UNIVERSITY OF BIRMINGHAM

SCHOOL OF BIOSCIENCES

# The Mole

The Biosciences Newsletter | July 2021

Editor: Steve Busby
Editorial Board: Doug Browning, Caroline Durbin, Olly George, Neil Hotchin, Nikki Kettles and Mike Tomlinson

**Editorial by Head of Biosciences (Professor Neil Hotchin)**

It has been some time since my last editorial for the Mole and, of course, much has happened in the meantime. One change is editorship of the Mole – Philippa and Doug are taking a well-earned break from editing the Mole and I'd like to thank both for their hard work and long hours putting together the mini-Mole during the past year and a half. I've had lots of positive feedback about the mini-Mole and how it helped colleagues keep in touch with the School during the seemingly endless months of lockdown. The new editor is Steve Busby, and I'm really grateful to Steve for agreeing to take on the role. Steve's brief to me was "keep it short and make us smile". I'm a rubbish teller of jokes so the best I can do on the smile front is to share a photo that makes me smile – this is my granddaughter, Lydia and the latest addition to the grandchild collection, Jude Hotchin, age 3 weeks.

Another reason for smiling is to congratulate Andy Lovering on his appointment as Professor of Structural Biology. On the topic of structural biology, soon we will be welcoming Professor Teresa Carlomagno as the new Director of the Biomolecular NMR National Facility, based on our campus, just off Vincent Drive. I also want to congratulate Saverio Brogna, Nik Hodges, Tim Knowles, Julia Lodge, Eugenio Sanchez-Moran and Mike Tomlinson on their award of the title of Reader, as well as Patrick Moynihan, promoted to Senior Research Fellow, and Pete Lund who becomes Emeritus Professor of Molecular Biology.

**Late news: The Biosciences Graduation Ceremony will be held on Wed 21st July at 3 p.m.**

**Important contacts:**

**Wellbeing Pages: https://intranet.birmingham.ac.uk/student/Your-Wellbeing/Index.aspx**

**College Intranet pages: https://intranet.birmingham.ac.uk/les/index.aspx**

**The PERCAT pages: www.birmingham.ac.uk/university/colleges/les/percat/index.aspx**

**Some more intranet pages (you need to log in to access these):**

**Who to go to for what: https://intranet.birmingham.ac.uk/les/college-services/index.aspx**

**The School Page: https://intranet.birmingham.ac.uk/les/biosciences/index.aspx**

**The Staff Handbook: https://intranet.birmingham.ac.uk/les/handbook/index.aspx**

## Note from the new Editor

Welcome to the midsummer Mole! The last time I edited the Mole was January 2016, so it was quite a surprise to be asked to take on the task again. Whilst the general look of our beloved organ has changed somewhat, its content retains the same themes. So let me lay out my view on why the School needs a newsletter, and what's in it for you, the highly esteemed reader. The first thing to say is that the Mole doesn't aspire to be a directory or a reference list… there are plenty of those for you, only a few clicks of your mouse away. Rather, we want to bring you the news and inform you of what is going on. We also want to showcase some of the great science going on. We are all members of the same School and, sometimes, finding out what is going on, on the next floor, next hallway, or even next door, can be fun, if not transformative.

As you all know (or maybe some readers don't know), the School has four major research themes:

- Cells & Molecules – coordinator Mike Tomlinson (Yun Fan next academic year)
- Microbiology – coordinator Jason Mercer
- Plant Science and Food Security – coordinator Dan Gibbs
- Biosystems and Environmental Change – coordinator Jim Reynolds

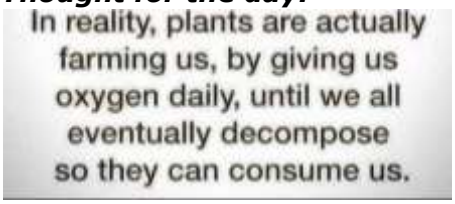
In this issue we focus on the Plant Science research theme that, as you will see, is wide-ranging, from molecules through to agriculture and forests and microbiomes, not to mention proper genetics! So most of this issue is devoted to this research theme, and I am grateful to Dan Gibbs for getting the material together. Of course, the other themes will feature in future issues, but the next Mole will be focused on Education… after all, we are a School!

