THE ROYAL SOCIETY

Submission to the House of Commons Science and Technology Committee one-off evidence session on the future of the Royal Botanic Gardens, Kew

Summary

1. As the UK's national academy of science the Royal Society welcomes the opportunity to submit a statement to this inquiry. This draws on the advice of Fellows expert in relevant scientific fields, science policy and research management. Preparation of this response was led by Sir John Skehel, Vice President and Biological Secretary of the Royal Society.

- RBG Kew constitutes a critical part of the UK's science infrastructure. The collections at RBG Kew are among the largest in the world and an irreplaceable resource of significance and historic importance. The collections, together with the associated human expertise, make RBG Kew the world's most important single centre for the study of plant systematics and related sciences. The plant biodiversity informatics that Kew provides underpins much of the UK's overall strong position in plant biology, ecology and conservation.
- Plant science will play a major role over the next century in mitigating several of the most important challenges faced by human society such as climate change, hunger and biodiversity loss.
- The plant science community in the UK is relatively small, but extremely well-regarded internationally. Several of the world's leading plant science resources and experts are based in the UK
- As with all major science infrastructure, stop/start funding risks eroding RBG Kew's value and effectiveness. RBG Kew needs ongoing, stable operating and capital investment within which to develop a long-term strategy to enable it to deliver. There are various models that could provide this. These should be thoroughly assessed to identify the best route for RBG Kew's future.
- RBG Kew operates in an area of science which is rapidly changing. The use of modern information and communication technology is radically altering the way information-rich sciences can deliver knowledge, advances in genomics and related technologies are transforming the life sciences, and there is ever greater interest in natural product chemistry. Kew's long-term strategy and resourcing must reflect these opportunities.

Plant science in the UK

2. Plant science will play a major role over the next century in responding to several of the most important challenges faced by human society such as climate change, food security and biodiversity loss.

3. Many important areas of the world for botanical research lack well-developed local infrastructure in plant science. In part because of the legacy of empire, the global collections of plants and animals in the UK, and their associated human capital, are of world leading importance and facilitate research on taxonomy, systematics and biodiversity in countries where it would otherwise not be possible.

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5. Successful plant science needs a balanced portfolio of research in three broad and increasingly interconnected areas – fundamental life processes in plants, the diversity and variety of plant life and the role and functioning of plants within ecosystems. While the first and third areas are well supported by

research councils, plant and fungal systematics have been in decline in universities—with some exceptions—meaning that much of the UK's capability and expertise is concentrated in a small number of institutions, including the Royal Botanical Gardens at Kew, the Royal Botanical Gardens at Edinburgh and the Natural History Museum.

The importance of the collections and science at RBG Kew

6. The collections at RBG Kew are among the largest in the world and a resource of historic importance and global significance, most of which are irreplaceable. They comprise living and preserved collections in the gardens at RBG Kew and at Wakehurst Place, the Millennium Seed Bank and the Mycological Herbarium. RBG Kew is the only facility anywhere in the world with such a broad range of collections comprising such a wide sample of global plant diversity. The seed banks of the CGIAR System and Global Seed Vault in are focused solely on the subset of plant species that are covered under the International Treaty on Plant Genetic Resource for Food and Agriculture. Kew's Millenium Seed Bank does not include crop plants but critically an extensive collection of crop wild relatives. The RBG Kew library and archives are also globally significant.

7. The collections overall represent a fundamental contribution to the national strategic capacity, and are also an international resource. The unique strength of the collection places an international responsibility on the UK to preserve and develop them and make them accessible to the rest of the world.

8. The collections and the associated human expertise at Kew constitute a critical component of national science infrastructure that facilitates research in plant biodiversity at Kew, in the UK and throughout the world. Staff perform both curation and research activities associated with the collections focusing in five key areas: comparative plant and fungal biology, conservation science, natural capital, plant health and biodiversity, and biodiversity informatics and spatial analysis. RBG Kew is therefore unmatched in its potential to do collections-based research on plants and fungi. Taxonomy and systematics research underpins UK plant science and mycology and it is fundamental to many other disciplines. Genomics and related technologies will increasingly add value to the collections and the research will continue and grow in significance via, for example the development of new science for sustainable food production and novel pharmaceuticals. On a macro level, the collections underpin research into global ecological processes which are important in regard to global climate and ecosystem change.

9. RBG Kew also has an important role in the practical conservation of plants in the developing world. There is a long history of work in a number of the extremely threatened biodiversity 'hot spots' around the world, for example Madagascar and various countries in South and Central America, and South East Asia. The record of scientific and societal service in these areas provided by Kew science staff is world class and affords special relationships in many developing countries.

10. The Millennium Seed Bank was established by RBG Kew in 2003 and now holds seeds from 13% of the world's wild plant species, with the aim of holding 25% by 2020[1]. The Millennium Seed Bank is now a partnership with 80 countries worldwide and represents an example of RBG Kew's international leadership.

11. The international reputation of Kew is one of the UK's strongest scientific brands, for example RBG Kew played a central role in the global effort to revise traditional plant classification, informed by application of genetic data. Work in this area is important to our involvement in international discussions about

[1] http://www.kew.org/science-conservation/millennium-seed-bank [accessed 27 November 2014]

climate change, ecosystem services, biodiversity and conservation. This is an area in which the UK has international influence.

