

Bud Burst

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NEWSLETTER OF THE BIRMINGHAM INSTITUTE OF FOREST RESEARCH



This is part of a science experiment, measuring tree growth. Please do not remove, it is not harming the tree in anyway.

Scan to find out more:



Branching Out by Dr Samantha Dobbie

A moment among the trees is all it takes to realise that there's lots to learn from these living landscapes. As complex social-ecological systems, forests allow us to study key concepts at a wide range of spatial and temporal scales. From the chemistry of carbon and water molecules, the biology of disease and pathogen spread and the geography of feedback loops and global challenges; forests, plants and ecosystems are deeply rooted within the school curriculum. Despite this, such perspectives are frequently overlooked in our classrooms. In a previous role as a secondary science teacher, I found high quality resources to teach these concepts were often hard to come by. Our aim at BIFoR is to bridge this gap and help engage the next generation of plant scientists and foresters.

To translate research outputs from BIFoR into curriculum-linked resources, we have been hard at work developing innovative teaching tools based on best practice. [BIFoR in a Box](#) is a free science, technology, engineering, and maths (STEM) kit

that encourages pupils to create and install a dendrometer (tree growth band), collect data and discover more about the BIFoR FACE experiment. Using materials from the kit pupils can join a growing community of citizen scientists measuring tree growth across the UK and beyond! Alongside the STEM kit, we have a growing bank of KS3, 4 and 5 lesson plans and adaptable slides and handouts. These have been co-created with researchers, to be downloaded and delivered by (time-poor, but knowledge rich) teachers.

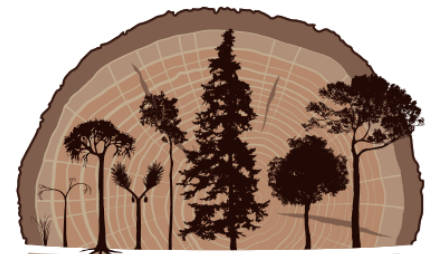
Pupils can now take a walk among time-travelling trees, explore links between carbon and water cycles, monitor fungal pathogens and engineer their own flux towers (using spaghetti and marshmallows!) without leaving their classrooms. By placing a spotlight on the people behind BIFoR, careers profiles also help to raise aspirations. After all, if we expect the next generation to value and support the future of our woodland ecosystems, at BIFoR, we must first branch out and help them experience it.

Funding success

Congratulations to Dr **James Levine**, now one of nine new **Treescapes Research Fellows**. His research project called **AFFORE³ST**, aims to demonstrate the potential of a data-driven approach to the planning of tree planting for quantifiable ecosystem services, and explore how this approach can best be integrated with a community-centered one.

Congratulations to Dr **Adriane Esquivel Muelbert** who has been awarded funding from the **Brazilian Ministry of Science and Technology** for 2 projects:

- ◆ To inform reforestation practices in the Brazilian Atlantic Forest to minimize biodiversity loss.
- ◆ To generate a synthesis of biodiversity across taxa for the Brazilian Amazon.



Trees in time

The 7th BIFoR annual community meeting
4 and 5 July 2023 (in person in Birmingham, UK or online)

Please join us on 4 and 5 July 2023 for our BIFoR annual community meeting. Can we learn lessons from the forests of deep time and of history to help contemporary forests face the challenges of the future?

www.birmingham.ac.uk/biforcom23

As part of the conference there will be a **public lecture** 'Forests and Carbon: (deep) past, (hard) present, and (bright) future' on 4 July 2023 4:00pm—5:30pm

<https://Forestsandcarbon.eventbrite.co.uk>



Image above: Apprentice Engineer, **Thomas Downes** has made a huge impact with his hard work ethic & willingness to engage with the research underway. Tom was runner up in our poster competition at our annual meeting 2022 & has received high praise for presentations to the science & apprenticeship community. Tom helps maintain the Phenocam mounted atop the 40m high Flux Tower at BIFoR FACE. There are now over 100,000 [time-lapse images](#) of foliage at BIFoR FACE enabling us to generate quantitative measures of plant phenology. We are part of the global [PhenoCam network](#).