The other big stories this time are Noni Franklin-Tong's election as a Fellow of the Royal Society… proof that you can do top-class science here… read her story!... and John Colbourne's mega-grant on Precision Toxicology. Plus all your favourites… and much more, besides.

**The Mini-Safe Mole (by Prof Andy Lovering and Dr Emma Monaghan)**

Many thanks to everyone for keeping Biosciences (and the University) a safe place to work during the past few months – your compliance has been both noted and appreciated. We have now had the announcement that full lifting of restrictions is likely to now come in July, and so we will all be continuing with current operations in place till then. It's a good time to remind PIs that there is an opportunity for lab risk assessments to move to 1m+ distancing if increased occupancy is necessary (and also safe – to do so requires submission of an updated risk assessment – this and any questions can be sent to biosci.hs@contacts.bham.ac.uk; office space is to be kept at 2m restrictions).
Another reminder is that it's now possible to rebook your second vaccine for an earlier slot (for those of you that possibly had one booked for late July, there have been several instances already for those being moved forward a month).

***Thought for the day:***




**Remember … stay safe and well!**

**Specially for Postgraduate students. Check out the LES PGR pages on Canvas and this link:**
**https://intranet.birmingham.ac.uk/student/graduateschool/pgr/covid/index.aspx**

# Focus on Plant Science and Food Security

**Research theme coordinator Dan Gibbs writes**: The Plant Science and Food Security theme has seen some big changes recently. As well as saying goodbye to several members (Chris Franklin, George Bassel, and Iain Johnston), we have welcomed a whole host of new academic staff at different career stages. Philippa Borrill, Estrella Luna-Diez, Marco Catoni, Graeme Kettles, and Florian Busch have all joined the theme as lecturers over the past three years, working on a diverse range of topics, including plant-pathogen interactions, wheat grain nutritional content, epigenomics, and photosynthesis. In addition, Christine Foyer joined as Chair of Plant Physiology in 2019, with Rob Jackson arriving in 2020 as the co-director of BIFoR (and deputy head of school!). Last but not least, we now have three ECR Fellows in the theme: Anne-Marie Labandera is a Leverhulme Early Career Fellow, Andy Plackett is a Royal Society Fellow, and Megan McDonald very recently joined as a Birmingham Fellow. With all this change, we have seen a big increase in the demand for plant growth space, and a need to accommodate a broader range of species – from ferns to strawberries, and wheat to oak trees! We also have had to adapt our facilities for new experimental approaches, including plant-pathogen studies that require category 2 containment and strict DEFRA licensing. As well as modifying our existing rooftop glasshouses and growth rooms, we are lucky to have recently seen completion of the new Wolfson Glasshouse development (more info on that below!). In this issue of the Mole, we present some recent highlights from the theme.

**Deputy Head of School, Rob Jackson adds**: It's likely that all of us have had a deeper appreciation for plants during the last 15 months, whether they be plants in the house or garden, crops in the allotment and fields or trees in our streets and woodlands. Some will also have had plants in their offices, but hopefully not too many have been lost to drought whilst working from home (I just managed to save my weeping fig – see photo – in the nick of time). A recognition of the importance of plants has always been a keystone of our School's research and teaching and indeed, the recent election of Noni Franklin-Tong to be a Fellow of the Royal Society in May recognises the huge contribution she and her colleagues have made to advances in plant cell biology – we congratulate her on this fantastic achievement! Moreover, the Plant Science theme has seen considerable investment in the last two years, with the recruitment of eight new staff, four of whom have interests in plant pathology and microbiology. Some of this has been driven by the Schools prominent role in BIFoR (the Birmingham Institute of Forest Research) and in developing new avenues in tree-related research. This has also been supported by a large investment from the Wolfson Foundation, to build the new Wolfson Advanced Glasshouses, based over on Elms Road. This facility is superb, with large controlled environment rooms and two labs associated with it. Trials with different plant species are now planned over the summer and the facility can now be added into future grant applications. The plant scientists are also influencing recent national policy initiatives, with contributions made to the Parliamentary Inquiry for England's Tree Planting Strategy, helping to shape the new UK Plant Science strategy, and contributing an essay to the University's contribution to the UN Climate Change Conference (COP26) being held in Glasgow in Oct/Nov 2021. With more interdisciplinary funding initiatives becoming more common, we are all keen to work with colleagues, so please do get in touch.

