

Plant Humanities: Where Arts, Humanities & Plants Meet
Where Next? Development Programme

Final Report to UKRI

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Plant Humanities: Where Arts, Humanities & Plants Meet

Final Report: Executive Summary

1. **Approach and Methodology.** This report provides an overview of the potential of the Plant Humanities to inspire UK researchers to undertake ambitious and innovative research addressing current challenges, research agendas and policy priorities. It documents the growth of arts and humanities-led interdisciplinary and cross-sector research projects and programmes concerned with plants in all their forms, drawing on evidence from national and international projects and initiatives. And it seeks to provide evidence which will strengthen future UKRI funding initiatives, including those involving partnerships between Research Councils and with other funding agencies.

The scoping work for this project had three main components: analysis of survey data on 329 funded research projects concerned with aspects of Plant Humanities in the UK since 2010, based on data provided by UKRI and the other major funding agencies; findings from 51 interviews with 63 key researchers in the field within universities and in botanic gardens, museums and libraries in the UK and overseas; discussion at four workshops involving 37 arts and humanities researchers and professional leaders in botanic gardens, natural history museums and research institutes in the UK, Europe and North America.

2. **Definition of Research Area.** Plant Humanities is an emerging research area which is strongly interdisciplinary in nature; international in scope and reach; well suited to bridge-building between academic and non-academic sectors; and closely engaged with issues of profound public concern, from biodiversity loss to human health and well-being. In its focus on botanic gardens and other green spaces where the arts, humanities and plants meet, Plant Humanities promises to significantly extend the reach of UKRI and to widen public understanding of the importance of arts and humanities research to science, policy and human welfare.

The significance and range of Plant Humanities derive from the diverse ways in which people engage with plants in the realms of practice, thought, imagination and representation. Plants and fungi matter profoundly to human culture, heritage and well-being. The ways in which they are used and understood by humans have shaped the economies, societies and landscapes we now inhabit, as well as the global challenges we face as a species. Plant Humanities is thus an inherently interdisciplinary project, where arts and humanities researchers are often in dialogue with different ways of conceiving the relations between people and plants. This focus on the intersection of different disciplines and forms of knowledge is one of the defining features of this field as it is currently developing nationally and internationally. The evidence presented in this report suggests that Plant Humanities can make a particularly significant contribution in those sites where humanities and scientific research, learning and public engagement find a common home – namely botanic gardens and natural history museums.

Research in Plant Humanities is undertaken in many disciplines concerned with aspects of the relationships between people and plants at a variety of scales. These include anthropology, archaeology, cultural and media studies, creative arts, development studies, geography, history, languages, literature, philosophy and psychology. The growing academic interest in botanic gardens as sites where research, learning and public engagement activities are co-located is mirrored by increasing interest within botanic gardens (for example at Kew or Edinburgh) and horticultural organisations (for example, the Royal Horticultural Society) in what university-based arts and humanities researchers can offer.

3. **Relationship to UKRI Strategic Priorities.** As a research area, Plant Humanities maps closely onto AHRC's priority theme, *Interdisciplinarity for contemporary challenges*. Given its inherent interdisciplinarity and cross-sector focus, the field provides a basis for addressing a wide range of challenges, including agroecology, food security, and biodiversity loss; cultural heritage, diversity and inclusion; environment, health and well-being in a post-Covid era; and the future management of land assets within the UK in the context of climate change.

Plant Humanities is also well aligned to AHRC's priority theme on *Arts and science, arts in science*. The application of new creative methods and approaches to the interpretation of botanical collections can bring significant tangible public benefits. Given the place-based opportunities they provide for engagement, learning and experiment of various kinds, botanic gardens are ideal sites, physically and intellectually, for the meeting of arts and science.

Plant Humanities research also addresses further AHRC themes such as *Research unlocking cultural assets* and *Public policy and public engagement*. Research on the historical and cultural dimensions of botanical assets (including herbaria, artefacts, art, archive, print, seed, tissue, digital data and living collections) can contribute significantly to knowledge and understanding in the arts and humanities as well as to the enrichment of public engagement. At the same time, the institutions holding such collections, notably botanic gardens and museums, are focussing more directly on questions of public policy including the diversity of their audiences, global inequities of access to biocultural heritage, and the public understanding of science.

Plant Humanities offers new opportunities to support cross-sector collaborations between university researchers and botanic gardens, natural history museums and herbaria. The increasing role of gardens alongside galleries, libraries, archives, and museums as partners and initiators of arts and humanities research is a development of strategic importance nationally and internationally. In response to pressing global challenges (ranging from food security, climate change, biodiversity loss and sustainable development to calls to protect traditional knowledges, decolonise Indigenous heritage, and promote health and well-being), plant scientists, collections managers, educators and interpretations specialists in the gardens sector are increasingly collaborating with arts and humanities researchers.

4. Plant Humanities: UK Research Landscape

4.1 Patterns of research funding. Research funding for Plant Humanities in the UK has grown significantly since 2015, as reflected in various funding streams including projects, networks, collaborative studentships and fellowships. Around half of all UK research grants in the field of Plant Humanities since 2010 have been supported by AHRC, though the largest grants in the field were those awarded by the European Research Council. Other significant funders were ESRC, the Leverhulme Trust, British Academy and the Wellcome Trust. NERC and MRC also funded some projects including aspects of humanities approaches to biodiversity, ecosystem services and natural capital.

A wide range of UK academic disciplines have received funding for research in Plant Humanities, including all the major arts and humanities subject areas, as well as subjects mainly funded via other UK Research Councils. The disciplines receiving the largest number of grants are (in descending order): history; geography; languages and literature; visual arts, architecture and design; environmental sciences; archaeology; anthropology; cultural and media studies; education; philosophy and theology.

A significant number of projects in Plant Humanities have included practice-based research involving creative practices such as drawing, writing and performance as research methods as well as outputs.

One third of all 329 UK projects in Plant Humanities funded since 2010 have involved gardens, natural history museums or other organisations managing botanical assets as principal investigators, collaborators or partners. The figure for AHRC-funded projects alone is even higher (41%). These organisations vary in scale and remit.

4.2 Research themes and approaches. As a field of research, Plant Humanities includes a wide range of subjects and approaches. In order to characterise the diverse contributions of the arts and humanities to research on plants, eight themes were identified. *Plant matter* refers to humanities research on the material forms of plants, especially within botanical collections; *Plant stories* includes research concerned with narrative, ecocriticism and the poetics of plants; *Plant thinking* represents the domain of plant philosophy, focussing on ethics, language and experience in a multispecies world; *Plant creative arts* refers to research on the arts of plants and gardens, encompassing both practice-based creative research and work on botanical illustration; *Plant cultures* includes humanities research on food cultures, plant cultivation and ethnobotany; *Plants, health and well-being* refers to humanities research on the relationships between health, medicine and the plant world; *Plant landscapes* includes research on garden design, landscape history and conservation management; and *Plant value* describes humanities contributions to debates over methods and approaches to the value of plants, ecosystems and biodiversity.

Each of the themes provides opportunities for interdisciplinary research connecting the arts, humanities, sciences and social sciences. Many projects involve more than one theme. Practice-based research is a significant and growing area of collaboration.

It is also notable that questions of *Plant value* have attracted increased funding in recent years, including projects on the value of ecosystem services, natural capital and biodiversity accounting from an arts and humanities perspective.

4.3 Opportunities and obstacles. There is a compelling case for the role of arts and humanities research in contributing exciting new perspectives and insights into botanical and horticultural collections (including living collections as well as the other assets of gardens). Explicit recognition of this by UKRI will significantly extend the range of current humanities-led research on museums and cultural heritage. The idea that the arts and humanities should form an integral part of the research, education and public programmes of natural history museums and botanic gardens is increasingly accepted across the sector. International exemplars include the work of the 'Humanities of Nature' department at the Museum für Naturkunde, Berlin, and the Institute for the Humanities at the New York Botanical Garden. Within the UK, botanic gardens such as those at Kew and Edinburgh have developed new science strategies emphasising the role of interdisciplinary research partnerships, especially with arts and humanities. From an academic perspective, what such institutions offer is not simply their collections and their scientific expertise: it is also their ability to attract, engage and inspire large numbers of people.

While recognising the opportunities, the Report identifies a number of obstacles to collaboration between university researchers and botanical institutions. These are:

- **Staff capacity:** this is a structural issue limiting the ability of partners in gardens and museums to engage in collaborative projects even when they wish to do so.
- **Disciplinary language:** differences in approaches to sources, methods, validation and presentation between researchers in the humanities and sciences can create barriers to effective collaboration. A commitment to interdisciplinarity can involve hard work to find common ground and sometimes means accepting that different research communities may come up with different answers to shared questions.
- **Institutional structures:** the different structures of universities and botanical organisations in relation to advancement, intellectual property, communications and research ethics can create challenges for cross-sector collaboration.
- **Knowledge and skills deficits:** knowledge of potential partners and assets within botanical institutions is uneven amongst arts and humanities researchers in the UK. Equally, there is variable understanding within these institutions of the potential significance of these collections for humanities-led research.

4.4 Urgent priorities. The Report identifies three areas where intervention is timely:

- **Unlocking the potential of botanical collections in arts and humanities research.** Research in botanical collections, including biocultural collections, requires a combination of skills, insights and innovative thinking across the disciplines associated with the study of 'nature' and 'culture'.
- **Connecting biodiversity, equity and social justice.** The global debate over biodiversity loss has involved serious consideration of issues of equity and justice within the global plant science community. At the same, current public debate over

issues of inclusion and diversity has raised challenging questions about the colonial contexts in which natural history collections were established and the importance of ensuring more equitable access to these collections.

- **Valuing green spaces for human well-being.** The COVID crisis has brought issues of access to green spaces and their role in the promotion of health and well-being to the forefront of policy-making. Research in Plant Humanities can foster new connections between science-based approaches to plants and a fuller appreciation of their social and cultural value, notably through practice-based research.
5. **Key organisations and individuals.** Plant Humanities research is conducted in many university-based disciplines, from eco-poetics to environmental psychology. While some of this work falls within AHRC's developing Health and Environment portfolio, the Report makes the case for conceiving Plant Humanities more widely than this, in terms of both disciplines and sectors. Details are also provided of the key national and international botanical institutions consulted for this Report, including botanic gardens, natural history museums and horticultural organisations.
6. **Interventions needed.** There is a clear opportunity for UKRI to harness its wide subject portfolio and strategic priorities in support of new initiatives in a very dynamic and exciting field of research. The overall objectives of these interventions are to raise the profile of arts and humanities research in the field; to develop a new programme supporting research; to address core priority areas identified above; to nurture interdisciplinary partnerships and exchange between universities and non-HEIs; and to enhance research infrastructure. Interventions proposed are:
- **Research programme:** a new humanities-led UKRI programme entitled *Between Nature and Culture: Unlocking the Potential of Botanical Collections in Arts & Humanities Research*. The possibility of developing this programme in partnership with other funders, either within UKRI or with other national and international funders, should be explored.
 - **Network and project funding:** a UKRI network call designed to foster cross-sector and practice-based research in one or more of the three priority areas; and cross-council highlight calls for humanities-led research projects on Biodiversity, Equity and Social Justice and/or on Valuing Green Spaces for Human Well-Being.
 - **Training and development:** a new short-term (3-6 months) fellowship scheme specifically to encourage partnership and engagement between university-based researchers and botanic gardens, museums and other organisations with a significant stake in the Plant Humanities.
 - **Research infrastructure:** in its statements on strategic policy, we recommend that UKRI makes clear the importance of scientific collections as key assets for arts and humanities researchers; and of the role of the arts and humanities in contextualising and interpreting these collections for wider and more diverse audiences.
 - **Processes and mechanisms:** two interventions at the operational level would help UKRI map the emerging research landscape in Plant Humanities include: an audit of non-academic partner and collaborator organisations involved in arts and humanities projects; and the explicit inclusion of 'environmental humanities' as a subject within UKRI's remit in order to make interdisciplinary research in this area more visible.

