the challenge. After the final mouth-searing habanero, some competitors were too disorientated to recall which team they belonged to! But there was a clear predominance of Biochemists left on the stage. 5 points to Biochemistry! The overall winners of the Quiz were Biochemistry, bagging 10 points for the best team average score. And congratulations to the highest scoring team, 'The Biohazards', comprising brain-boxes Katie Bloomfield, Rishika Chohda, Leah Clements and Stella Harper, receiving 5 points for Biology and £80 in Amazon gift vouchers.

Rob Jackson's lab adopted Steve Busby into their team. Also in the photo (above) are Rob's tutees, Stella and Leah. from the winning 'Biohazards' team.

Biochemistry now take the overall BioCup lead, thanks to 5 more points for providing the most entries to our latest School Instagram survey. Follow the School @uob-bio and BioSoc @biosocuob to keep up with the latest news and exciting BioCup developments. These include football, netball and board game competitions, Tutor Group Karaoke, and a Non-Pub Pub Quiz, all planned for after Easter.

Our roving reporter, Mike Tomlinson, writes:

The BioSoc 2022 Easter Ball was greatly enjoyed by students and staff at the Botanical Gardens on the evening of April 1st. I can report that our students really know how to let their hair down – they danced all evening, even in between dinner courses!

Rolling back the years to join the students were Debbie Cunningham, Leanne Taylor-Smith, Mojgan Rabiey, Luke Alderwick, Rob Jackson and Mike Tomlinson. All were so grateful to the students for inviting them along and making them feel welcome. Big thanks and congratulations go out to BioSoc Vice-President Rebecca Budden and her team who did such an excellent job organising the Ball.

The personalised chocolates were greatly appreciated. These were a gift from the School and provided via community building funding from the College. A feeling of community was certainly built at the Ball!

Noticeboard: Biosciences News

School Manager, Claire Cooper writes: as more of us return to a greater presence on campus, the school is, once again, starting to feel a more vibrant community. Thanks go out to Leah and Florian for organising the Coffee mornings, these have been a big hit, and have allowed Biosciences staff to come together and chat, something we have all missed throughout the pandemic. Moving forwards, the coffee mornings will be held on different days of the week, so as to draw in staff who don't work on certain days. So, the May coffee morning is set for Tuesday 3rd , whilst the June date will be Thursday the 9th (all at 10:30, of course: mark your diaries now, please).

You'll notice the COVID signs are being taken down to full mark the end of restrictions. Mask wearing is no longer expected, however, whose who wish to continue to wear masks are encouraged to do so. Also, if you have new starters or visitors requiring access within the Biosciences building, it will no longer be a requirement for them to have read the building induction and return-to-campus PowerPoint in advance in order to be given access to the Biosciences building. We do want to keep the Building Access master-list however, therefore access requests should still be sent to the Biosciences

The School of Biosciences Instagram page has now been running for 7 months! We have a dedicated team managing this account: Mike Tomlinson, our current Apprentice, Leah Thompson, and Maria Tedford and Megan Campbell, both 3rd year UG Biosciences students. They have gone from 0 to 464 followers in this time, posting regular, exciting content which is a superb achievement!

The school is setting up a Biosciences Estates Committee and there will be representation from different areas within the school. This Committee will serve to provide transparency regarding Estates processes and approvals within the School of Biosciences and this ties in neatly with a new process for managing estates requests that has been implemented in the College of Life and Environmental Sciences. All Estates requests will be captured on a proforma to be submitted to Deputy Head of School and Claire Cooper. The request will then be considered by HoS and if approved, further approval will be required from the College. More details about this will soon follow!

IMPORTANT ALERT: We are sorry to report a **very** serious incident earlier in the month at the new Wolfson Advanced Glasshouse facility. Police are searching for six 'Santa bandits' who broke in under the cover of a snow storm. The incriminating image below was captured as they brazenly stared into a security camera. Do you recognise any of them?

Our thoughts are with our unfortunate plant researchers who had only just started to use the new facility. "They took all my tomatoes!" lamented a tearful Dr Estrella Luna-Diez, "and my favourite olive tree!". "These people are scabby roasters!" was the opinion of an enraged Dr Graeme Kettles. "My PhD student has spent many months genetically modifying Arabidopsis to express haggis fruit. Our work is now ruined by these Bampots!"

Please help bring these villains to justice: contact Campus Security, who, using the very latest GWAS data, have identified a 12-hour time window, during which the crime must have occurred, starting shortly after 23:59 on Thursday 31st March.

Noticeboard: PERCAT & BGRS

UNIVERSITY OF BIRMINGHAM | IMI INSTITUTE OF MICROBIOLOGY AND INFECTION

All About The PERCAT Community

The PERCAT (Postdoctoral and Early Researcher Career Development Training) initiative has been established to facilitate the career development and training of Postdoctoral and Early Career Researchers across the Colleges of Life and Environmental Sciences and Engineering and Physical Sciences.

