



Royal Botanic Gardens
Kew

**Future Leader
Fellowships in Plant
and Fungal Science**

2021



Foreword

The global events of the past year, from raging wildfires to the widespread impact of the COVID-19 pandemic, have shown us that life on this planet is fragile and intimately interconnected, and the urgency with which we need to understand and protect the world's biodiversity continues to increase. But tackling this major challenge for the future of our own species and the health of our planet requires time, resources and training.

The flagship Future Leader Fellowship programme at the Royal Botanic Gardens, Kew (RBG Kew) enables the brightest and most innovative young scientists to develop research projects in their field of expertise while gaining the necessary leadership and professional skills for the next stage of their careers. Furthermore, our 2021 Future Leader Fellows will benefit from joining the organisation at a pivotal moment, as we launch and implement a ground-breaking new scientific mission and strategy. The successful applicants will form an integral part of our vibrant, dynamic and cross-disciplinary scientific environment and will profit from direct access to the world's most extensive plant and fungal collections along with state-of-the-art laboratory facilities.

The Fellowships will be spread across RBG Kew's two sites in the UK: Kew Gardens and Wakehurst. With over two million annual visitors to our gardens and many public-facing activities, such as our annual Science Festival, there will be invaluable opportunities to communicate research findings and engage with citizens and policymakers. With this combination of resources, training and opportunities, we hope to provide early-career researchers with the skills and knowledge they need to become the world's future leaders in plant and fungal sciences.

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Science at the Royal Botanic Gardens, Kew

The Royal Botanic Gardens, Kew (RBG Kew) was founded in 1759, and from its beginnings as a Georgian royal garden it has become a global centre for plant and fungal science, tackling urgent environmental challenges.

It has two main botanic garden sites: Kew Gardens in south-west London, which is also a UNESCO World Heritage Site, and Wakehurst in West Sussex, which is home to Kew's Millennium Seed Bank. We also have a permanent research office in Madagascar, one of the world's biodiversity hotspots. With some 350 members of staff, Kew Science has an extensive research programme that spans the study of genes through to ecosystems – from the analysis of genomes to the discovery and identification of new species and the impact of climate change on the wild relatives of crops.

During 2021, we will launch an ambitious new Science Strategy for RBG Kew, to push the frontiers of fungal and plant science and make substantial contributions to the biggest challenges facing humanity. In partnership with our global network of collaborators, our scientific actions will help to understand and protect biodiversity at taxonomic, genetic, functional and ecosystem levels, and at all spatial scales. Our expertise will contribute fungal and plant knowledge to partnerships aimed at safeguarding all biodiversity, and our exploration of the useful properties of plants and fungi will provide significant benefits to society.



Our mission is to understand and protect plants and fungi for the wellbeing of people and the future of all life on Earth. To achieve this mission, we have set out five Scientific Priorities to help us achieve transformative change and maximum positive impact. These are:

Priority 1: Ecosystem Stewardship

Priority 2: Biobanking and Unlocking Properties

Priority 3: Digital Revolution

Priority 4: Accelerated Taxonomy

Priority 5: Enhanced Partnerships

We will draw upon activities and expertise across these five priority areas to train the next generation of fungal and plant scientists. The Future Leader Fellowship (FLF) programme is a crucial part of this ambition, building critical capacity to help discover and implement sustainable nature-based solutions to the challenges we face today.

Each Fellowship is directly aligned with our new scientific mission and one or more of the five Scientific Priorities, which the Fellows will contribute to driving forward. For more information, read the interim [Scientific Priorities 2021–2030 document](#).



Collections and facilities

Underpinning the scientific research carried out at Kew are the Science Collections, which incorporate both living and preserved material – from dried plant and fungal specimens to DNA and living seeds. These important resources, documenting plant and fungal diversity through time and space, form one of the largest and most diverse botanical and mycological collections in the world, containing over 8.5 million items and representing approximately 95 per cent of the world's vascular plant genera and 60 per cent of fungal genera. The extensive scientific collections of plants, fungi and artefacts from across the globe lie at the heart of the organisation and form the foundation of Kew Science. Researchers also have full access to the rich resources of the Library, Art and Archives and Living Collections to facilitate their research.