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1. Approach and Methodology

This report provides an overview of the potential of the Plant Humanities to inspire UK researchers to undertake ambitious and innovative research addressing current challenges, research agendas and policy priorities. It documents the growth of arts and humanities-led interdisciplinary and cross-sector research projects and programmes concerned with plants in all their forms, drawing on evidence from national and international projects and initiatives. And it seeks to provide evidence which will strengthen future funding initiatives involving partnership between UKRI Research Councils and with other funding agencies.

The scoping work for this project had three main components:

1. Analysis of survey data on 329 funded research projects concerned with aspects of Plant Humanities in the UK since 2010, based on data provided by UKRI and the other major funding agencies
2. Findings from 51 interviews with 63 key researchers in the field within universities and in botanic gardens, museums and libraries in the UK and overseas
3. Discussion at four workshops involving 37 arts and humanities researchers and professional leaders in botanic gardens, natural history museums and research institutes in the UK, Europe and North America

Research grant data was initially derived from a search for key terms in grants databases published or provided by the major funders of UK research. This database was further refined through examination of evidence provided on UKRI and other funder websites where available. Interviewees and workshop participants were selected on the basis of the research grant evidence, especially their roles within interdisciplinary and cross-sector partnerships, and their experience of major initiatives and programmes in Plant Humanities. An effort was also made to ensure diversity in this sample of key researchers, especially in relation to discipline, career stage and sector (to ensure representation of researchers and managers within botanic gardens and museums). It is acknowledged that in selecting 'key researchers' (i.e. those with significant track records), the sample of interviewees represents expert opinion in the field rather than a representative cross-section of the research community. Restrictions on international travel in 2020-1 limited our ability to conduct site visits and meetings in person. However, the online interview format proved effective in generating ideas and further discussion at workshops.

2. Definition of Research Area

“This new, interdisciplinary field explores and communicates the unparalleled significance of plants to human culture. Plants offer remarkable scope for research and interpretation due to their global mobility and historical significance to human cultures. Their travels offer intriguing roadmaps to cross-cultural exchange and the movement of people, while the importance of plants to fields as diverse as medicine, the history of science, environmental studies, art, and art history renders them a compelling focus for interdisciplinary conversations. Climate change and environmental degradation add to the urgency of researching plant-human interactions and combating the inability to recognize and acknowledge the diversity and importance of plants that has become known as plant blindness.”

[Dumbarton Oaks Plant Humanities Initiative](#) (2018)

The significance and range of Plant Humanities derive from the diverse ways in which people engage with plants in the realms of practice, thought, imagination and representation. Plants and fungi matter profoundly to human culture, heritage and well-being. The ways in which they are used and understood by humans have shaped the economies, societies and landscapes we now inhabit, as well as the global challenges we face as a species. Plant Humanities is thus an inherently interdisciplinary project, where arts and humanities researchers are often in dialogue with different ways of conceiving the relations between people and plants. This focus on the intersection of different disciplines and forms of knowledge is one of the defining features of this field as it is currently developing nationally and internationally. And the evidence presented in this report suggests that Plant Humanities can make a particularly significant contribution in those sites where humanities and scientific research, learning and public engagement find a common home – namely botanic gardens and natural history museums.

The immediate origin of the term ‘Plant Humanities’ lies within an interdisciplinary initiative launched in 2018 by the Dumbarton Oaks research institute at Harvard University in collaboration with JSTOR labs and the Andrew W. Mellon Foundation. Some of the key lessons learned in that initiative have directly informed this project. However, it is important to emphasise that the concept of Plant Humanities has a wider resonance connecting to longer-established concerns in the UK, Europe, Australia and many other parts of the world. Umbrella terms like these (and others such as ‘green humanities’, ‘conservation humanities’ or ‘forest humanities’) typically enable interdisciplinary and cross-sector collaborations which address environmental topics and agendas, encouraging thinking across subject boundaries and more direct engagement with pressing issues of public concern. This is evident in the current strong involvement of arts and humanities researchers in discussions of key societal challenges such as climate change and biodiversity loss, as well as in cross-disciplinary debates over the Anthropocene. Plant Humanities has much in common with the broader realm of the environmental humanities, while also offering a unique blend of interdisciplinarity, collaboration and public engagement, notably in the botanic garden context.

Research in Plant Humanities is undertaken in many disciplines concerned with aspects of the relationships between people and plants at a variety of scales. These include anthropology, archaeology, cultural and media studies, creative arts, development studies, geography, history, languages, literature, philosophy and psychology.

Furthermore, the recent growing academic interest in botanic gardens as sites where research, learning and public engagement activities are co-located is mirrored by increasing interest within botanic gardens (for example at Kew or Edinburgh) and horticultural organisations (for example, the Royal Horticultural Society) in what university-based arts and humanities researchers can offer. These benefits are especially apparent in three areas: the growing emphasis on interdisciplinary research within plant science, conservation and education; the development of new models of interpretation and community engagement in a garden context, including more participatory approaches to co-curation; and calls for new approaches to questions of diversity, equity and inclusion which require skills typically found in the arts and humanities.

In sum, Plant Humanities is an emerging research area which is strongly interdisciplinary in nature; international in scope and reach; well suited to bridge-building between academic and non-academic sectors; and closely engaged with issues of profound public concern, from biodiversity loss to human health and well-being. In its focus on botanic gardens and other green spaces where the arts, humanities and plants meet, Plant Humanities promises to significantly extend the reach of UKRI and to widen public understanding of the importance of arts and humanities research to science, policy and human welfare.

3. Relationship to UKRI Strategic Priorities

As a research area, Plant Humanities maps closely onto AHRC's priority theme, *Interdisciplinarity for contemporary challenges*. In the context of challenges relating to agroecology, food security, and biodiversity loss, the arts and humanities offer distinctive insights to plant scientists and ethnobotanists. In relation to the increasing number of calls to decolonise botanical collections and widen public access to them, it offers models for interdisciplinary ways of working which link plant scientists, humanities researchers and communities at local, national and international scales. In the study of the relationship between environment, health and well-being, it offers new perspectives from the health humanities which are of renewed importance in a post-Covid era.

In the context of new challenges in the management of land assets within the UK, Plant Humanities offers holistic frameworks and methods which integrate the methods of science, social science and the arts. This connects directly to a second AHRC priority theme, namely *Arts and science, arts in science*. The application of new creative methods and approaches to the interpretation of the scientific collections of botanic gardens and natural history museums can bring significant tangible public benefits. Given the placed-based opportunities they provide for engagement, learning and experiment of various kinds, botanic gardens are ideal sites, physically and intellectually, for the meeting of arts and science.

Beyond these two key areas, Plant Humanities research has significant potential in relation to other AHRC priorities, notably *Research unlocking cultural assets* and *Public policy and public engagement*. Research on the historical and cultural dimensions of

botanical and biocultural¹ assets (including herbaria, artefacts, art, archive, print, seed, tissue, digital data and living collections) can contribute significantly to knowledge and understanding in the arts and humanities as well as to the enrichment of public engagement. In the case of biocultural collections (such as Kew's remarkable [Economic Botany Collection](#)) these assets include many artefacts that are also found in museums of art, design, technology and culture, but in the botanical context are arranged by plant family rather than chronology or culture. From an arts and humanities perspective, such assets – together with the other scientific, library and art collections found in botanical gardens and museums – provide ample materials for interdisciplinary research. At the same time, the institutions holding such collections are becoming more keenly interested in questions of public policy in relation to the diversity of their audiences, global inequities of access to biocultural heritage, and public understandings of plant science.

Plant Humanities thus offers new opportunities to support cross-sector collaborations between university researchers and their partners in botanic gardens, natural history museums and herbaria,² including plant scientists and experts in conservation, horticulture, learning and interpretation. Indeed, the increasing role of botanic gardens alongside galleries, libraries, archives, and museums as partners and initiators of arts and humanities research is a development of strategic importance within UK Higher Education. Thus Oxford University's coordination of its collections within a single division under the heading of GLAM – standing in this case for 'Gardens, Libraries and Museums' – effectively re-purposes a familiar brand in the collections and heritage sector.³

The involvement of botanic gardens in arts and humanities research is of growing international as well as national significance. In response to pressing global challenges (ranging from food security, climate change, biodiversity loss and sustainable development to calls to protect traditional knowledges, decolonise Indigenous heritage, and promote health and well-being), plant scientists, collections managers, educators and interpretations specialists in the gardens sector are increasingly collaborating with arts and humanities researchers. As shown by experience at sites such as Kew Gardens or the New York Botanical Garden, the co-location of humanities research infrastructure (including libraries, archives and art galleries) alongside botanical collections, plant science and a wide range of public engagement and learning activities in botanic gardens makes them particularly fruitful for research and education in Plant Humanities.

¹ *Biocultural collections* have recently been defined as 'repositories for plants and animals used by people, products made from them, and/or information and archives about them' (J Salick, K Konchar & M Nesbitt, *Curating Biocultural Collections: A Handbook*, 2014: 1-2). Examples include collections of economic botany formerly displayed in museums which are today found across natural history museums, botanical gardens and other institutions.

² *Herbaria* are collections of plant specimens, whole or in part, usually dried and mounted on paper. They may also contain other specialist collections including fungaria (fungi) and xylaria (woods). In the UK, herbaria are managed by a variety of bodies, including botanic gardens, natural history museums, universities, research institutes and civic museums: it is estimated they collectively contain more than 22 million sheets.

³ In UK heritage policy, GLAM has come to stand for Galleries, Libraries, Archives and Museums. In the remainder of this report, we follow the Oxford University usage in which GLAM references Gardens, Libraries and Museums.

Arts & Humanities Research at Kew Gardens



Victoria amazonica, Kew Gardens



International researchers visit Kew's biocultural collections

Research into plants and fungi, horticulture and conservation have long been integral features of science at Kew, based on its extraordinary collections, including the herbarium, fungarium, Millennium Seed Bank, economic botany, library art and archives. The combination of its collections, its authoritative voice on plant science and its global reach gives Kew an influential role in contemporary debates over biodiversity loss, climate change and conservation.