**Following election as a Fellow of The Royal Society, Noni Franklin-Tong tells her story:**

***From curiosity to a model system: self-incompatibility in poppies:*** Self-incompatibility (SI) in *Papaver rhoeas* (the field poppy) has been studied in Birmingham for almost 50 years. This started in

the 1970s with Mike Lawrence (pictured here, ~1990), my old PhD supervisor, who established the genetic control of SI in this species. The ability to discriminate between self and non-self is widespread in eukaryotes. Flowering plants use complex pollen-pistil interactions to play a decisive role in determining reproductive success; SI is critical to prevent potentially deleterious inbreeding. It is regulated by a polymorphic multi-allelic *S*-locus, comprising dozens of tissue-specific expressed pollen and pistil *S*-determinants which define mating types; this sophisticated allorecognition system prevents self-fertilization. SI was first discovered by Darwin and is an outstanding system to study from several perspectives. Mike was interested in population genetics when I joined his lab as a PhD student in 1982. He established that there was an astonishing number of S-alleles controlling this polymorphic self-recognition system (more than 60!). Unfortunately, I didn't take to such a theoretical project, that required playing with numbers and simulations on a huge mainframe computer using Fortran. Luckily, I liked working with plant material, and I developed an *in vitro* assay for mimicking the SI response that reproduced the *Papaver* SI system *in vitro* in living pollen tubes. This turned out to be the only successful SI bioassay for any species for almost 25 years!

It was 1983 and the start of cell and molecular biology studies on poppies. Fortuitously a young lecturer had just arrived who had been recruited as a molecular biologist, which was a new direction for research in those days. Mike persuaded him to work with me to identify and clone the poppy S-genes, and the rest is history. His name was Chris Franklin, and he eventually became my husband (left, helping in the field). We grew hundreds of poppy plants in the field outside the department (right) every summer to collect plant material which was frozen away to last the year, as the plants only flowered for about a month, and the glasshouses couldn't hold the

number of plants we needed. It's all been built over now. Identification of the pistil and pollen *S*-determinants is a major goal of most SI researchers because this is the key to how SI is specified. We did succeed in cloning several alleles of the *S*-determinants, with the stigma *S*-gene, which encodes a small, secreted protein (PNAS, 1994) and eventually, the more elusive pollen *S*-determinant, a small novel polymorphic transmembrane protein (Nature, 2009).

Next, I turned my attention to the cell biology of SI, initiated by a stay in Edinburgh to learn how to microinject pollen tubes. This was the start of my independent career. The *in vitro* SI bioassay system was the lynchpin for mechanistic studies, as it allowed investigation of the cell biology of SI for the first time. It enabled elucidation of major mechanisms responsible for rejection of incompatible pollen. We established that the poppy SI system triggered calcium signalling (one of the first demonstrations of $Ca^{2+}$-signalling in plant cells using live-cell imaging). Later we discovered that this SI signalling network triggered PCD-programmed cell death (Nature, 2004). Over the years, the research made contributions to diverse fields including cell-cell recognition, signalling, polarised tip growth, and actin cytoskeleton dynamics. *Papaver* SI turned out to be a great model system, providing insights into key cellular processes in pollen tubes that are relevant to eukaryotic cell biology in general.

Because SI has huge applied potential to produce F1 hybrids, transferring a SI system between species has been the elusive ambition of plant breeders, with implications for solving food security issues. For this reason, most researchers work on SI in crop species. I am always being asked, "why do you work

on poppies?" (subtext: are you mad?). However, using the poppy *S*-determinants, we made the first (and to date only) functional trans-genera transfer of a SI system *in vivo* (Science, 2005). We showed that the two *Papaver S*-determinants can act as a functional synthetic *S*-locus in a highly divergent self-compatible species. This breakthrough has implications for translational work, as it was thought that functional transfer of *S*-determinants to distant species was impossible. So, working on this oddball system, we had the last laugh.