To support our scientists across the many disciplines of plant and fungal science at RBG Kew, we have a wide range of state-of-the-art research facilities, including laboratories for flow cytometry, molecular biology, seed biology and small molecule analysis. At Wakehurst, the Wellcome Trust Millennium Building, which houses the Millennium Seed Bank, is a purpose-built facility for the long-term storage and study of seeds collected from across the world.



Fellowship details



What does the Fellowship offer?

The Future Leader Fellowship in Plant and Fungal Science provides a unique opportunity for early-career researchers to develop their scientific portfolio and skills in a vibrant research environment.

Five Fellowships will be awarded by Kew on an annual basis to talented early-career researchers with innovative and viable research ideas. The Fellowship provides researchers with an internationally outstanding level of educational and professional development, empowering them to establish themselves as independent researchers in their discipline by the end of the Fellowship.

Fellowships at a glance

- Five Future Leader Fellowships awarded annually
- Four years in duration
- £5,000 for research expenses
- Access to a mobility fund
- Development and mentorship

The programme offers a four-year research fellowship based at either Kew Gardens or Wakehurst. The yearly call for applications will include information on the positions available and the overarching Scientific Priorities they will be contributing to. Each RBG Kew Future Leader Fellow will be line-managed by a senior researcher and will become fully integrated into one of our research teams and Kew Science as a whole.



The Fellows will be part of a stimulating research environment with access to state-of-the-art facilities, world-class collections, unique public engagement opportunities and several hundred plant and fungi experts to collaborate with.

The Fellowship will include a budget of £5,000 for research expenses and access to a mobility fund to carry out a research visit of up to three months at a UK or overseas academic or non-academic organisation.

Fellows will be encouraged to use their time at RBG Kew as an opportunity to build their track record through publishing high-quality academic papers and securing research funding. They will also be given support to develop their research networks, both at RBG Kew and externally, supervise MSc and PhD students, contribute to science communication and public engagement activities, and commit time to a variety of career development opportunities.

Central to the Fellowship is a comprehensive development and mentorship scheme that all Fellows complete during their time at RBG Kew. This scheme will provide Fellows with the opportunities needed to gain the necessary skills and training to establish themselves as independent researchers. It includes a range of training workshops on topics from grant writing to research impact, a mentorship programme, bi-annual meetings with the Director of Science, and opportunities for researcher-led development. Researcher-led development allows Fellows to come up with creative ways to provide opportunities not just for themselves but for all Fellows at RBG Kew. This could include activities such as symposia, discussion groups or writing retreats.

The Future Leader Fellowship in Plant and Fungal Science is equivalent to a postdoctoral research role, and the Fellowship aims to provide early-career researchers with the time and resources to build their track record so they can move on to an independent research role following completion of the Fellowship. As a part of this, Fellows are encouraged to contribute to the development of research funding proposals.



Am I a suitable applicant?

Ideal applicants for these positions are early-career researchers on an upward trajectory, with innovative and interesting research ideas aligned to the relevant research department.

Suitable applicants should:

- hold a PhD or equivalent in a relevant subject, awarded no more than seven years prior to the application closing date.
- have completed at least one postdoctoral research position, although strong applicants who have just finished their PhD will also be considered.
- have experience of contributing to publications and other research outputs – strong applicants will have published six peer-reviewed papers, with three as the first author.

The seven-year period excludes interruptions such as parental leave or long-term illness. For maternity leave, an 18-month extension will be applied for each child born during this period. For paternity leave and long-term illness, the extension will be applied based on the amount of leave taken.



Open Fellowship positions in 2021

There are five Fellowships available annually, each positioned within an active research team. The Fellowships available in 2021 are outlined below, along with information on the research area and the Scientific Priorities they will contribute to. Please note that these project areas are indicative only, and will be further developed depending on the Fellows' strengths, interests and potential for impact. If in doubt about your potential fit, we encourage you to contact FLFScience@kew.org to arrange a meeting to discuss your application with the potential line manager.