A notable feature of current thinking about research at Kew is a new emphasis on interdisciplinary research. In this context, its globally significant collections have become vital resources for arts and humanities researchers as well as plant scientists.

Kew's five-year [Science Strategy](#) (published September 2021) includes an explicit commitment to interdisciplinary partnership with arts and humanities researchers:

"The arts, humanities and social sciences offer powerful tools to study the human element of biodiversity and to engage with people, through research questions, methodologies, language, and communities of practice. They can address some of the most pressing questions facing RBG Kew: how to integrate support for biodiversity and human well-being; understanding links between cultural and biological diversity; how to achieve impact at diverse levels including community and government; how to deliver access to and new understandings of RBG Kew's collections; and how to broaden our reach, both within and outside the gardens."

Planning for a new Centre for Arts & Humanities Research at Kew is now underway. This commitment reflects Kew's recent experience of partnership with arts and humanities researchers from a wide range of disciplines (including anthropology, archaeology, conservation, design history, geography, history, literature, languages, museum studies and philosophy). These partnerships have also extended to collaborations with visual artists engaged in practice-based research, and to Kew's garden in Wakehurst, Sussex.

As an Independent Research Organisation and member of several Doctoral Training Consortia, Kew is strongly committed to research training within the arts and humanities. Kew staff are currently co-supervising 14 AHRC-funded PhD projects linked to collections in economic botany, library & archives and horticulture.

The Plant Humanities concept also provides a strong basis for collaborative funding programmes supported by UK funding bodies, enlarging the resources potentially available to arts and humanities researchers. Within UKRI, these include cross-council programmes on *Global Food Security*, *Landscape Decisions* and *Towards a National Collection*; and the AHRC-NERC programmes on *The Future of Treescapes* and the *Hidden Histories of Environmental Science*. Further programmes led by individual research councils in the areas of climate change, heritage, livelihoods and well-being are all areas where Plant Humanities projects could contribute significantly. In the past, funding within the ODA budget has supported projects through the Newton Fund and Global Challenges Research Fund, and while these funding streams have been curtailed, continued support for international research within the science budget is likely to include significant opportunities for partnership with institutions in the Global South.

Partnerships between UKRI and other research funders at national and international level could also support research in the area of Plant Humanities. The Wellcome Trust, which also partners with the British Academy, offers one example relevant to research on environment, health and well-being. Internationally, the Plant Humanities theme could help provide bridges between UKRI and government funding agencies, charitable foundations and research institutes concerned especially with research and engagement agendas linked to the Plant Humanities.

4. Plant Humanities: UK Research Landscape

The current research landscape in Plant Humanities within the UK reflects the growing role of interdisciplinary research and research partnerships between university-based researchers and partners in botanic gardens and other organisations. In mapping this landscape, we consider, in turn, the patterns of funded research projects in Plant Humanities since 2010 (section 4.1); the themes and approaches represented within these projects (4.2); the opportunities and obstacles as understood by key researchers in the field (4.3); and the most urgent and timely priorities for intervention (4.4).

4.1 Patterns of research funding

Data on all funded research projects potentially relevant to the Plant Humanities since 2010 was obtained from the major funders of research in the UK (UKRI, British Academy, Leverhulme Trust, Wellcome Trust and the European Research Council). This covered all major forms of research funding, including projects, fellowships, studentships, networks and centres. The initial data was generated on the basis of a number of search terms potentially relevant to Plant Humanities, generating a very large dataset that was then reduced to a smaller sample of 329 projects on the basis that their methods, concepts and approaches were significantly aligned with those of the arts and humanities. This provided the basis for analysis of patterns of research funding as well as informing selection of a sub-sample of key researchers who were subsequently invited to interviews and workshops.

Key points from the analysis include:

- Research funding for Plant Humanities in the UK has grown significantly since 2015, as reflected in various funding streams including projects, networks, collaborative studentships and fellowships
- AHRC is responsible for 46% of all UK research grants in the field of Plant Humanities (49% of research projects, 71% of network grants, 45% of collaborative studentships, 30% of fellowships)
- Other significant funders of UK research linked to Plant Humanities include ESRC, Leverhulme Trust (notably for Fellowships), British Academy, Wellcome Trust and European Research Council (notably for larger grants)
- The largest grants in the field of Plant Humanities (£1m-£2m) were those awarded by the European Research Council: for the period since 2010, a total of 20 ERC projects were identified as incorporating some aspect of the Plant Humanities. Of these, four major projects were led by UK researchers⁴

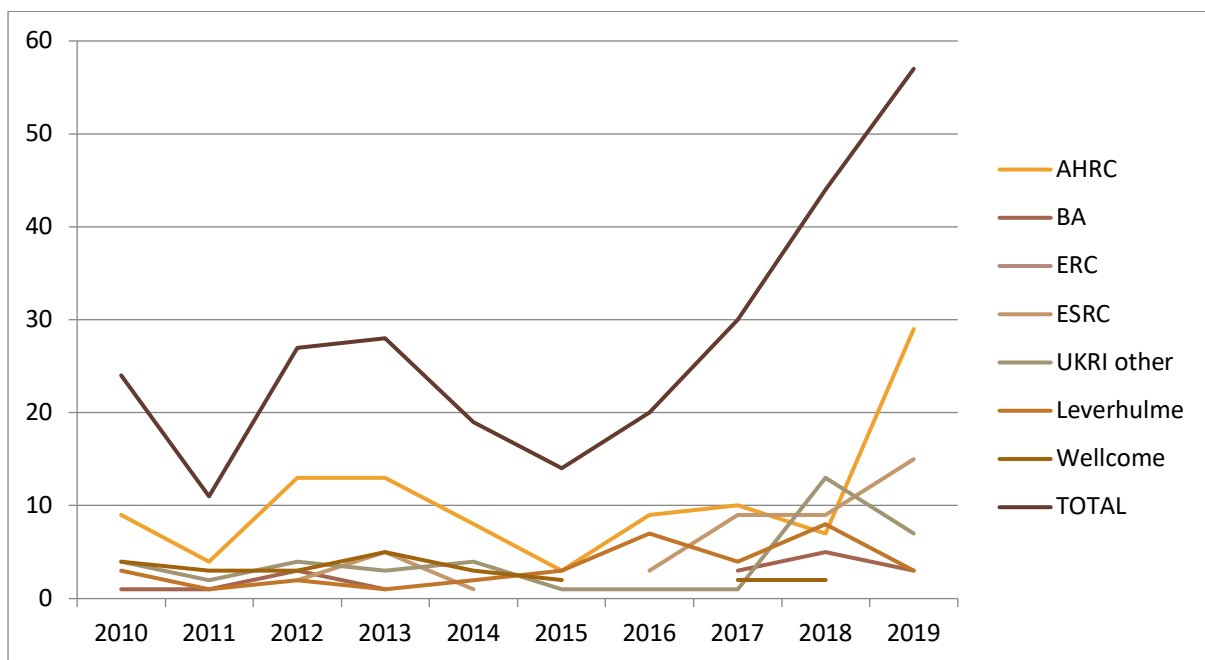


Fig. 1 Number of funded research projects in the Plant Humanities, 2010-2019

⁴ The UK-led ERC projects were: 'Rethinking urban nature' (Matthew Gandy, Cambridge, 2014-2019); 'Smart forests: transforming environments into social-political technologies' (Jennifer Gabrys, Cambridge, 2020-25); 'Environmental spaces and the feel-good factor: relating subjective wellbeing to biodiversity' (Zoe Davies, Kent, 2017-22); and 'The ecology of crusading: the environmental impact of conquest, colonisation and religious conversion in the medieval Baltic' (Aleksander Pluskowski, Reading, 2010-2014). Many of the other ERC projects involved UK researchers.

- Research connected to the Plant Humanities in some aspects of their methods or concepts has been supported by Research Councils in science and medicine: these include NERC and MRC. These were mainly projects concerned with biodiversity, ecosystem services and natural capital, including aspects of ethnobotany
- A small number of grants have been made by Wellcome and Leverhulme to support UK research infrastructure and research centres linked to Plant Humanities
- A wide range of UK academic disciplines have received funding for research in Plant Humanities, including all the major arts and humanities subject areas, as well as subjects mainly funded via other UK Research Councils (including biosciences, education, health studies and psychology)
- The disciplines receiving the largest number of grants (as identified by the location of the discipline of the Principal Investigator) are (in descending order): history; geography; languages and literature; visual arts, architecture and design; environmental sciences; archaeology; anthropology; cultural and media studies; education; philosophy and theology
- 41% of the 152 AHRC-funded projects in Plant Humanities involved botanical institutions (such as gardens, natural history museums or other non-HEI organisations managing botanical assets) as leaders, collaborators or partners. These institutions are listed in Appendix B
- 33% of all 329 Plant Humanities projects involved gardens, natural history museums or other organisations managing botanical assets as principal investigators, collaborators or partners
- A significant number of projects in Plant Humanities have included practice-based research involving drawing, writing and performance as research methods as well as outputs. These and other projects have also been concerned with drawing and making as objects of study, for example in botanical art or craft cultures

4.2 Research themes and approaches

Plant Humanities is a broad field encompassing research in a wide range of subjects connected with plants and their significance for people. While analysis by discipline of the Principal Investigator, as above, highlights the extent of its reach right across the AHRC subject domain, it fails to capture the field's inherent interdisciplinarity. For this purpose, it is useful to characterise projects by their topic and approach. Based on a framework developed in a previous study,⁵ projects in the Plant Humanities database

⁵ *Plant Humanities: a scoping report on RHUL-Kew collaboration* (Royal Holloway, University of London, Aug 2020). This Report includes a more detailed account of the literature of Plant Humanities as of 2020.

were initially classified by one or more broad themes, reflecting methods and concepts associated with various aspects of the Plant Humanities. This thematic framework was further refined through an iterative process of review, resulting in the eight broad themes shown in Figure 2.

In this framework, *Plant matter* refers to humanities research on the material forms of plants, especially as reflected in humanities-led research on the collections of botanic gardens including the colonial histories of plant collecting and transfer. *Plant stories* includes research concerned with narrative, ecocriticism and the poetics of plants. *Plant thinking* represents the domain of plant philosophy, especially focussing on ethics, language and experience in a multispecies world. *Plant creative arts* refers to research on the arts of plants and gardens, encompassing both practice-based creative research and work on botanical illustration. *Plant cultures* includes humanities research on food cultures, plant cultivation and ethnobotany. *Plants, health and well-being* refers to humanities research on the relationships between health, medicine and the plant world. *Plant landscapes* includes research on garden design, landscape history and conservation management. Finally, *Plant value* describes humanities contributions to debates over methods and approaches to the value of plants, ecosystems and biodiversity. These eight themes encompass the diverse conceptual frameworks, approaches and methods of the Plant Humanities. Together they provide a working map which incorporates the major concerns of arts and humanities academics, including narrative, image, matter, thought, experience, space, ethics and practice.