Although I closed my lab and took early retirement in 2013, due to the fallout caused by cancer diagnosis and the debilitating effects of the treatment, I am still employed by UoB as a "part-time Research Fellow". Working from home started years before COVID-19 for me! The poppy SI research continues in collaboration with Maurice Bosch at Aberystwyth University and Moritz Nowack and Zongcheng Lin in Ghent. I am kept pretty busy interacting with these guys; it doesn't feel like "part-time" sometimes! We now use the engineered Arabidopsis "SI" system, which allows use of genetically encoded probes to study the mechanistic basis of the *Papaver* SI-PCD system. This provides new opportunities further to elucidate and dissect key mechanisms and components involved in SI-PCD. One current project is investigating the role of oxidation and reactive oxygen species in the execution of the SI-PCD response, with the hypothesis that the activity of proteins involved in pollen energy metabolism is altered. Another has identified a gene that functions as an inositol deacylase of glycosylphosphatidylinositol (GPI-) anchoring proteins that is essential for SI, implicating GPI remodelling as an important step required for SI.

**The New Wolfson glasshouses:** The Wolfson Advanced Glasshouses are a new £3M state of the art environmental research facility that will accelerate plant science research across the College of Life and Environmental Sciences in a wide range of key areas including food security, sustainability and climate change. Located in the Green Zone of Campus (Building G20), the containment level 2 facility provides seven independently computer-controlled compartments with nearly 100m$^2$ growing space, complementing the outdoor BIFoR-FACE experiment at Mill Haft, Staffordshire. The compartments provide a range of supplementary lighting and shading as well as automated watering, temperature control and $CO_2$ feeds. The facility has two laboratory areas, a waste processing area and ancillary soil and lab stores. Over the coming months, the facility will begin plant growth trials, becoming fully operational in the Autumn. The facility will be managed by Emma Monaghan with assistance from technician Stephen Hill. If you have any queries or questions, please contact the team via: wolfson.glasshouse@contacts.bham.ac.uk follow updates on Twitter using @Uob_glasshouses.

**Research update on 2021 fieldwork at BIFoR-FACE:** The group of Estrella Luna-Diez has now begun fieldwork at BIFoR-FACE, after being delayed for nearly two years due to the pandemic stopping work in 2020. Estrella, postdoc Rosa Sanchez-Lucas, PhD student Mark Raw and three externally funded summer students will work on understanding how the immune capacity of oak trees and seedlings is affected under elevated $CO_2$ against fungal diseases (powdery mildew). They have two large experiments going: (1) Time-course phenotyping and metabolome analyses of mature oak and naturally regenerated seedling leaves as they develop powdery mildew, and (2) Methylome analysis of mature oak leaves to link epigenetic changes with different transgenerational phenotypes that we are observing after last year's masting season. (Project is funded by a pump-priming grant by the School.) Samples are temperature sensitive, so they are collected using a dry shipper. Arborists collect leaves from the top, middle and bottom of the

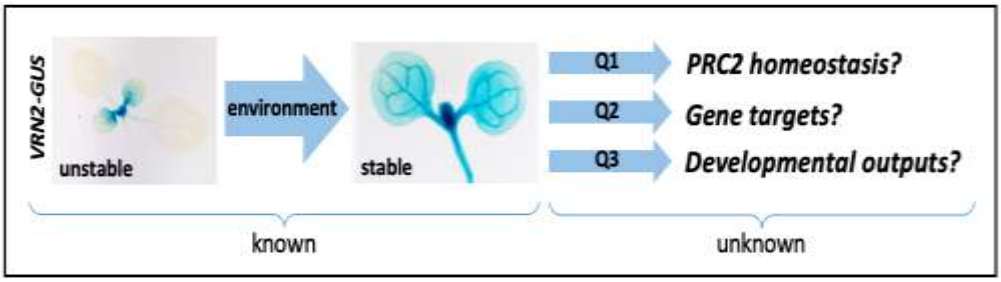
mature oak canopies, bring the samples down and they freeze them straight away! This spring has been so cold that so far we have only found **ONE** naturally regenerated oak seedling. There must be many more so hopefully the warm weather of early June will have encouraged the seedlings to come out! The only seedling found has been named "Hope" by Mark (photo on the left).