Fellowship in Pollinator Biological Chemistry



At RBG Kew, part of our work focuses on fundamental and applied research into the characterisation, nature and uses of naturally occurring chemicals from plants and fungi.

For example, we investigate how plant chemicals drive plant–insect and plant–fungal interactions and how plant compounds influence the health and behaviour of invertebrates, to help support ecosystem services of beneficial insects, including pollinators. Ultimately, our work delivers nature-based solutions that address global challenges and, through the exploitation of plant chemistry, optimise biodiversity conservation, environmentally benign ecosystem stewardship and sustainable food systems.

This work is especially timely in the wake of recent global assessments of the state of the world’s wildlife and ecosystem services, including from the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services, and the Food and Agriculture Organization of the United Nations. In 2020, the World Economic Forum identified biodiversity loss, including the decline of pollinating insects, as one of the most likely and impactful global risks. All these reports highlighted the critical role of nature-based solutions in addressing the global challenges of biodiversity loss, feeding an increasing global population, and mitigating climate change through enhanced natural ecosystems, all of which depend on pollination services.



The impacts of anthropogenic drivers such as habitat loss, agricultural intensification and climate change on pollinators have been comprehensively studied. However, our knowledge of the natural chemical processes that influence pollinator health, including macro and micronutrients, the interaction of floral chemistry with microbial symbionts, disease pathogens and direct impacts on pollinator behaviour, soil quality, habitat diversity, floral resources and competition, are less well understood. Yet they are critical in developing nature-based solutions to optimise pollination services and conserve pollinators.

Our work aims to address this research knowledge gap. We want to hear from applicants with an interest and experience in studying the chemistry of pollinator interactions and who have the ability to develop a high-calibre research programme addressing this. We have state-of-the-art natural products chemistry facilities, including high resolution liquid chromatography–mass spectrometry with a direct infusion ionisation platform that supports metabolomics approaches, nuclear magnetic resonance spectroscopy for structural elucidation and gas chromatography–mass spectrometry. These facilities and expertise in chemistry, combined with our in-house specialist knowledge of insect biology, particularly pollinators, provide a unique opportunity for successful applicants to undertake highly novel research in a cutting-edge field.

The Fellowship in Pollinator Biological Chemistry is suitable for applicants with a background in pollination biology or chemical ecology with a strong interest and/or experience in plant chemistry. The successful applicant's research interest in their nominated field will go beyond specific interactions to address broader questions, such as their relevance to the challenges facing humanity today, as articulated in RBG Kew's corporate strategy, Our Manifesto for Change, and our Scientific Priorities document.

This Fellowship position aligns to RBG Kew's Scientific Priority 1: Ecosystem Stewardship.

Fellowship in Plant Trait Evolution

A strong area of research at RBG Kew relates to the study of specific character traits that cut across plant lineages.

We focus on a wide range of genomic, structural, chemical and ecological traits, which we analyse within a comparative evolutionary framework to understand the drivers and processes underpinning global plant biodiversity and how this information can be used to stop biodiversity loss.

Much of our research into trait evolution is underpinned by our extensive living and preserved scientific collections, and the many diverse datasets associated with them. We also take advantage of many of the new developments in 'omics' technologies and ecological modelling approaches to enhance our interpretation of our data, including through the application of machine learning algorithms. These are increasing the power of our analyses, enabling us to unlock how different traits interact and evolve to generate plant biodiversity, how key traits can influence or be influenced by evolutionary and ecosystem processes, and, in turn, how these insights can inform our understanding of how plants adapt and survive in a changing world.