The thematic framework suggested here is a heuristic device designed to demonstrate the diverse ways in which the perspectives of the arts and humanities can inform and enrich research on plants. Each of these themes is associated with fundamental research questions and methods in the arts and humanities (in other words, this very much reflects the view ‘from the humanities’). It is important to note that many of the research projects considered in this report embrace more than one of these themes.

Nonetheless, considering their ‘primary’ orientation reveals some significant patterns. For example, projects principally concerned with two major themes – *Plants, health and well-being* and *Plant landscapes* – together accounted for more than a third (37%) of all projects since 2010. Significantly these were also themes in which other UKRI Research Councils were the most strongly represented (see Appendix A). Funded research has been relatively evenly distributed across the remaining six themes, in a wide range of disciplines from literature and philosophy (especially in *Plant stories* and *Plant thinking*) to archaeology, ethnobotany and the study of food cultures (especially in *Plant cultures*).

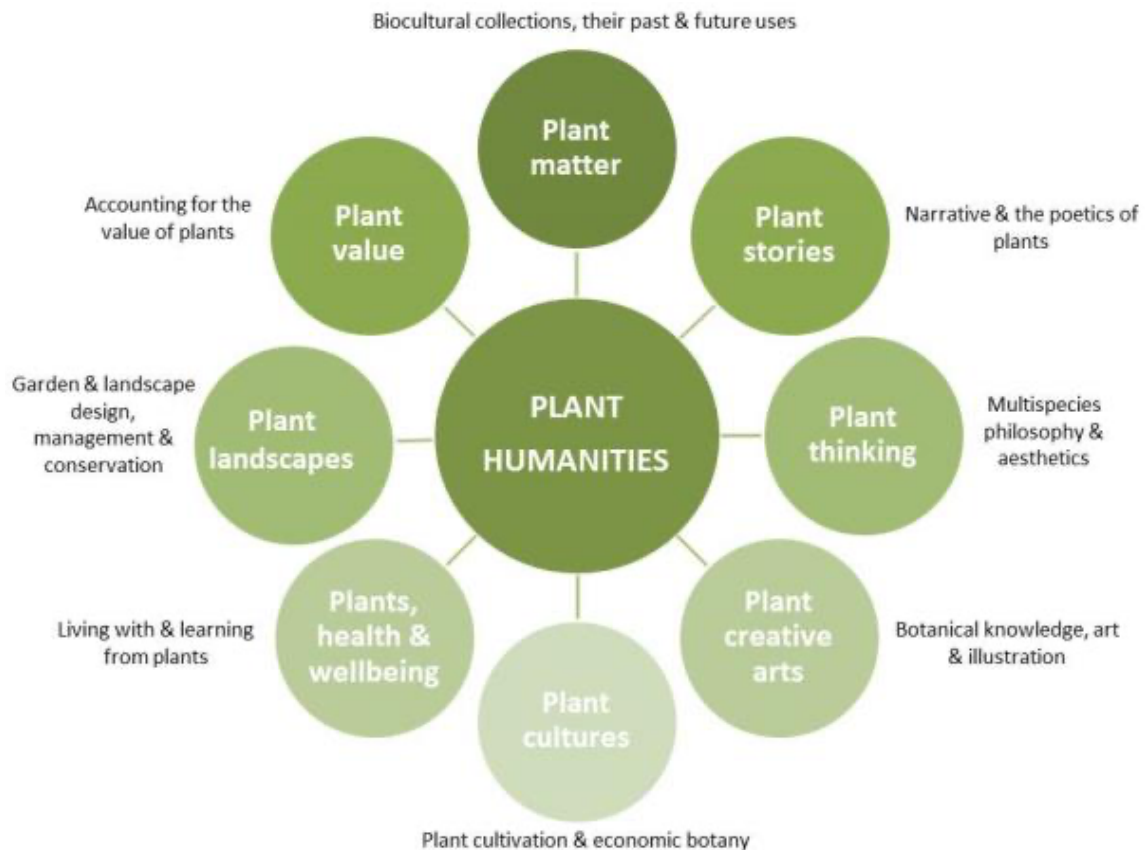


Fig. 2 A thematic map of the Plant Humanities (F Driver & C Cornish, 'Plant humanities: where arts, humanities, and plants meet', <https://tea-assembly.com/issues/8>)

It is notable that questions of *Plant value* have attracted increased funding in the last three years, including projects on the value of ecosystem services, natural capital and biodiversity accounting from an arts and humanities perspective. Such research, as conducted by philosophers, anthropologists, geographers, historians and lawyers, has clear potential to contribute significantly to debates over policy and practice, as witnessed in new approaches to the ecosystems services framework conventionally used to evaluate the significance of biodiversity for human welfare. In this context, the recent debate amongst bioscientists concerning 'Nature's Contributions to People', an approach which seeks to recognise 'the central and pervasive role that culture plays in defining all links between people and nature' is of fundamental significance, notably in the context of Indigenous knowledge.⁶

The thematic analysis of Plant Humanities projects undertaken for this report also draws attention to the significance of practice-based research within Plant Humanities, most obviously within the *Plant creative arts* theme. Such research typically uses drawing, writing, performance or other forms of creative practice as research methods, as for

⁶ S. Diaz et al, 'Assessing nature's contributions to people' *Science* 359 (2018) 270-2.

example in artists' engagements with botanical and biocultural collections.⁷ A concern with creativity takes a somewhat different form in projects which focus on material practices such as drawing or making as objects of study in their own right. The theme of *Plant matter* thus includes collections-based ethnographic and participatory projects with craft communities, from basket-makers in Scotland to Indigenous communities in Amazonia.

Practice & Research in Plant Humanities



Kew herbarium specimen



Burchell colour chart 1820s (Kew)



Lindsay Sekulowicz, Watercolour 2017

Practices of collecting, making, documenting and analysing plants and plant-based artefacts have been the subject of much research in the Plant Humanities – for example, studies of the visual culture of botany (*Making Visible: The visual and graphic practices of the early Royal Society*, Sachiko Kusakawa, University of Cambridge, AHRC).

In addition to this concern with practices as objects of study, some Plant Humanities projects deploy drawing, writing and performance as practice-based methods of research. Examples include:

Sensing and presencing rare plants through contemporary drawing practice

Sian Bowen, Northumbria University, Leverhulme Trust

Collection to source: cosmology and ethnobotanical artefacts of the Northwest Amazon

Lindsay Sekulowicz, University of Brighton with RBG Kew, AHRC

Changing treescapes: making visible the cultural values at risk from tree pests and diseases through arts approaches

Julie Urquhart, University of Gloucestershire, AHRC

⁷ See the essays by Yota Batsaki, Luciana Martins, Lindsay Sekulowicz and Redell Olsen in the online magazine [The Ethnobotanical Assembly](#), special issue on Plant Humanities (eds F. Driver & C. Cornish), Dec 2021.

4.3 Opportunities and obstacles

The researchers interviewed for this report typically described the opportunities presented by the Plant Humanities in terms of the benefits of interdisciplinarity, partnership, policy impact and public engagement. These opportunities are also being actively addressed within the GLAM sector, notably within botanic gardens. At the same time, interviewees identified a number of key obstacles to partnership.

4.3.1 Opportunities

The focus on plants, botanical collections and green spaces associated with Plant Humanities offers specific benefits both to researchers and their collaborators. There is a compelling case to be made for arts and humanities research as a way of contributing exciting new perspectives and insights into botanical and horticultural collections (including living collections as well as herbaria, libraries, botanical art, archives and artefacts), significantly extending the range of current humanities-led collections-based research on museums and cultural heritage. Moreover, the Plant Humanities concept was frequently described by the key researchers interviewed for this project as offering a platform for dialogue between humanities scholars and plant scientists interested in developing genuinely collaborative interdisciplinary projects. There are now many examples of successful projects which involve partnerships between university-based researchers and collaborators in botanic gardens.

Botanic gardens and allied institutions (including natural history museums, herbaria and horticultural societies) are increasingly significant participants in Plant Humanities research, leading and collaborating in numerous UKRI projects, notably in the arts and humanities (Appendix B). The idea that the arts and humanities should form an integral part of the research, education and public programmes of natural history museums and botanic gardens is increasingly accepted across the GLAM sector, internationally as well as nationally.

In the natural history museum context, the work of the 'Humanities of Nature' department founded in 2012 at the Museum für Naturkunde, Berlin, stands out. Its programmes and activities function to connect the various specialist departments of the museum which houses an estimated 30 million natural history specimens. The MfN's Humanities department's research and engagement enables the development of robust, informed and ethically responsible practices across the museum's collections, especially in relation to those originating in colonial contexts. This work has proved especially timely in view of current debates over provenance, access and engagement with source communities in natural history museums across the world.

In the botanic garden context, the establishment in 2014 of an Institute for the Humanities at the New York Botanical Garden, supported by The Andrew W. Mellon Foundation, marked a significant moment not only for NYBG but also for many other botanic gardens. The Institute's dynamic fellowship, symposia, education and outreach programmes have demonstrated the significance of humanities research for the public reach of botanic gardens. The potential of plants as connectors, supporting the

development of intergenerational and cross-community knowledge, is particularly well demonstrated in NYBG's new Foodways initiative, which explores and celebrates the connections between food, heritage and identity.

These international developments create new opportunities for partnership with UK institutions, as well as offering models for what is possible within UK botanic gardens and natural history museums at a time when they are actively seeking to engage with arts and humanities researchers. Of particular note here is Kew Gardens' new five-year [Science Strategy](#) (published September 2021) which includes an explicit commitment to interdisciplinary partnership with arts and humanities researchers and a proposal to establish a new Centre for Arts & Humanities. Similarly, the Royal Botanic Gardens Edinburgh 10-year [Science and Biodiversity Strategy](#) ('Responding to the biodiversity and the climate emergency', published June 2021) places strong emphasis on research partnership, including reference to 'cultural research' and 'cultural heritage resources'. At both Kew and Edinburgh, as in New York and Berlin, the policy landscape has been significantly affected by debates over wider societal challenges – especially, in the case of the botanic gardens, those connected with biodiversity loss, climate change and racial injustice. In these and other botanical institutions, there is now a clear desire to engage with the methods, ideas and insights of the arts and humanities.

The re-orientation of the research strategies of botanic gardens in order to address national and international policy agendas around global challenges (such as climate change, biodiversity loss, sustainable living, biocultural heritage, food security, health and well-being) presents clear opportunities for the Plant Humanities, since addressing these challenges require the kinds of skills and expertise which arts and humanities scholars can offer. In the botanic garden or natural history museum context, the value placed on the humanities in researching, documenting and communicating about plants and their human uses is increasingly evident. In these settings, the humanities are by necessity oriented to interdisciplinarity and to public engagement. Arts and humanities-oriented research on plants enables the telling of rich stories about human history and culture, as well as enabling the recontextualisation of collections as new questions emerge and as new agendas on value and justice take shape.