You can follow the fieldwork adventures (and Hope) on Twitter! @ELunaDiez

***New BBSRC Grant for Dan Gibbs: "A Molecular Framework for Environment Responsive Chromatin Modification in Plants"***

To survive in changing environments, plants must sense their surroundings and modify how they grow and develop. One way in which both animals and plants respond is through altering their gene expression through chemical modification of their chromatin. For example, a protein complex called the "Polycomb Repressive Complex 2" (PRC2) is involved in histone methylation, which triggers gene silencing. The PRC2 is found in animals and plants, but most plants have a larger variety of the different proteins making up the complex. This means they encode for a broader range of potential PRC2 combinations, and therefore have a larger "tool kit" for controlling the specificity and timing of chromatin methylation.

We still know very little about how the PRC2 directly senses the outside world to trigger these changes only when they are needed. As part of our ongoing ERC "GasPlaNt" project, we showed that the stability of a plant-specific component of the PRC2 – a protein called VERNALIZATION2 (VRN2) – is controlled by oxygen availability and temperature, and only accumulates under hypoxia (which can occur during floods) or during long term cold exposure (i.e., Winter) (Gibbs *et al.* 2018 *Nature Communications*; Labandera *et al.* 2021 *New Phytologist*). This suggests that VRN2 might act as a specialised "sensor" module of the PRC2 in flowering plants that ensures methylation of target genes is only triggered under the right environmental conditions. With this new grant we will investigate the consequences of environment-triggered VRN2 accumulation by answering three fundamental questions (see figure): (1) How do increases and decreases in VRN2 affect the other PRC2 variants and shape the global PRC2 landscape? (2) What are the genome-wide targets of stable VRN2-PRC2? (3) How do environment-triggered increases in VRN2 translate into plant developmental changes? This work will increase our understanding of how plants directly translate environmental changes (e.g., the seasons or stresses) into chromatin modifications that reprogram gene expression to align growth and development with the prevailing conditions.



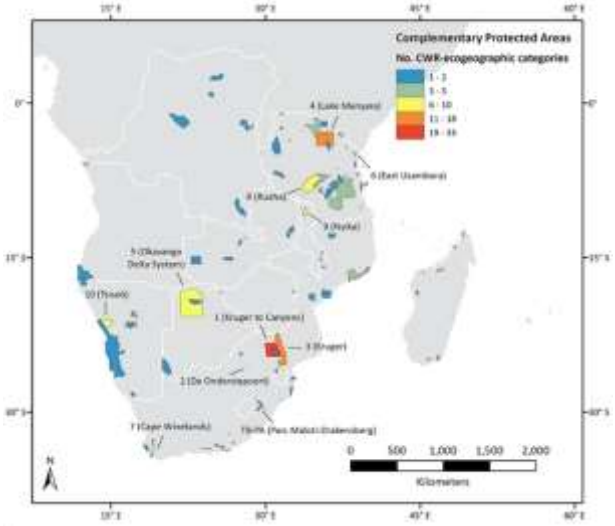

**PhD student Muhammad Ali wins first prize for presentation at Commonwealth Scholars event!**

Last month, the Commonwealth Scholarship Regional Network Coordinator conducted a virtual symposium "*Unlock Challenges and Opportunities in the COVID-19 World (UCO- COVID-19 World)*". Muhammad Ali from the Borrill lab participated as a speaker and presented his PhD research on "*Identification and characterization of ZIP genes for iron and zinc transportation in wheat*". Ali was awarded 1st prize for the best presentation. He says "It was a challenge for me to present my research in front of humanities and social sciences students. Overall, it was a good experience and I really enjoyed this meeting."

**Our science in action: Crop Wild Relatives conservation in Southern Africa**

Professor Nigel Maxted and colleagues from the School have been working with UN Bioversity International and CIAT Alliance and the countries of the South African Development Community (SADC), with Darwin Initiative funding, to establish a regional network of crop wild relative (CWR) protected areas. This work is particularly critical because the region is facing unprecedented challenges related to food security, climate change and poverty reduction.