We have particular expertise in the study of genomic characters such as genome size, polyploidy, chromosome organisation and DNA repeats, which helps us to unravel the origin, evolution and biological significance of the immense diversity within and between plant genomes. For example, recent research has shown how genome size and ploidy level impact the ability of plants to grow and compete in plant communities differing in their nitrogen and phosphate levels – a discovery that is highly relevant in today's world, where increasing nitrogen and phosphate pollution from agriculture is changing the distribution of biodiversity. At the genomic level, our recent study of genome dynamics across the diversity of genome sizes encountered in plants has revealed how genome size itself may play a role in influencing the evolutionary trajectory, and hence survival, of species.

The Fellowship in Plant Trait Evolution is suitable for applicants with a strong background in trait analysis, bioinformatics, comparative phylogenomics and predictive modelling. It provides an exciting opportunity for the successful applicant to develop their own research programme that explores key traits important for understanding plant adaptation and resilience to global change.

This Fellowship position aligns to RBG Kew's Scientific Priority 1: Ecosystem Stewardship and Priority 2: Biobanking and Unlocking Properties.

Fellowship in Comparative Fungal Biology

Life depends on plants, but plants depend on fungi. With their multiple ecological roles, fungi are fundamental to life on Earth. Yet knowledge of fungal biology lags far behind that of plants.

RBG Kew has a strong track record in fungal diversity research and is home to the largest fungarium in the world, which holds over 1.25 million fungal specimens. We are also currently attempting to document our collection by using molecular barcodes and whole genome sequences (WGS), which are used as reference libraries and subsequently integrated in the ongoing reconstruction of the fungal tree of life.

At RBG Kew, we research the systematics, ecology and evolution of fungi. The research combines fundamental taxonomic expertise with modern molecular approaches and ecological perspectives. We produce authoritative and wide-ranging insights into the systematics, evolution and traits of major fungal groups. By studying diversity at the level of genes through to ecosystems, we explain how fungi evolve, interact with each other and their environment, and respond to global change.

Our work ranges from baseline diversity studies in biodiversity hotspots through to reconstructing the fungal tree of life, with a special emphasis on evolution and ecology of lifestyles and symbiotic interactions. We have special expertise in a number of different groups of fungi (e.g. lichens, mycorrhizal fungi, endophytes, decomposers) and use these as model groups to address broader questions related to determinants of diversity, community ecology and global change.





We are also interested in methods-testing in phylogenetics, including trait evolution (e.g. ancestral character state reconstructions) and dating events, and ecological statistics. We are developing correlation networks to integrate metabolomics with genomic data, implementing comparative genomics tools to elucidate the main features in the evolution of pathogenicity, and analysing the environmental factors that drive underground fungal diversity and the implications for ecosystem processes.

The Fellowship in Comparative Fungal Biology is suitable for applicants with a strong background in fungal systematics, molecular techniques and analytical methods, with potential bioinformatics and comparative genomics knowledge. Successful applicants will have the opportunity to develop their research idea, which could range from baseline diversity studies to phylogenetics/genomics. We are interested in hearing from applicants with research ideas that use a group (or many groups) of fungi as a model system to address broader questions related to determinants of diversity, evolution, community ecology and global change, with a special emphasis on evolution and ecology of lifestyles and symbiotic interactions.

This Fellowship position aligns to RBG Kew's Scientific Priority 1: Ecosystem Stewardship, Priority 2: Biobanking and Unlocking Properties, and Priority 4: Accelerated Taxonomy.

Fellowship in Spatial Analysis

Spatial analysis work at RBG Kew involves researching, mapping and understanding the distribution of biodiversity and natural capital.

We do this by applying and developing a variety of geospatial techniques delivering science-based knowledge, conservation and solutions to make a difference. The research ranges from remote sensing and spatial analysis for assessing extinction risk, to biodiversity modelling to understand the processes driving plant and fungal diversity.

RBG Kew's Science Collections hold a rich array of specimens and associated scientific information, all of which contain spatial attributes that can be exploited to help understand the distribution of plant traits, species and key ecosystem functioning. The spatial analysis team works collaboratively with colleagues across Kew, within UK universities and governments, and internationally through our network of colleagues and projects to deliver impact.