From an academic perspective, what institutions such as gardens and botanical collections offer is not simply their collections and their scientific expertise: it is also their ability to attract, engage and inspire large numbers of people, not least as visitors. For example, Kew Gardens and Wakehurst attracted 2.5 million visitors in 2019-20, the Royal Horticultural Society has 525,000 members nationally and there are countless community-level organisations devoted to the upkeep of gardens and green spaces across the regions and localities of the UK. More generally, it has been estimated that Areas of Outstanding Natural Beauty and National Parks currently attract 260 million visits per year. Never have green spaces been more important to the UK population and economy. The wider public health benefits of access to these spaces are the subject of much discussion, especially in a post-pandemic era. There are also urgent issues of equity as well as wider conceptual issues about connectedness with more-than-human nature that humanities scholars are well placed to explore.

Some Network Grants in Plant Humanities



Support for networks in Plant Humanities is a vital means of enabling collaboration between partners, bridging scientific and humanities disciplines. They are also an important means of connecting academic researchers with researchers, practitioners, professionals and community stakeholders beyond the university, whether local, national or international. Networks can help to explore both shared and divergent approaches to intellectual and policy challenges; to test concepts and methods; and to provide the basis for larger and longer-term collaborations.

Examples of networks supported by UKRI in the area of Plant Humanities include:

Valuing nature

Rupert Read & Aled Jones (University of East Anglia)

The philosophical life of plants

Daniel Whistler & Danielle Sands (Royal Holloway, University of London)

Cross-pollination: re-valuing pollinators through arts and science collaboration

Andrea Liggins & Mike Christie (University of Wales, Lampeter)

Living histories of sugar in Scotland and the West Indies: transnationalisms, performance and co-creation

Marisa Wilson & Robin Sloan (University of Edinburgh)

People and Plants: reactivating ethnobotanical collections as material archives of Indigenous ecological knowledge

Ali Clark (National Museums of Scotland) & Mark Nesbitt (RBG Kew)

4.3.2 Obstacles

While offering clear opportunities for humanities-led research initiatives involving university-based researchers and non-HEIs, the current research landscape also includes some obstacles to collaboration. The four most frequently identified by our interviewees were: staff capacity; disciplinary language; institutional and career structures; and knowledge and skills deficits.

Staff capacity. A lack of available staff time – both in the preparation of funding bids and in the management of projects – is commonly identified as an obstacle to collaborative research. Building relationships with partners obviously takes time as does the development of viable project proposals. In principle, all research active academics in universities are expected to devote a proportion of their time to such activity, though such time frequently gets squeezed due to teaching and other professional activities. In non-HEIs, however, research time is generally much less available, given the demands of curatorial and other roles, and much more difficult to protect. Few professionals in the GLAM sector are entitled to sabbaticals, and the ‘buying out’ of staff time can be more challenging than in the university context, especially in the case of staff working in more specialist areas who cannot readily be substituted. This structural issue is particularly important when it comes to the capacity to lead projects, but it also places limits on the ability to engage in collaborative projects even where there is a desire to do so and facilities in place to support collaborative working.

Disciplinary language. In discussion with interviewees, the difference in disciplinary language between arts and humanities researchers and plant scientists was often cited as a significant barrier. In this context, ‘language’ often served as a shorthand for epistemological differences in approaches to research sources, methods, validation and presentation.⁸ Differences in the conventional modes of doing and presenting research in science and the humanities means that participants in collaborations sometimes have to work hard to find common ground where very different approaches can meet. The challenges of interdisciplinary conversations are many. They include accepting the value of different perspectives on common problems: in the words of one early-career researcher, ‘interdisciplinarity is about accepting different answers to the same questions’. They may also be reflected in the evaluation of interdisciplinary proposals, especially where peer reviewers lack experience of arts and humanities research. This issue is particularly significant in the case of practice-based research which is commonly regarded in the sciences as a way of reaching wider audiences but less commonly understood (in science) as a form of fundamental research in itself.

Institutional and career structures. The different structures of universities and partner institutions can create challenges for career progression and mobility between sectors. One of the challenges of interdisciplinary research, felt acutely by early career researchers, is the extent to which such work is valued highly by appointments and promotions committees. However, given the growing volume of research funding available to support work in this field and the increasing value placed on external partnerships by many universities, there are grounds for optimism on this issue. Of greater significance in this context are the differences in terms and conditions of employment between universities and the Independent Research Organisations, especially in matters of salary, which can create challenges to staff mobility between

⁸ Linguistic barriers were also identified as significant challenges. In many contexts, the dominance of English as the language of communication in science and Latin as the basis for plant taxonomy creates challenges for public engagement and community-led models of research. The importance of translation in reaching more diverse audiences is evident from the examples of projects cited here. In addition, the importance of documenting and cataloguing vernacular plant names is an important theme in ethnobotanical research.

these institutions. Different approaches to communications, intellectual property and research ethics between sectors may also require careful management in joint projects.

Knowledge and skills deficits. Knowledge of how a potential partner works – the internal structure and culture of an institution as well as its ‘outward face’ as expressed in mission statements and policy priorities - is a prerequisite to effective partnership. University-based researchers at an early stage of collaboration need effective ‘ways in’, i.e. clear routes by which they can identify potential collaborators within a botanic garden or natural history museum, and vice-versa. The challenge here is not simply about how to increase knowledge of potential research assets (expertise as well as collections) beyond the university sector. It is also about raising awareness within botanic institutions of the multiple potential affordances of those assets for research within the arts, humanities and social sciences as well as within the plant sciences. This may require attitudinal changes within these institutions in how collections are defined and how they can be used, especially within humanities-led projects – a process that is already underway as reflected in recent UKRI-funded projects involving botanic gardens.

Successful interdisciplinary collaboration requires recognition of the skills and strengths that each discipline brings to a partnership. In the case of botanical collections, one of the most important prerequisites for collections-based research is knowledge of the working practices of plant scientists including aspects of field collecting, taxonomy, specimen preservation and exchange. Learning about these practices is one thing; being trained in skills that enable navigation of collections in herbaria or interpretation of herbarium sheets is another. And without these skills arts and humanities researchers are necessarily reliant on collaboration with plant scientists for effective access to these research assets. Moreover, in many cases the problem of unlocking such collections is accentuated by the structure and design of botanical catalogues and databases which have traditionally prioritised information of use to plant science.

4.4 Urgent priorities

This Report has established that Plant Humanities is a growth area with significant potential for further development and is well-aligned with the strategic priorities of funders, universities, botanic gardens and policy-makers. While there are a number of obstacles to partnership between university-based Plant Humanities researchers and colleagues in non-HEIs, many of these can be addressed by UKRI in practical interventions with achievable objectives. Before outlining the nature of the proposed interventions, we highlight three areas considered by key researchers in the field as priorities for intervention on the basis of urgency and timeliness. These are:

- 1. Unlocking the potential of botanical collections in arts and humanities research: between nature and culture.** Research in botanical collections, including biocultural collections (combining natural specimens, cultural artefacts and historical archives), requires a combination of skills and insights from a range of disciplines. The value of such collections for arts and humanities research – indeed, their very status as cultural assets - has been demonstrated in recent projects supported by UKRI, British Academy

and Wellcome Trust. The importance of these projects lies not just in the new insights they generate into the making, interpretation and uses of such collections but also in the contribution that they can make to the understanding of issues of fundamental importance to the arts and humanities including heritage, language, sustainability and livelihoods. Addressing these issues requires innovative thinking across the disciplines associated with the study of 'nature' and 'culture'. This is particularly clear in botanic gardens and natural history museums where collections management and interpretation require both scientific and cultural expertise.

This priority could be addressed through (i) a fellowship scheme encouraging engagement between arts and humanities researchers and institutions with botanical collections (2022-3); (ii) a programme for humanities-led interdisciplinary research on botanical collections in natural history museums and botanic gardens (2023).

Some Recent Research Projects on Biocultural Collections



Cotton from Guyana, 1880
(Kew collections)



Parts for a violin from Bavaria, 1861
(Kew collections)



Rain cape from the Philippines, 1985
(Kew collections)

Biocultural collections are repositories for plants and animal specimens of use to people, potentially or actually. Typically they include both specimens and products, whether hand or machine-made, along with materials such as plant fibres and extracts. In the nineteenth and twentieth centuries, economic botany collections were found in many museums and botanic gardens, providing an archive of resource extraction. Today, with some exceptions (notably at Kew), such collections have been dispersed or renamed. From an arts and humanities perspective such assets provide the basis for interdisciplinary research on the intellectual, economic, cultural and scientific aspects of resource use - past, present and future.

Recent research projects on biocultural collections include:

Situating Pacific barkcloth production in space and time

Frances Lennard (University of Glasgow), Adrienne Kaepler (Smithsonian) and Mark Nesbitt (Kew), AHRC research grant

Mobile museum: economic botany in circulation

Felix Driver (Royal Holloway) and Mark Nesbitt (Kew), AHRC research grant

Digital repatriation of biocultural collections: connecting scientific and indigenous communities of knowledge in Amazonia

Luciana Martins (Birkbeck), British Academy research grant

Seeds for survival: a global history of seed banking

Helen Curry (Cambridge), Wellcome Trust Award in the Humanities & Social Sciences

2. **Connecting biodiversity, equity and social justice.** The global debate over biodiversity loss since the 1990s has involved serious consideration of issues of equity and justice within the global plant science community. Following the [Convention on Biological Diversity](#) and the Nagoya Protocol, which came into force in 2014, major botanic gardens and natural history museums have been actively addressing questions of access and benefit sharing in relation to their collections. The urgency of the current moment stems from an increasing concern that questions of access and benefit have been considered too narrowly, with more work to do to ensure the ambitious objectives of these agreements can be achieved. Meanwhile current public debate over issues of inclusion and diversity, especially in relation to racial justice, has raised challenging questions about the colonial contexts in which natural history collections were established and maintained, and the importance of ensuring more equitable access to the collections themselves as well as to the knowledge associated with them. This requires researchers in disciplines such as history, anthropology, geography, law, museum studies and economics to consider innovative approaches to such collections, especially in relation to matters of digital access, intellectual property, social equity and cultural heritage.

This priority could be addressed through (i) an interdisciplinary network on the theme of biodiversity, equity and social justice, especially at the international level (2022-3); and (ii) a cross-council highlight call designed to reflect the importance of humanities-led research on biodiversity, equity and social justice (2022-3).

3. **Valuing green spaces for human well-being.** The COVID crisis has brought issues of access to green spaces and their role in the promotion of health and well-being to the forefront of policy-making. Research by arts and humanities scholars has long explored the cultural origins and consequences of different ways of imagining and valuing nature in diverse ecological contexts, and the changing relationship between human societies and green spaces. The particular contribution of the Plant Humanities is to encourage new connections to be made between science-based approaches to plants and a fuller appreciation of their cultural value. In this context, practice-based research in creative writing and the visual arts can contribute significantly to the understanding of the experience of living and working in, or visiting, parks, gardens and forests, and its relationship to measures of well-being.

This priority could potentially be addressed through further development of the AHRC's Environment & Health portfolio, for example through (i) a network call designed to foster cross-sector and practice-based working, bringing arts and humanities insights into closer connection with the work of science-led management and conservation practice; (ii) encouragement of collaborative PhDs connecting HEIs and a wider range of partners in the environmental sector.