The SADC region has 16 member states in Southern Africa with diverse ecosystems including woodlands, rainforests, temperate areas, islands, deltas and deserts. SADC countries, especially South Africa, Madagascar and the Congo, are home to some of the world's top biodiversity hotspots. Combined with the high diversity of agricultural practices, the region has evolved a level of CWR diversity that has significant value for agriculture, food security and poverty eradication. The SADC Regional Development Plan notes that the region is susceptible to droughts, crop pests and diseases, and the current crop varieties cultivated are unlikely to sustain production under future climate change-modified environments. To ensure continued crop production requires either new varieties to be bred, or crossing between existing varieties and climate change-smart lines that have enhanced agro-environment resilience. Genetic diversity is key to both activities, and, luckily, the SADC region is rich in genetic resources, but, sadly, these are currently poorly conserved and underutilised. The necessary genetic diversity, rich in pest and disease resistance, high yields, drought tolerance and salt tolerance traits, is likely to be found in the CWR of the region that is closely related to existing crops. Up to 130 million people in the SADC region could benefit from systematic conservation and sustainable use of CWR and its use in crop breeding.




There was previously no active conservation of CWRs in their natural habitats (*in situ*) and CWR diversity was also under-represented in gene bank (*ex situ*) collections. The SADC regional *in situ* network connects priority sites and their managers with other stakeholders such as researchers, gene bank curators, breeders, conservationists and farmers. The network promotes effective conservation and use of CWR by enhancing communication among stakeholders, and by sharing experience, information, guidelines, protocols, best practice and standards for conservation and use of CWR resources. Hence, with minimal additional investment, we have significantly contributed to advancing the development of climate-smart crop varieties for the region. The network will help achieve positive country- and site-level CWR conservation, while demonstrating benefits to local communities, who live in and around protected areas and reserves, and farmers and farming communities, who are involved in the day-to-day management of CWR diversity.

Farmers and consumers are the ultimate beneficiaries of conservation and use of CWR. Farmers will be able to maintain and even increase crop production, while mitigating the most negative effects of climate change, pests and diseases. Africa is the most food-insecure continent with the highest levels of malnourishment and poverty, so establishing the network will help avert further food insecurity and starvation, only possible because of the effective conservation and use of CWR diversity co-led by School of Biosciences staff.

*Photo*: *Asparagus densiflorus* (Kunth) Jessop, a tertiary genetic relative of cultivated asparagus (*A. officinalis* L.), with confirmed use in increase of fertility and a potential source of resistance to several diseases (e.g. rust, fusarium crown and root rot)(credit: South African National Biodiversity Institute).

**The real social lives of mitochondria – tracking connectivity in plant cells**

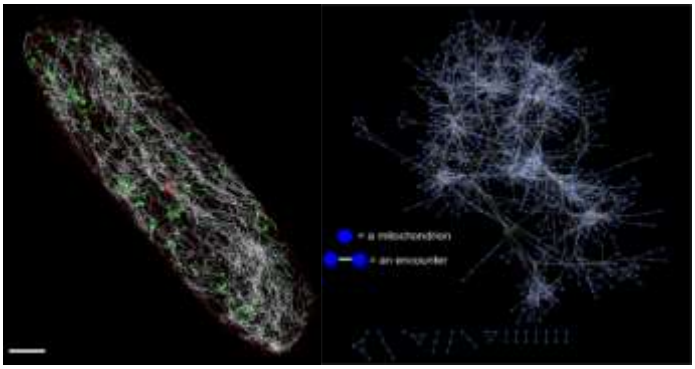
*by Jo Chustecki, final year MIBTP student*

*If you're currently trying to find the right balance between post-lockdown socialising and continuing to distance, don't worry – you're not alone!*

Plant mitochondria face the same problem, as our recent paper explains: https://www.cell.com/cell-systems/fulltext/S2405-4712(21)00133-2. These powerhouses of the cell, found in plants as individual organelles, are highly dynamic, interacting with each other, and making use of actin filaments to run highways of motion through the cell. We wanted to know why plant cells move their mitochondria in this way. We knew that being spaced out in the cell helps these mitochondria deliver energy around cellular space, interact with other organelles and generally avoid the build-up of mutagens. Interacting with each other also can help exchange mitochondrial DNA, membranes and proteins.