Welcomes, congratulations and goodbye

We welcome:

- Drs **Beth Pettifor** and **Marine Cambon** who join the expanding team led by Prof. **James McDonald**, whose current research interest focusses on microbiome engineering approaches to address key global challenges such as waste management and sustainable fuel production (using microbiomes to produce biofuels and biogas), and in combating tree disease (engineering microbial communities for disease suppression and health promotion).
- Dr **Lisa Lamberte** who joins as a postdoc working on the **DiversiTree Project** — investigating if increased tree diversity increases ecosystem functionality through a greater microbial diversity that can resist pathogen infections,
- Dr **Maria-Laura Ciusa** who joins as a Research Assistant, investigating how new strains of pathogens emerge and evolve on tree.
- **Naina Korotania**, who joins the team further to being awarded the **Applied Microbiology International Basil Jarvis Studentship**. Naina will work on developing phage cocktails to treat bacterial diseases of trees.
- Dr **Diego Marquez** joins as a postdoc working alongside Dr **Florian Busch** on his NERC funded project that is using cutting-edge technology and mathematical modelling to advance our understanding of plant carbon uptake

We congratulate our first cohort of Forest Edge scholarship students who have passed their viva's Dr's **Ben Howard**, **Jenny Knight** and **Polly Jarman**.

We say farewell but know we'll keep in touch with Prof **Frank Uekötter** who is moving on to the **Ruhr University Bochum** and Dr **Mojgan Rabiey** who is taking up an Assistant Professor role at the University of Warwick in plant-microbe interactions.

Research Highlight: Scaling up to understand tree-pathogen interactions

Rabiey, M., Welch, T., Sanchez-Lucas, R., Stevens, K., Raw, M., Kettles, G.J., Catoni, M., McDonald, M., Jackson R.W. and Luna, E. (2022) in Current Opinion in Plant Biology <https://doi.org/10.1016/j.pbi.2022.102229>

Trees are among the most valued plants on earth supporting our health, climate and wellbeing. However, like all other plants, trees are vulnerable to attack by a multitude of pests and pathogens. Unlike many other plants, most trees have not undergone years of research in tree-pathogen interaction, genomics, transcriptomics, metabolomic and breeding. This is because trees are a challenging system to study, due to their size, slow growth and their woody tissue. But even when the challenges of working with trees are big, the opportunities to advance our knowledge on not just the trees but also their communities are bigger. In this review, carried out by the plant science team in Biosciences, we discussed the key challenges in studying tree-pathogen interaction, but highlighted the enormous opportunities for pathology research in trees and the benefits that scaling-up our understanding on tree-pathogen interactions can provide in the fight against plant pathogenic threats.

BIFoR FACE Research Update

We are now entering the seventh year of our world-leading Free-Air Carbon Dioxide Enrichment (FACE) experiment! The list of BIFoR FACE –related research & indeed all BIFoR papers are on our new [Research Portal](#) page.

Dr **Anna Gardner** was first author on a [paper](#) which provided a meta-analysis of all available data on stomatal conductance of trees under elevated CO₂. The paper resolves some of the long-standing questions regarding stomatal behaviour in elevated CO₂ in woody species.

Dr **Liam Crowley** collected over 68,000 individual invertebrates at BIFoR FACE during his PhD, his most recent [paper](#) compares sampling methods & temporal patterns of arthropod abundance and diversity in a mature temperate Oak woodland. Many of the samples he collected are now being sent to the [Sanger Institute's BIOSCAN](#) project looking at flying insect biodiversity, contributing to our further understanding of insects under elevated CO₂ and to their national study aiming to study genetic diversity of 1 million flying insects.

Following-up **Aileen Baird's** PhD work on the fungal diversity present at BIFoR FACE, the dried fruiting bodies she collected (over 700!) have been sent to new collaborators: Prof. **Thorsten Grams** and Dr. **Benjamin Hesse** at **Technical University Munich**. The 13C isotopic signature of these samples will be analysed to investigate if a greater proportion of the new photosynthates may have been allocated belowground via fungi for nutrient acquisition under elevated atmospheric CO₂ concentration. This work will help us understand the fate of C in soils and allow us to see the wider impacts of CO₂ enrichment beyond the trees themselves.

Stay in touch

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