There is a dedicated webpage available to all Postdoctoral researchers at:

https://www.birmingham.ac.uk/university/colleges/les/percat/about.aspx

Should you require further information relating to the PERCAT community, or would like to establish who your PERCAT school rep is, please contact Anthea Hall at a.hall@bham.ac.uk who is currently covering the role of PERCAT Officer.

Upcoming Events And Activities

PERCAT Research Funding Workshop: Where do I start workshop

Wednesday 22nd June 2022, (13:30 – 15:30)

This session provides an overview of the research funding landscape for postdoctoral and early career researchers in EPS and LES. It introduces the major funders (UK-focused), types of grants, typical application processes and assessment criteria, and is designed to help you start identifying appropriate funding routes for your research.

The session is jointly run by the EPS and LES Research Support and Development

Postdoctoral Researcher Conference (EPS & LES)

Alan Walters Building - Thursday 30 June 2022 (09:30-17:30) Tickets to launch soon

This is the only dedicated conference for postdoctoral and early career research staff in EPS and LES, giving you the opportunity to shareyour research, listen to keynote speakers and network across multiple disciplines.

For more information:

https://www.birmingham.ac.uk/university/colleges/les/percat/events/percat-postdoctoral-researcher-conference-2022.aspx

The 2022 Biosciences Graduate Research School Symposium

The annual BGRS symposium will be held on Friday the 6th May 2022 from 9am-5pm. Posters and talks will be presented by 2-4th year PGRs, and there will be a special guest talk by Prof. Tracy Palmer from Newcastle University. The posters will be displayed in the undercroft, while student talks will be taking place in E102 and NG08.

The guest talk will be held in the Haworth lecture theatre, but the time and title are yet to be confirmed.

Vendors will be present at the event as well and will be putting up their stalls in and around the Undercroft. Lunch and tea will be provided for the event, which will be free of cost. UG, PGT/PGRs and academic/non-academic staffs are all welcome to attend the event and there is no prior registration required.

Noticeboard

UNIVERSITY OF BIRMINGHAM | IMI INSTITUTE OF MICROBIOLOGY AND INFECTION

Inaugural Lecture: Professor Alan McNally 'Viruses to bacteria and back again: a scientific journey plagued by good fortune', Wednesday 6th July at 4:30 p.m in the Leonard Deacon Lecture Theatre at the UoB Medical School.

Join Professor McNally as he takes us on his career journey to date, spanning the H5N1 avian influenza epidemic; his work on genome sequencing and antimicrobial resistance; and his major contributions towards the UK's Covid testing capabilities.

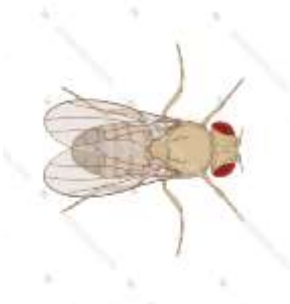
Please note that this event was rescheduled from 2nd February 2022 and that registration is necessary. To register:
https://www.birmingham.ac.uk/university/colleges/mds/events/2022/02/alan-mcnally-registration.aspx
Please contact Yvonne Dawson y.dawson@bham.ac.uk for further information

***IMPORTANT NOTE FROM THE EDITORS*: we hope that you enjoyed this 'special' combined issue of the Mole and the IMI-er. Next time, it's 'back to normal', with the usual formatting, and usual features, for the Summer Issue of each newsletter. The Mole will be focussing on the Structural and Molecular Biology theme, please send copy to Steve Busby. All copy for the Summer IMI-er (due out on 11th July) should go to Alison Iboro Offong.**

Professor Nigel Maxted (above) is Co-Chair of the IUCN Species Survival Commission Crop Wild Relative Specialist Group; Chair of the European Cooperative Programme for Plant Genetic Resources In Situ Working Group; Chair of the Defra Plant Genetic Resources Committee; Senior Scientific Advisor for the Global Environmental Facility / World Bank on Plant Genetic Resource Conservation and, until recently, was an Honorary Research Fellow at Royal Botanic Gardens Kew. He was appointed International Science Advisor for Bioversity International in 2016. He has published >250 scientific papers and 24 books on various aspects of Plant Genetic Conservation.

Other forthcoming inaugural lectures

Nigel Maxted: *Wed 4 May at 4:30 p.m.*
Alicia Hidalgo: *Thur 23 June at 4:30 p.m.*
Full details and booking instructions at:
https://www.birmingham.ac.uk/university/colleges/les/inaugural-lectures/index.aspx



Professor Alicia Hidalgo (above) aims to understand structural plasticity of the nervous system: in development, regeneration and repair. Alicia exploits flies as a model system to find link between structure and function in the brain. How does the brain change as we grow, learn and age? What happens in nervous system injury and disease, and how can we promote regeneration and repair?