We wanted to look at the whole population of mitochondria in the cell, to uncover what other principles might be underpinning motion. By imaging movement over time, using the BALM confocal microscopes (thanks to Alex Di Maio for the help!), and tracking each individual over time, we can take the speed, angle of motion and the distances between mitochondria to get an idea of the physical status of the population. We can also quantify social statistics by building social networks of these organelles (if a node is each mito, an edge is formed when they come close to each other). This way, we get an idea of how well they might pass information through their community, whether certain individuals are more popular, and, overall, how well connected the population is.

We found that plant cells are working with a trade-off, with their mitochondria balancing between being well-connected socially, and physically well-spaced. We also used a clustering mutant called *friendly*, whose mitochondria are buddied up all the time (they aren't following the social distancing guidelines!), and showed that this mutant transiently challenges this trade-off. It's the first time this social-network thinking has been applied to plant cell mitochondria – and we hope that this method can be transferred to other organelles, so we can get connectivity/colocalisation data for all of these dynamic social networks in the cell! Watch out, Mr Zuckerberg!



It's been a great year for these plant mitochondria, getting the limelight at the recent international Plant Systems Biology conference, where Jo won the Plant Journal prize for her talk, and a blog post over at Botany ONE, check it out here: bit.ly/3w4GAOw. Plants move too!

**Left photo:** Mitochondria (green) and their paths over time (white) through one cell (scale bar 10μm).

**Right photo:** The mitochondrial social network from the same cell.

**Spotlight on a new arrival, Megan McDonald writes:** I use a combination of -omics tools to understand how fungi cause disease on crop plants. I am originally from a small town in central Arizona and studied Microbiology at the University of Arizona in Tucson. I obtained my PhD from the ETH Zürich in Switzerland. There I used phylogenetics and population genetics to study the movement of fungal diseases around the world. I moved to Australia to start a postdoc with a competitive fellowship from the Swiss National Science Foundation in 2012. Since then, I have taught myself to code and used various -omics technologies to identify virulence genes in the fungi that infect wheat (some even refer to me now as a "bioinformatician"). In November 2020 I started as a Birmingham Fellow within the School of Biosciences. Here I plan to continue my work using long-read sequencing to examine chromosomal plasticity and horizontal transposon transfer among plant pathogenic fungal species. I am excited to engage with my new colleagues in both the IMI and BIFoR on anything to do with fungal genomes.

**Spotlight on (another) new arrival, Florian Busch writes:**

I am a theoretical and experimental plant physiologist interested in all aspects of photosynthesis. My focus is on linking different photosynthetic processes with mathematical models to study the biochemical limitations of carbon fixation and to gain a quantitative understanding of how plant carbon uptake responds to changes in the environment. Originally from Germany, I studied both biology and mathematics at the University of Heidelberg to become a high school teacher. There I fell in love with the excitement of discovering previously unknown things through research, which made me decide to follow an academic trajectory. I ended up doing a PhD at the University of Western Ontario in Canada studying the impact of climate change on photosynthesis in boreal forest trees. During my first postdoc at the University of Toronto in Canada I started to integrate some theoretical aspects of modelling into my mostly experimental work, which was largely focused on light harvesting in plants and how plants use this light energy to fix $CO_2$. In 2012 I moved to the Australian National University in Canberra to work first on how stomata restrict $CO_2$ entering the leaf and later focused on $CO_2$ diffusion through the leaf mesophyll and the cuticle. As part of the ARC Centre of Excellence for Translational Photosynthesis, I was exploring how we can use photosynthetic modelling to determine what processes are limiting carbon uptake in crop plants. My current research here at UoB aims at understanding mechanistically how different photosynthetic processes interact and influence each other so we can answer the question of *why* plants behave the way they do. Experimental tools that are central to my work include leaf gas exchange and stable isotope techniques, which I use to test the validity of photosynthetic models and hypotheses derived from them. My work is fuelled by coffee and I'm always up for having a stimulating discussion over a cup or two.