5. Key organisations and individuals

Plant Humanities research is being conducted in many university-based disciplines, from eco-poetics to environmental psychology. While some of this work falls within AHRC's

developing Health and Environment portfolio, this report has made the case for conceiving Plant Humanities more widely, in terms of both disciplines and sectors, as well as engaging more explicitly with opportunities for international collaboration. The potential list of key individuals and organisations is thus very large. A list of botanical institutions involved in AHRC-funded Plant Humanities research since 2010 is provided in Appendix B. The names of all those interviewed for this Report is provided in Appendix C.

Of particular importance to the Plant Humanities is a relatively small group of national institutions in the UK's GLAM sector which are responsible for managing and/or advocating for significant botanical assets, including plant specimens, botanical archives and living landscapes. These collections are of strategic importance for collaborative research and engagement in Plant Humanities by virtue of the global reach of their collections, the national remit of their activities, the scale of their research infrastructure (including libraries and archives) and their role in public engagement.

6. Interventions needed

The Plant Humanities are currently thriving in the UK. A wide variety of topics and types of project are being supported in a range of disciplines. However, the distinctive profile of this work and the substantial opportunities it offers for new arts and humanities-led initiatives with non-HEI partners have not generally been recognised beyond project level. There is, in other words, a strategic opportunity here for UKRI to harness its wide subject portfolio and strategic priorities in support of new initiatives in a very dynamic and exciting field of research. Practical interventions in a number of policy areas would help UK arts and humanities research to realise its full potential in this rapidly developing field.

The core objectives of these proposed interventions are:

- **To raise the profile** of arts and humanities research conducted in botanic gardens, natural history museums and allied institutions in the GLAM sector
- **To develop a new programme** supporting research in the field, involving partnership between UKRI Research Councils and potentially with other funding agencies
- **To address the urgent priority areas:** Between nature and culture; Valuing green spaces for human well-being; Biodiversity, equity and social justice
- **To nurture interdisciplinary partnerships and staff exchange** between universities and non-HEIs, in order to foster long-term collaboration across sectors
- **To enhance research infrastructure** – both digital and physical – to enable high-quality arts and humanities research in the field

The interventions proposed to address these vary in scope and scale, and some of them extend well beyond the needs of one field, however broad and interdisciplinary. They are arranged here under five headings: research programmes; network and project funding; training and development; research infrastructure; process and mechanisms.

6. 1 Research programme

The case for an intervention at programme level is based on two principal considerations: firstly, the need to raise the profile of humanities-led interdisciplinary research within this field, especially given its cross-sector and international dimensions; and secondly, the challenge of securing funding for multi-institutional and longer-term collaborations.

As confirmed by our review of the UK research landscape, large-scale funding for Plant Humanities-related research (at levels beyond that possible within standard UKRI grants) is generally confined to ERC grants, Leverhulme Research Centres and special programmes. Significantly, most of the larger Plant Humanities projects have an international focus and/or international collaborators. In this respect, it should be noted that continuing uncertainty over the continued access of UK researchers to ERC funding and the recent demise of GCRF and Newton funding present major challenges to research in Plant Humanities, which has involved some remarkably innovative work with communities and agencies in the Global South.

To respond to the priority areas identified above, we propose a humanities-led UKRI programme entitled *Between Nature and Culture: Unlocking the Potential of Botanical Collections in Arts & Humanities Research*. The possibility of developing this programme in partnership between funders, either within UKRI or with other national and international funders, should also be explored.

6.2 Network and project funding

Interventions at the level of network and smaller-scale project funding are designed in part to support the priority areas; and in part to address issues raised in the course of interviews with stakeholders, particularly the need to nurture new networks and cross-sector collaborations through small-scale and seed-funding.

In this context, it is clear that modest forms of research funding are extremely highly valued in this field, as in the arts and humanities more generally. In particular, this includes funding for the scoping of potential projects and network building, especially those which involve partnership across sectors. Such funding can be particularly useful in the collaborative development of project ideas with community partners, enabling experiment and testing proof of concept, as well as providing a robust basis for advocacy of arts and humanities research within botanical institutions and universities. This form of support will also be helpful in facilitating research leadership in non-HEIs as well as Universities in what is still a relatively new and emerging area within the botanical and horticultural context.

To respond to these needs, we propose (i) a UKRI network call designed to foster cross-sector and practice-based research in one or more of the three priority areas identified above; (ii) cross-council highlight calls for humanities-led research projects on

Biodiversity, Equity and Social Justice and/or on Valuing Green Spaces for Human Well-Being.

6.3 Training and development

The commitment to interdisciplinary research in this field requires further consideration of staff training needs to facilitate collaboration across disciplines and sectors, including funding to enable visiting fellowships, placements and residencies.

Training and development needs associated with cross-sector collaboration are widely recognised at postgraduate level within Doctoral Training Consortia, through collaborative supervision with non-HEIs and placements and other development opportunities for all doctoral researchers. Extending this principle to early and mid-career level, and making it available to staff in both universities and their non-HEI partners, requires the creation of new funding mechanisms to support staff exchange between these sectors in the form of fellowships, placements and residencies. The objective would be to facilitate greater understanding of institutional cultures and practices, to build research relationships, to develop new skills and to foster new collaborations. Such a model could also be extended to practice-based research, drawing on experience with artists' residencies funded by the Arts Council and Leverhulme Trust.

To address this issue, we propose a new short-term (3-6 months) fellowship scheme specifically to encourage partnership and engagement between university-based researchers and botanic gardens, museums and other organisations with a significant stake in the Plant Humanities.

6.4 Research infrastructure

In recent years, the importance of funding the UK's research and innovation infrastructure has received much attention from UKRI, notably in the 2020 Roadmap Report. It is clear from this report, and those of other bodies such as Research Libraries UK and the British Academy, that the provision and maintenance of research infrastructure is as important to the arts, humanities and social sciences as it is to other areas of science. In the context of Plant Humanities, the collections of botanic gardens and natural history museums were described in one of our workshops as 'laboratories for the humanities'. In the context of UKRI's strategic priorities, they have also become cultural assets of increasing significance.

There are many areas where the needs of scientists and humanities scholars are essentially similar or convergent: digital access to collections, for example, is as important an issue for historians as it is for plant scientists. In the area of Plant Humanities, as shown by a variety of recent initiatives, large-scale digitisation projects offer the promise of new kinds of humanities-led inquiry as well as innovative pedagogies and public humanities initiatives. Digital resources combining library, museum and archive collections with those of botanical gardens in global data

infrastructures

such as the Global Biodiversity Information Facility (GBIF) and the Biodiversity Heritage Library (BHL), in which Kew and the Natural History Museum are key partners, are of particular value in this context. In interviews with stakeholders, accelerated digitisation and cataloguing of botanical collections were highlighted as urgent priorities, with cataloguing presented by collections managers as itself a form of practice-based research. Enhancing the accessibility of digital resources in formats appropriate to the needs of a wide variety of users, including arts and humanities researchers, remains a key priority within the GLAM sector as a whole, as reflected for example in AHRC's 'Towards a National Collection' programme.

These are large issues in which UKRI is already engaged, as indicated by the place of cultural assets and digital humanities in its strategic vision. From a Plant Humanities perspective, what is required here is a clear recognition in UKRI strategic policy statements of the importance of scientific collections as key assets for arts and humanities researchers; and of the role of the arts and humanities in contextualising and interpreting these collections for wider and more diverse audiences.

6.5 Processes and mechanisms

As in any area involving research funding, especially in projects where partnerships with external organisations are concerned, discussion of funding priorities often leads on to comment on the mechanisms and processes by which research funding is allocated. UKRI research funding rules as applied either to research partners based overseas or to smaller organisations and community groups within the UK, are sometimes said to inhibit effective collaboration. Connected to this is a sense, especially amongst non-academics, that the Research Councils need to reach out more to stakeholders beyond HEI and Independent Research Organisations, providing advice on partnership-building, a more streamlined application process and resources to support more equitable partnerships.

These are large issues which need to be tackled at a more general level. In undertaking this report, however, we have been particularly struck by the diversity of partner organisations involved in UKRI projects, ranging from major international institutions to very small community organisations at the local level (as indicated in Appendix B).

Two specific interventions at the operational level which would help UKRI map the emerging research landscape in Plant Humanities would be (i) an audit of non-academic partner and collaborator organisations involved in arts and humanities projects, and (ii) explicit inclusion of 'environmental humanities' as subject within the UKRI remit in order to make interdisciplinary research in this area more visible. Currently there is no way of identifying a grant proposal as 'environmental humanities' at application stage and therefore no efficient way for UKRI to measure and monitor research activity in the field.

7. Acknowledgements

We would like to thank all our interviewees and workshop participants for their contributions to this research. Particular thanks are due to our project partners Yota Batsaki at Dumbarton Oaks, Elena Canadelli at the University of Padua and Michaela Schnull, of Harvard University Herbaria; to Fiona Ainsworth and the Library & Archives team at Kew, Ed Ikin and Lorraine Lecourtois at Wakehurst, Lorna Mitchell at RBG Edinburgh and Fiona Davison at the Royal Horticultural Society for providing advice and support; and to Christopher Daley, Graham Huggan, Luciana Martins, Kiri Ross-Jones and Vanessa Sellers for feedback on a draft of the report. Research grants data for UKRI and ERC was kindly provided by Maria Traill at UKRI. Thanks also to Ken Emond at the British Academy for providing data on their grants.