We wish to excite and inspire the next generation of experts through this Fellowship, which provides a unique opportunity for a spatial scientist with interests in plants, biogeography, remote sensing and conservation. We are looking to extend and develop our research in quantifying natural capital throughout the landscape, in particular carbon. We will conduct spatial analysis and modelling with the latest tools and methods (those developed in-house and beyond), to quantify the natural capital of the landscape. This will lead to improved stewardship and a better understanding of the balance needed to conserve biodiversity while increasing natural capital. We would particularly welcome applications from experienced candidates with research ideas relevant to this area.

The Fellowship in Spatial Analysis is suitable for a spatial scientist with a strong background in R and Python, biomass measurements, and UAV and/or LiDAR, and the ability to develop spatial research ideas that align to Kew's scientific mission.

This Fellowship position aligns to RBG Kew's Scientific Priority 1: Ecosystem Stewardship and Priority 3: Digital Revolution.

Fellowship in Seed Conservation



Kew's seed conservation scientists provide long-term conservation solutions for some of the world's most threatened, rare and useful plant species.

Based at the Millennium Seed Bank (MSB), the world's largest wild plant seed bank, the team manages Kew's overseas seed conservation network – the Millennium Seed Bank Partnership (MSBP). Activities include project development and delivery, partnership building, and knowledge and technology sharing – all with a remit to improve conservation outcomes for the world's flora. The work of the MSB and Partnership is underpinned by science, bringing the latest innovations to bear to maintain high quality, diverse germplasm *ex situ*.

The MSBP has reached a pivotal point in its development. After two decades of collecting and research by RBG Kew with partners in almost 100 countries and territories, the Partnership is now placing additional emphasis on the value and potential use of stored collections that can help to halt the loss of biodiversity and promote its recovery in priority regions in the UK and overseas.





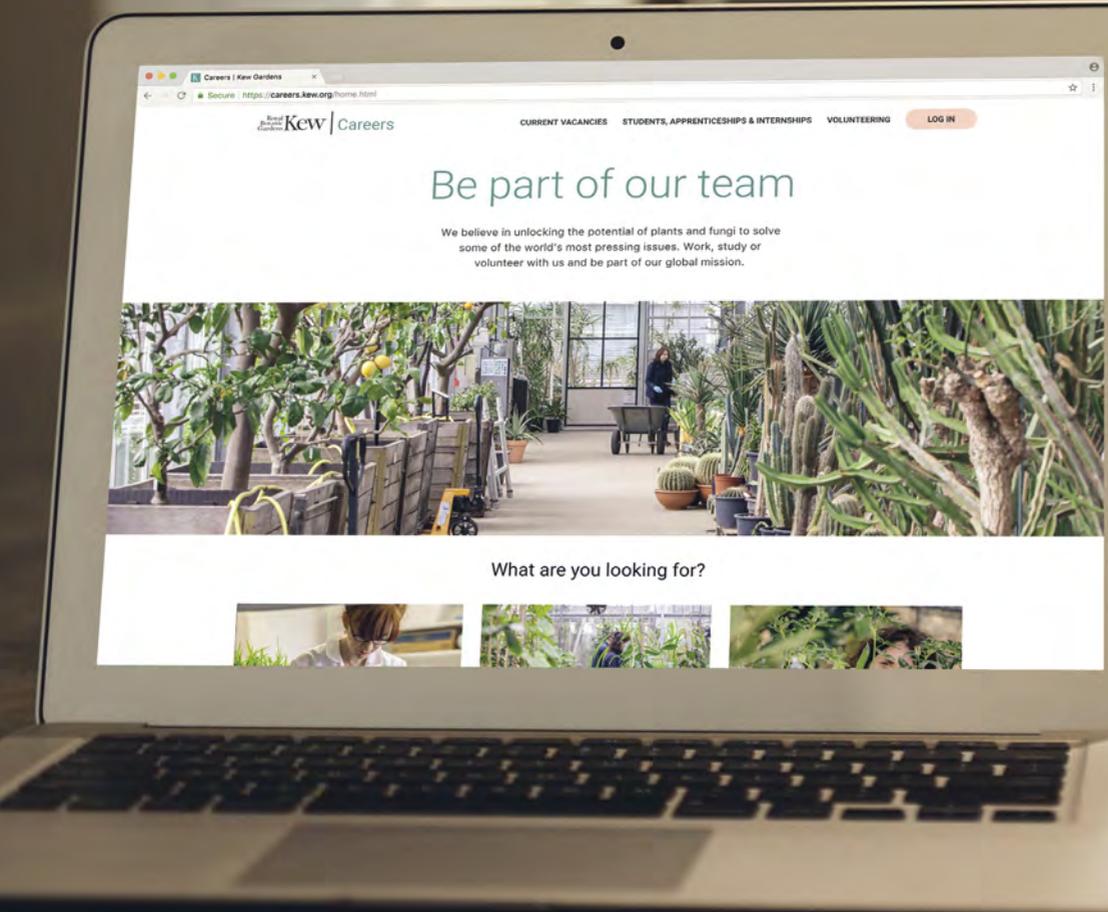
Important advances have been made through the MSBP Data Warehouse (brahmsonline.kew.org/msbp) to compile and report collections held by RBG Kew and partners, but innovation is urgently needed to develop approaches for conservation decision-making that embrace wild populations and include duplicated (multi-genebank) and multi-origin *ex situ* collections, including living collections. This Fellowship will explore solutions to:

- Analyse and use phenotypic/trait data and new phylogenomic/genotypic data for collections and taxa, in concert with the Pedigree module of Plant Search (BGCI, in development).
- Exploit access to the World Checklist of Vascular Plants and consolidation of Kew's taxonomic and collections databases using Earthcape/Brahms8 systems for taxonomic and phylogenetic gap analysis of collections.
- Demonstrate how *ex situ* collections held by separate platforms used by the botanic garden, crop and forestry sectors can be effectively discovered, accessed and evaluated, and used to address climate change, species recovery and habitat restoration challenges.
- Develop and test indicators of quality and usefulness for wild source collections, of relevance to post-2020 global biodiversity targets.

The Fellowship in Seed Conservation will be suitable for applicants with a strong interest in plant conservation, genetic resource evaluation, trait analysis, and building collaborative conservation outcomes. Applicants should have a strong background in big data, including excellent data compilation, cleaning and databasing skills, together with excellent data analysis and statistical skills, and the ability to develop interesting research ideas that align to Kew's scientific mission.

This Fellowship position aligns to RBG Kew's Scientific Priority 2: Biobanking and Unlocking Properties and Priority 5: Enhanced Partnerships.

Application process



The application

Applications must be submitted through the Kew careers portal (careers.kew.org/home.html). Applicants must complete an online application form and include a CV and a research plan as attachments. The research plan does not have a set format but should not exceed three sides of A4. The research plan only needs to provide an outline of what your plans would be for the four-year Fellowship, which will then be developed into a full research plan in collaboration with your line manager if successful.

The interview

Candidates with the strongest applications will be invited to interview for the Fellowships in June 2021. The interview process will include a short presentation by applicants on research ideas followed by questions from the interview panel.

Advice for applicants

Applicants should ensure they read the relevant Job Profile for the Fellowship they are applying to. This includes information on the specific skills, experience and qualifications we are looking for.

The research plan is a mandatory element of the application and must be included in order to be considered for interview.

Applicants can get in touch with prospective line managers via FLFScience@kew.org to arrange a meeting to discuss their application. This will be an informal conversation but will help applicants get a clear understanding of whether the position is right for them and what constitutes a strong application.

Timeline

Launch of Future Leader Fellowship in Plant and Fungal Science programme and applications open	14 April 2021
Deadline for applications	13 June 2021
Interviews	w/c 28 June 2021
Fellowship start date	September 2021

If you have any further questions on
any elements of the programme, please
email FLFScience@kew.org.

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