**The Postdoc Pages**

**Now available online! Port Postdoc: A PERCAT online podcast series**
Listen to Dr Susanne Boerner (Marie Curie Global Fellow, Geography, Earth and Environmental Sciences) and Dr Emma Ferranti (Research Fellow, Geography, Earth and Environmental Sciences) in discussion with Dr Saikat Dutta (Research Fellow, Engineering) on the subject of **Climate challenges - Spotlight on Community and Stakeholder Engagement**. Follow the PERCAT podcast series on twitter @PortPostdoc.

**PERCAT Careers Seminar: Careers adjacent to Academia Thursday 15th July 2021, 1-2pm, Online – Zoom.**
Are you a postdoctoral or early career researcher looking to explore the career routes open to you? Are you considering roles outside academic research but where you can continue to make a contribution to academic endeavour and the HE sector and where the qualifications, skills and experience you possess are a vital asset? In this seminar we explore how those with PhDs and postdoctoral experience can move into careers in professional services functions supporting academia.
**Register on this Eventbrite page. Deadline: 12 noon on Tuesday 13th July.** Please ensure you use your UoB email.

**Remote Read and Write: Friday 2nd, 9th, 16th, 23rd and 30th July 2021. 9.30am-3.15pm, Online**
This day will enable you to work on your own writing, planning or literature discovery in a 'virtual' but supportive environment. There will be time to set targets at the beginning of the day and there will be regular planned breaks to enable you to network with colleagues or take a walk.
**Sign up at mds.research.training@contacts.bham.ac.uk to be added to the Teams group and join the remote break/networking sessions.** Note: it is possible to drop in and out of the session without having to attend all day.

**John Colbourne tells us about his big award: Precision Toxicology at our School of Biosciences**

Did you know that people are exposed to more than 300,000 manufactured chemicals? Traditional chemical safety testing is so slow and costly that few of these chemicals have been evaluated to protect human health and the environment from the potentially toxic effects of chemicals and their mixtures. Attempts to regulate chemicals have been unsuccessful due to the lack of information on toxicity.

Did you also know that toxicology research and teaching at our School of Biosciences has a long and distinguished history, including the longest running (established in 1979) and most productive MSc Toxicology course in the UK? Well this year, we were granted the largest award for research to our University by the European Commission, that brings together our experts (30 people at UoB!) and powerful technologies (including at Phenome Centre Birmingham) to systematically reveal the biomolecular pathways and the genetic basis of toxicity, and determine which chemicals cause harm. The project is called PrecisionTox, which within five years will reduce expenses, improve the pace of testing, and reduce experimentation on animals by leveraging the power of the phylogenetic tree.


All animals share the same genetic ancestry and, despite having branched off into diverse forms through evolution, animals continue to share much of the same DNA. Importantly, genes that govern disease response are among the most likely to be shared among different animals. As a result, instead of using traditional mammal models like rats, greater accuracy can be achieved by using a diverse range of biomedical model species – fruit flies, water fleas, round worms, and embryos of frogs and zebrafish – along with human cell lines to observe what happens when organisms are exposed to chemicals. Moreover, by using advanced approaches to analysing activity at the molecular level, we can identify the fundamental biological mechanisms by which these organisms – and humans – respond to toxic chemical exposure.

Although there is broad interest in moving away from traditional animal testing, replacing old standards with new ones is a difficult task. Change often produces anxiety, and decision makers can be reluctant to promote approaches with which they are unfamiliar. So rather than push our scientific findings towards regulators and private companies, we instead work directly with government agencies and industry to gain insight, guidance, and feedback on producing results that can (and will!) be used in the real world.

**Luisa Orsini News:**
*Institute for Global Innovation* Daphnia Water Solutions: performance data and routes to market (£8,000).

Marie Curie Fellow Anurag Chaturvedi joined John Colbourne and Luisa Orsini in May. Benchmarking and performance analysis of Daphne Water Solutions. Umgeni Water Amanzi, South Africa (£70,000).

**Steve Unwin News:**
A paper published and is working with Animal Concepts (https://www.animalconcepts.eu/) to map, analyse and provide recommendations on mental resilience for those working at the human-wildlife interface via the Pan African Sanctuary Alliance (www.pasa.org) and Orangutan Veterinary Advisory Group (www.ovag.org)

# Some recent Publication from staff in the School

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