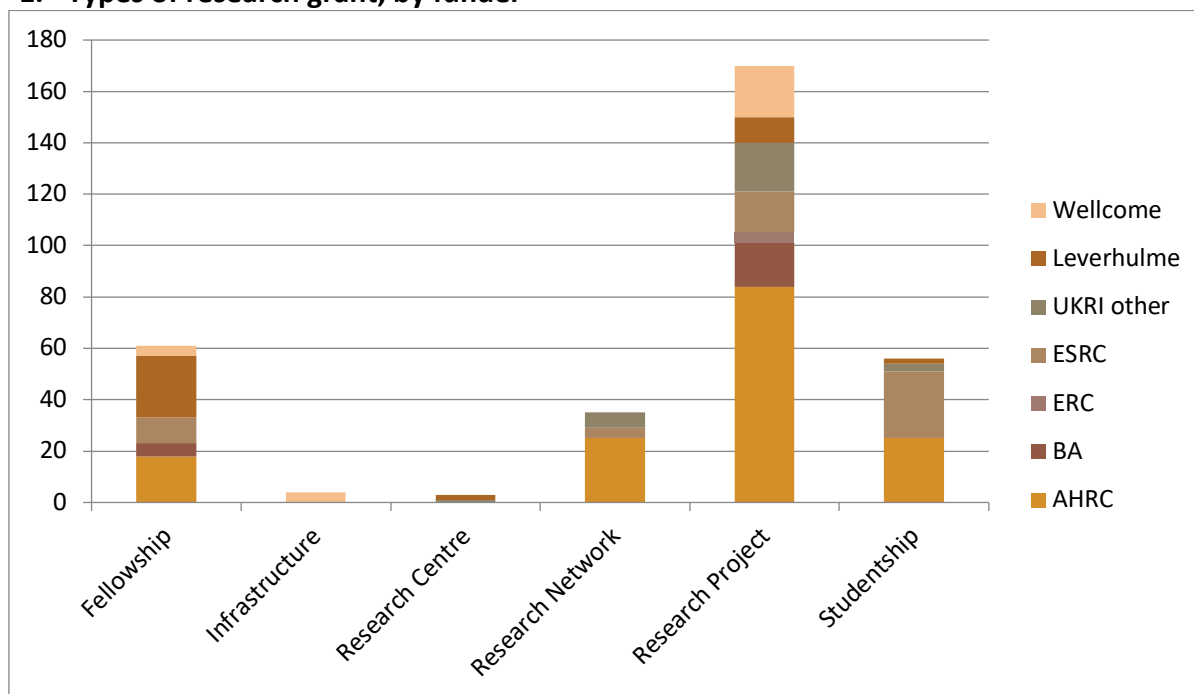
8. Appendices

- A. Research grants data and analysis
- B. Botanical institutions involved in AHRC research projects 2010-20
- C. Interviewees
- D. Workshop participants
- E. Project team and partners

APPENDIX A

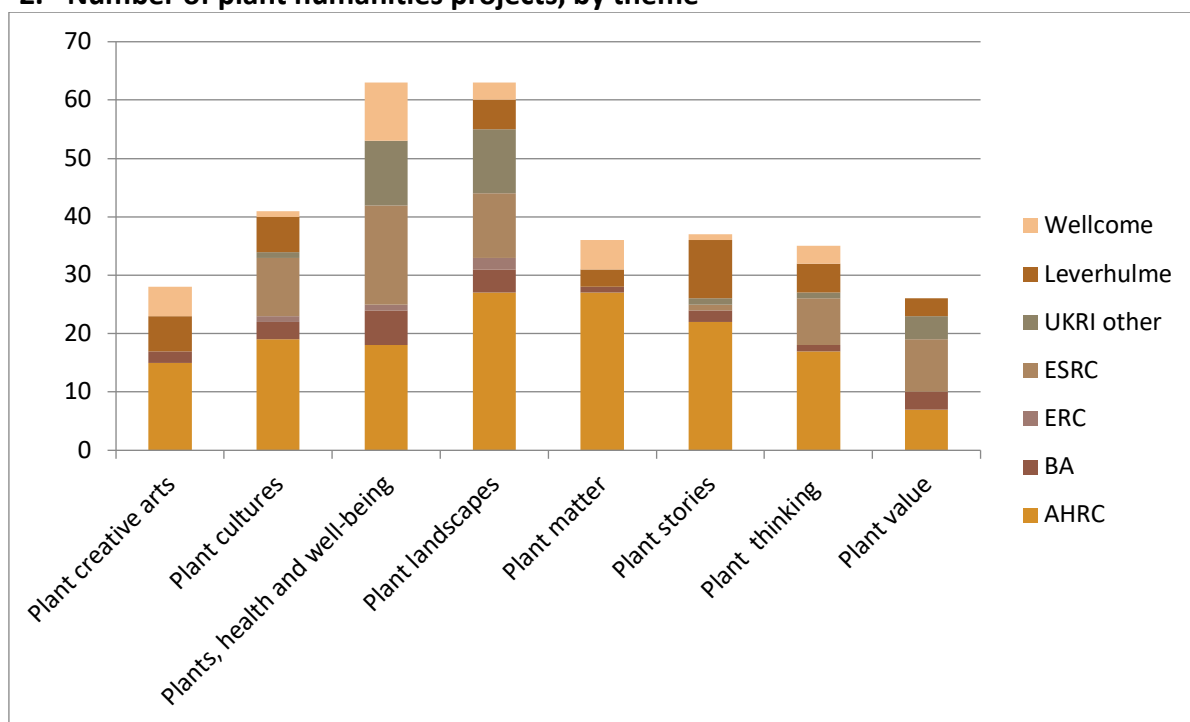
PLANT HUMANITIES RESEARCH GRANTS IN THE UK, 2010-2020

1. Types of research grant, by funder



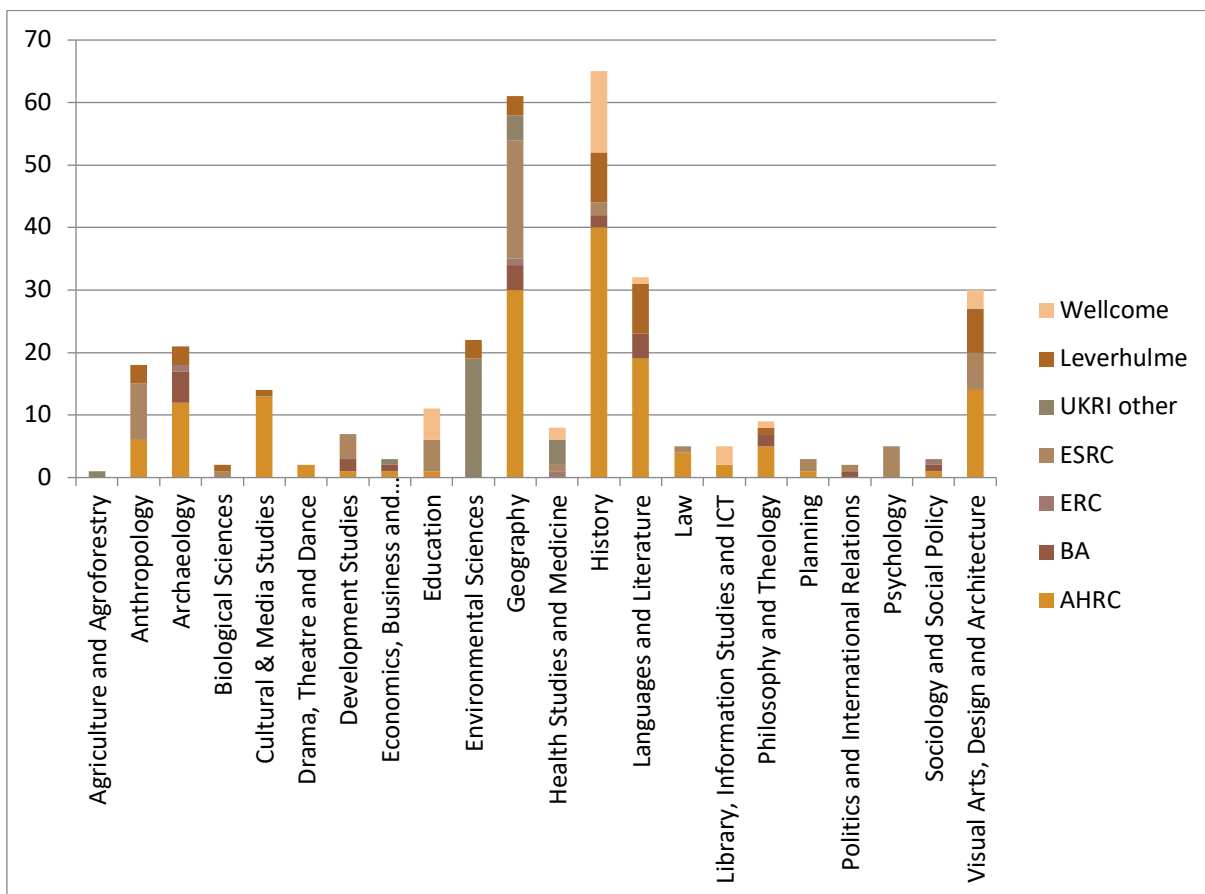
	AHRC	BA	ERC	ESRC	UKRI other	Leverhulme	Wellcome	TOTAL
Fellowship	18	5		10		24	4	61
Infrastructure							4	4
Research Centre					1	2		3
Research Network	25			4	6			35
Research Project	84	17	4	16	19	10	20	170
Studentship	25			26	3	2		56
TOTAL	152	22	4	56	29	38	28	329

2. Number of plant humanities projects, by theme



	AHRC	BA	ERC	ESRC	UKRI other	Leverhulme	Wellcome	TOTAL
Plant creative arts	15	2				6	5	28
Plant cultures	19	3	1	10	1	6	1	41
Plants, health and well-being	18	6	1	17	11		10	63
Plant landscapes	27	4	2	11	11	5	3	63
Plant matter	27	1				3	5	36
Plant stories	22	2		1	1	10	1	37
Plant thinking	17	1		8	1	5	3	35
Plant value	7	3		9	4	3		26
TOTAL	152	22	4	56	29	38	28	329

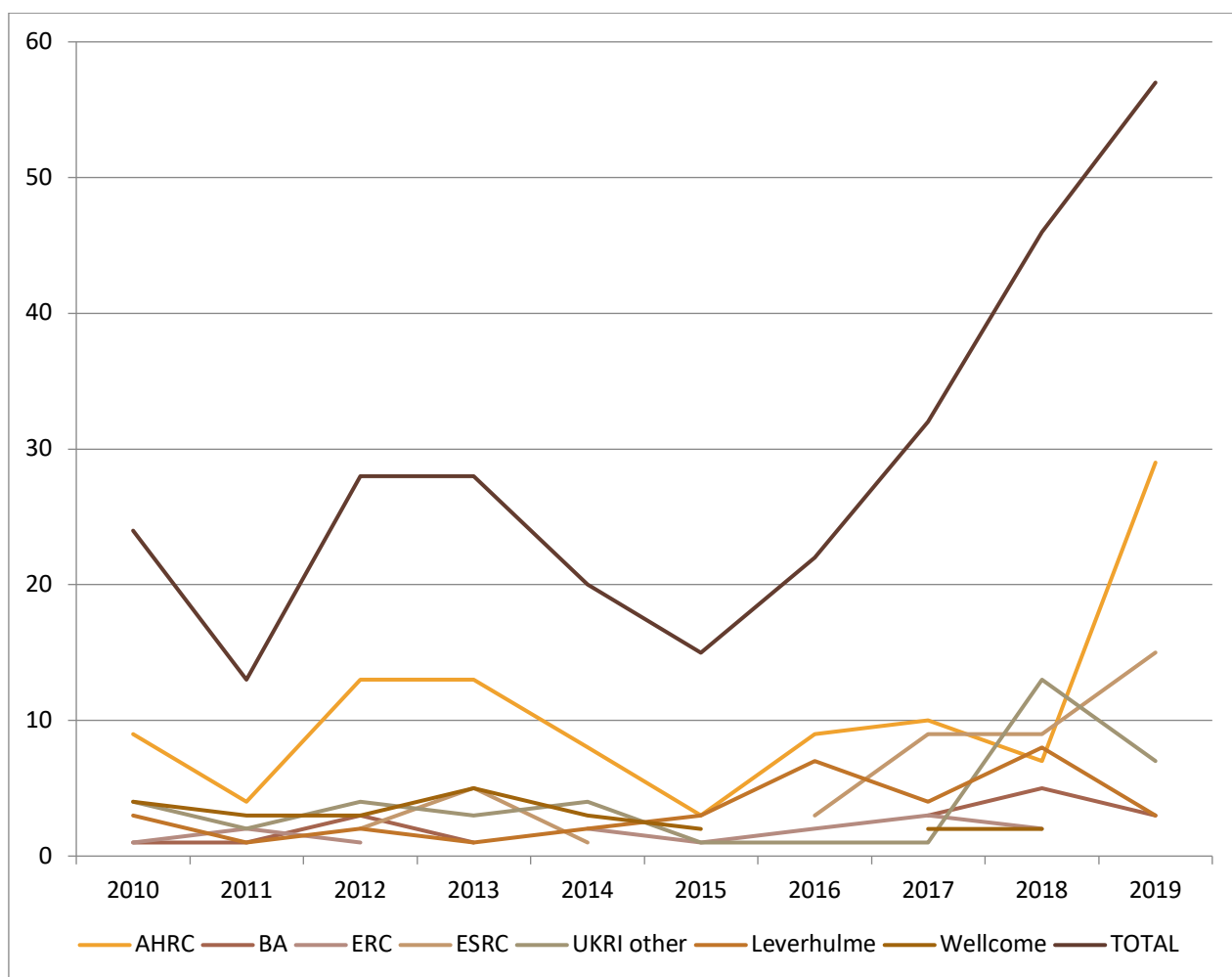
3. Number of plant humanities projects, by primary discipline