12. The work carried out at RBG Kew relies on the strength of its collections. The significance of RBG Kew's scientific work in plant and fungal systematics has increased progressively over the last few decades as this has declined in the University sector and is important for the UK's overall strong position in plant biology, ecology and conservation. RBG Kew is critical in maintaining the UK's capabilities in these areas and plays an important role in training the next generation of plant biodiversity scientists. The cadre of foreign students trained by Kew, especially from developing countries, greatly benefits biodiversity science in their home countries.

13. RBG Kew already has many collaborations with the research community and there is scope for it to be more proactive in 'selling its wares'. Increased collaborations will be critical for Kew to use its collections and expertise to capitalise fully on recent advances in ICT, molecular biology and natural product chemistry.

Effects of budget cuts on scientific infrastructure at RBG Kew

14. Before the announcement of temporary additional funds for 2014/15 in September, a process of restructure in RBG Kew was put in place that will remove 125 full time equivalent posts. This process is intended to generate savings and strategically focus RBG Kew's resources on its core competencies and unique capabilities, the intention being to lay the foundation for better science at RBG Kew in future to both meet UK commitments and increase the ability to attract external funding.

15. The long-term impact of this re-structuring on the quantity and quality of science undertaken at RBG Kew has still to be determined and it is therefore difficult to predict the effects of any future cuts. However RBG Kew now has reduced capacity to absorb cuts and if these were to occur, they would almost certainly impact on RBG Kew's core functions.

Government's obligation to maintain Kew

16. As a body set up under statute, the UK Government has a primary role in ensuring that RBG Kew is adequately resourced to fulfil its statutory obligations. However these obligations represent just part of the functions the organization undertakes. This financial responsibility is presently met by a grant-in-aid from DEFRA, which represents a large fraction of Kew's funding. Kew raises additional resources from public and private research funders and through philanthropy but it would not be possible to maintain Kew's core science infrastructure without ongoing government funding.

17. DEFRA took the decision to cut its grant-in-aid for RBG Kew in part due to budgetary pressures within the Department. The Society recognizes that such short-term pressure is difficult to manage however maintenance of the collections and associated human capital at RBG Kew requires long-term, reliable funding. Short-term financial issues must not be allowed to put key scientific infrastructure in the UK at stake.

The future of science at Kew

18. The Society notes that the senior management team at RBG Kew are continuing to implement substantive restructuring plans. A period of stability will be needed for new structures to become embedded, for confidence to be established, and for new funding sources to be identified and secured. A

long-term strategy is needed to enable RBG Kew to develop its inherent resources to maximise their value to science, allowing it to be proactive as well as reactive. There are major risks from continued uncertainty and disruption that should be minimized in the near future.

19. The financial challenges faced by RBG Kew this year were in part due to budgetary pressures on its sponsoring Department, DEFRA. The Society cannot comment on the competing priorities for funding within DEFRA but wishes to highlight the importance of placing RBG Kew on a sustainable stable footing. The current difficulties might present an opportunity to make a broader assessment of how best Government can both fulfil its statutory obligations to RBG Kew and enable the excellent science at RBG Kew to be supported and promoted.

20. The Society does not wish to recommend a particular course of action for RBG Kew. Instead, it highlights possibilities that might warrant further exploration, as part of a more thorough assessment of the future of RBG Kew. Were such an assessment to be undertaken, the Society would be prepared to provide advice where appropriate.

Possible futures for RBG Kew

21. **RBG Kew and the priorities of its sponsoring Department**
Wherever RBG Kew sits, it is important that its role as a valuable part of the UK's scientific infrastructure is recognized. Its sponsoring Department should be willing to take a broad view of the strengths of RBG Kew, including basic, core science, public engagement and its national and international role. Without this there is an ongoing risk that RBG Kew funding may be squeezed in tension with other Departmental priorities.

22. **Opportunities for further synergy between RBG Kew and the Natural History Museum**
RBG Kew serves a triple role as a visitor attraction, a collections-based research institute and a provider of UK science infrastructure. This arrangement is not dissimilar to that at the Natural History Museum. In exploring future governance models for RBG Kew it may also be worth considering their application to the NHM and vice versa. There is some overlap in the areas of research conducted at RBG Kew and NHM, so there may also be opportunities for further synergy across the two institutions.

23. **Improving external assessment of RBG Kew research**
RBG Kew currently assesses the quality of its science through external science audits. There are opportunities to make this external review more rigorous and independent, and so more useful for the organization.

24. **Increasing collaboration**
RBG Kew has an extensive network of national and international collaborators and as a provider of critical UK science infrastructure it must continue to pay special attention to the ease with which its collections and other resources can be accessed by the wider academic community, including Universities and Research Institutions in the UK as well as overseas organizations. Access for and collaboration with external scientists help the UK to get the most from this resource. RBG Kew has begun a major digitization process which will improve this access and is the lead player in the development of the World Flora Online. Long-term investment will be needed to establish and accelerate these processes.

25. **Providing stability**
The situation at RBG Kew is illustrative of a wider issue, that scientific infrastructure requires ongoing,

stable investment alongside investment in skilled people to ensure it can deliver[2]. Stable investment at RBG Kew would allow the exploitation of opportunities for collaboration and the use of genomics and boost the scientific value of the collection.

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[2] Royal Society (2014) *Response to BIS Consultation on Proposals for long-term Capital Investment in Science and Research* https://royalsociety.org/policy/publications/2014/consultation-response-long-term-capital-investment-science-research/