UK Plant Humanities projects, by primary discipline: raw data

	AHRC	BA	ERC	ESRC	UKRI other	Leverhulme	Wellcome	TOTAL
Agriculture and Agroforestry					1			1
Anthropology	6			9		3		18
Archaeology	12	5	1			3		21
Biological Sciences				1		1		2
Cultural & Media Studies (includes Museum Studies)	13					1		14
Drama, Theatre and Dance	2							2
Development Studies	1	2		4				7
Economics, Business and Management	1	1			1			3
Education	1			5			5	11
Environmental Sciences (other than Biological sciences)					19	3		22
Geography	30	4	1	19	4	3		61
Health Studies and Medicine			1	1	4		2	8
History	40	2		2		8	13	65
Languages and Literature	19	4				8	1	32
Law	4			1				5
Library, Information Studies and ICT	2						3	5
Philosophy and Theology	5	2				1	1	9
Planning	1			2				3
Politics and International Relations		1		1				2
Psychology				5				5
Sociology and Social Policy	1	1	1					3
Visual Arts, Design and Architecture	14			6		7	3	30
TOTAL	152	2 2	4	56	30	38	28	329

4. Number of plant humanities projects funded, 2010-2019



	AHRC	BA	ERC	ESRC	UKRI other	Leverhulme	Wellcome	TOTAL
2010	9	1	1	2	4	3	4	24
2011	4	1			2	1	3	11
2012	13	3		2	4	2	3	27
2013	13	1		5	3	1	5	28
2014	8		1	1	4	2	3	19
2015	3	5			1	3	2	14
2016	9			3	1	7		20
2017	10	3	1	9	1	4	2	30
2018	7	5		9	13	8	2	44
2019	29	3		15	7	3		57
TOTAL	105	22	3	46	40	34	24	274

APPENDIX B

Botanical Institutions involved in AHRC-funded Plant Humanities Research since 2010

AHRC have funded 152 Plant Humanities projects since 2010. Of these, 62 (41%) have involved botanical institutions as leaders, collaborators or partners.⁹ These include botanic gardens, herbaria, natural history museums and non-HEI agencies managing natural heritage.

Adelaide Botanic Garden
Askania-Nova Biosphere Reserve
Booth Museum of Natural History
Botanic Gardens Conservation International
Botanical Garden of Curitiba
Botanical Survey of India
British Association of Nature Conservationists
Community Land Scotland
Conservation International
Council for the Protection of Rural England
DEFRA
The Eden Project
Forestry Commission
Forest Research UK
Forestry England
Foundation for Agrarian Development Peru
Friends of Nottingham Arboretum
Future Terrains
Greater Lincolnshire Nature Partnership
Harvard University Herbaria
Hunterian Museum, Glasgow
International Union for Conservation of Nature
John Muir Trust
Kenya Forestry Research Institute
!Khwa ttu, South Africa
Lake District National Parks Authority
Lincolnshire Wolds Countryside Service
Linnean Society
Museum of London Archaeology
National Association for Areas of Outstanding Natural Beauty
National Botanic Garden of Wales
National Forest Company
National Museum and Art Gallery of Trinidad & Tobago
National Institute of Agricultural Botany

⁹ Botanical institutions are defined as organisations responsible for managing and/or advocating for significant botanical assets, notably plant collections in various forms, libraries, manuscript archives and living landscapes.

National Museum of Natural History, Washington DC
National Museum of Natural History, New Delhi
National Herbarium of Trinidad & Tobago
National Museum of Scotland
National Museum Wales
National Museums Liverpool
National Parks England
Natural England
Natural History Museum, London
New Forest National Park Authority
Oxford Botanic Garden and Arboretum
Oxford University Museum of Natural History
Quantock Hills Area of Outstanding Natural Beauty
Rewilding Europe
Royal Botanic Garden Edinburgh
Royal Botanic Gardens, Kew
Royal Botanic Garden Victoria
Royal Horticultural Society
West of England Nature Partnership
Wildfowl & Wetlands Trust
The Wildlife Trusts
Wildlife Trust for Lancashire, Manchester and North Merseyside
The Woodland Trust
Yale Peabody Museum of Natural History
Yorkshire Wildlife Trust

APPENDIX C

Interviewees

Lora Angelova	The National Archives
Sian Bowen	Arts University Bournemouth
Duncan Cameron	University of Sheffield
Lisa Cardy	Natural History Museum, London
Mark Carine	Natural History Museum, London
Richard Coulton	Queen Mary University of London
Peter Crane	Oak Spring Garden Foundation
Helen Curry	University of Cambridge
Stephen Daniels	University of Nottingham
Fiona Davison	Royal Horticultural Society
Caitlin DeSilvey	University of Exeter
Maura Flannery	St. John's University, New York
Mariana de Campos França	Leiden University
Lauren Gardiner	Cambridge University Herbarium
Birgitta Gatersleben	University of Surrey
Jennifer Geroni	National Museum of Wales
Ros Gray	Goldsmiths, University of London
David Harris	Royal Botanic Garden Edinburgh
Stephen Harris	Oxford University Herbaria
Andrea Hart	Natural History Museum, London
Harriet Hawkins	Royal Holloway, University of London
Pauline von Hellermann	Goldsmiths, University of London
Ina Heumann	Museum für Naturkunde, Berlin
Clare Hickman	Newcastle University
Graham Huggan	University of Leeds
Ed Ikin	Royal Botanic Gardens, Kew (Wakehurst)
Joela Jacobs	University of Arizona
Mark Jenner	University of York
Katja Kaiser	Museum für Naturkunde, Berlin
Sachiko Kusakawa	University of Cambridge
Siobhan Lambert-Hurley	University of Sheffield
Anna Lawrence	University of Cambridge
Sabina Leonelli	University of Exeter
Luciana Martins	Birkbeck, University of London
Christof Mauch	Rachel Carson Center, Munich
Cheryl McGeachan	University of Glasgow
Andrew Mills	Hunterian Museum, University of Glasgow
Lorna Mitchell	Royal Botanic Garden Edinburgh
Jasper Montana	University of Oxford
Jane Munro	Fitzwilliam Museum, University of Cambridge
Tahani Nadim	Museum für Naturkunde, Berlin
Emma Nicolson	Royal Botanic Garden, Edinburgh
Joanna Norman	Victoria & Albert Museum

Joanna Ostapkowicz	University of Oxford
Matthew Pace	New York Botanical Garden
Heather Pardoe	National Museum of Wales
Lucia Pietroiusti	Serpentine Gallery, London
Greg Radick	University of Leeds
Rupert Read	University of East Anglia
Sita Reddy	Independent researcher
Wood Roberdeau	Goldsmiths, University of London
Lindsay Sekulowicz	University of Brighton
Vanessa Sellers	New York Botanical Garden
Susanne Seymour	University of Nottingham
Shela Sheikh	Goldsmiths, University of London
Sally Shuttleworth	University of Oxford
Anna Svensson	KTH Royal Institute of Technology, Stockholm
Nicole Tarnowsky	New York Botanical Garden
Chris Thomas	University of York
Julie Urquhart	University of Gloucestershire
Thaïsa Way	Dumbarton Oaks
Marisa Wilson	University of Edinburgh
Charles Zimmerman	New York Botanical Garden

APPENDIX D

Workshop participants

Fiona Ainsworth	Royal Botanic Gardens, Kew
Yota Batsaki	Dumbarton Oaks
Elena Canadelli	University of Padua
Mark Carine	Natural History Museum London
Caroline Cornish	Royal Holloway, University of London
Helen Curry	University of Cambridge
Vinita Damodaran	University of Sussex
Felix Driver	Royal Holloway, University of London
Sonja Dümpelmann	Penn University/Rachel Carson Center
Martha Fleming	University of Copenhagen
Lauren Gardiner	University of Cambridge Herbarium
Birgitta Gatersleben	University of Surrey
Stephen Harris	University of Oxford Herbaria
Andrea Hart	Natural History Museum London
Harriet Hawkins	Royal Holloway, University of London
Ina Heumann	Museum für Naturkunde, Berlin
Graham Huggan	University of Leeds
Katja Kaiser	Museum für Naturkunde, Berlin
Siobhan Lambert-Hurley	University of Sheffield
Sabina Leonelli	University of Exeter
Kaja Marczewska	V&A Museum
Luciana Martins	Birkbeck, University of London
Lorna Mitchell	Royal Botanic Garden Edinburgh
Tahani Nadim	Museum für Naturkunde, Berlin
Mark Nesbitt	Royal Botanic Gardens, Kew
Joanna Norman	V&A Museum
Redell Olsen	Royal Holloway, University of London
Kiri Ross-Jones	Royal Botanic Gardens, Kew
Simon Schaffer	University of Cambridge
Michaela Schmull	Harvard University Herbaria
Anne Secord	University of Cambridge
Lindsay Sekulowicz	University of Brighton
Vanessa Sellers	New York Botanical Garden
Kate Teltscher	University of Roehampton
Thaïsa Way	Dumbarton Oaks
Rachel Webster	Manchester Museum

The main workshops took place on 1 July and 21 July 2021. Follow-up workshops were held on 18 November and 2-3 December 2021.

APPENDIX E

Project team and partners

Project team

Felix Driver	Royal Holloway, University of London	Principal Investigator
Caroline Cornish	Royal Holloway, University of London	Co-Investigator
Mark Nesbitt	Royal Botanic Gardens, Kew	Co-Investigator

Partners

Yota Batsaki	Dumbarton Oaks, Harvard University	Executive Director
Elena Canadelli	University of Padua	Associate Professor
Michaela Schnull	Harvard University Herbaria	Director of Collections