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Project title: Observing ferns in the wild and in botanic gardens

Location: Scotland, UK

Dates: 20 October 2025 to 1 November 2025

Project description:

I planned a 2-week trip in Scotland to increase my working knowledge on ferns because I work as a botanical horticulturist looking after the fern and temperate rainforest zones in a display glasshouse, the Princess of Wales Conservatory, at Royal Botanic Gardens, Kew. I spent 5 days with members of the British Pteridological Society (BPS), looking at ferns common in the Scottish Borders, visiting gardens and attending lectures at the BPS national meeting. I work shadowed botanist Dr. Michael Sundue at Royal Botanic Garden Edinburgh, for a day, to look at his research papers and herbarium specimens. For the remaining days, I visited 2 more botanic gardens, with guided tours from the horticulturists, and natural areas, including 2 temperate rainforests.

Natural areas visited:

Carrieffran

Cramond Island

Crinan Wood

Loch Skene

Raking Gill

River Almond Walkway

Taynish National Nature Reserve

Gardens visited:

Benmore Botanic Garden

Craigieburn gardens

Dawyck Botanic Garden

Glasgow Botanic Garden

Holyrood Park

Royal Botanic Garden Edinburgh

Achieved outcomes:

1. Develop my fern identification skills

Before meeting with the experts at BPS, I attempted to identify ferns I saw on Cramond Island using the Collins wild flower guide and Field Studies Council's Common ferns guide, with limited success, because some ferns display some features from one species and also others from another species, according to the written descriptions. When I discussed this problem with fern specialists, I learnt that some species have many forms, and hybridisation is common in the wild. The best way to identify the ferns would be to look at all the forms of the genus in the whole area first, then if we find the extreme of 2 forms which match the description of 2 species, anything in the middle is a hybrid. To confirm this, we can take a fertile frond to a microscope, under which we can see that a hybrid produces distorted, non-viable spores.

We looked at a lot of *Dryopteris*, which to my untrained eyes look very similar; even after looking at them for 3 days under the guidance of experts, I could still only occasionally identify them correctly. Three months after the trip, as I looked through my photographs and compared them to my notes for writing this report, I found that I am unable to decipher which species of *Dryopteris* are in my photos. Unfortunately, this is a skill I would need to learn from joining more BPS field trips.

However, I picked up on other subtle skills in identification, such as:

- The degree of frond division can be counted by the number of different midribs (costa, costule) in the frond, not including the rachis.
- The lowest pinna and the first segment are most useful in identification, in comparison to the tip of the frond.
- The proportion between the stipe and lamina, the size of gaps between pinnae, the position of the widest pinna in the frond, and the cross section of the stipe are all useful information.
- The location, environment and habitat of the plant are important for identification too, which is why it is hard to name a specimen with unknown provenance in an artificial environment such as a glasshouse.

Here are a few ferns common in Britain which have more distinct forms:

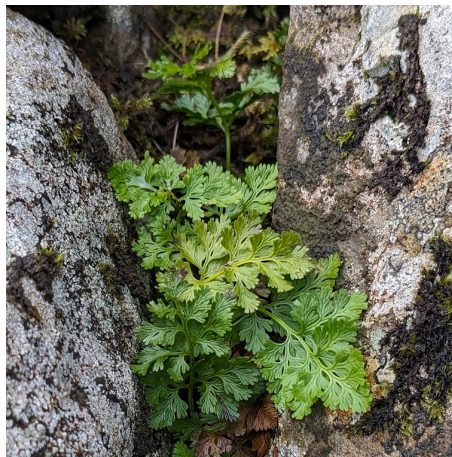
Blechnum spicant (hard fern)

- Sterile fronds form a rosette
- Fertile fronds look different (dimorphic)



Cryptogramma crispa (parsley fern)

- Dimorphic
- Grows on scree



Polystichum aculeatum (hard shield-fern)

- All *Polystichum* have distinctive 'thumb' in each segment



Pteridium aquilinum (bracken)

- Deciduous
- Up to 2 to 3 m tall
- Spreads widely by creeping rhizome



When I met with botanist Dr. Sundue, he showed me the best way to take photographs of a fern specimen, select important pieces for pressing and mounting, and to describe information not visible from the specimen (e.g. location, habitat, form; and if the frond is too large to be pressed entirely, to include additionally the length of stipe, length and shape of frond, number of pinnae) in writing for the label. I also learnt how to read the tree of life and find out about the features that distinguish different genera within a family from scientific journals.

Conclusion

The most important lessons I learnt are:

- How to record (in photographs, writing and pressed specimen) the important features of a fern when I need to get it verified for identification by botanists.
- What to look out for when I compare living ferns in the glasshouse to pressed specimens in herbariums, to confirm if they are labelled correctly.
- When I request wild collected fern spores to add to our living collection, I will try my best to find out the location and habitat from which they were collected, to ease future verification.

2. Develop my fern display skills

While visiting the glasshouses in various botanic gardens and the temperate rainforests, I am most inspired by how horticulturists built stone walls and arches to display ferns and lycophytes vertically, creating a fuller and more natural display than what I did at work (filling gaps in the ground).

Benmore Botanic Garden

- Ferns of different heights are planted together to fill up the vertical space.
- Some ferns and moss naturally colonise walls and shelves.



Glasgow Botanic Garden

- The horticulturist built stone walls, arches and slopes himself from concrete, scaffolding poles and planks, soil and coir to display ferns and lycophytes vertically.



Royal Botanic Garden Edinburgh

- Huge varieties of plants (including small shrubs) are mounted on each arch and tree trunk.



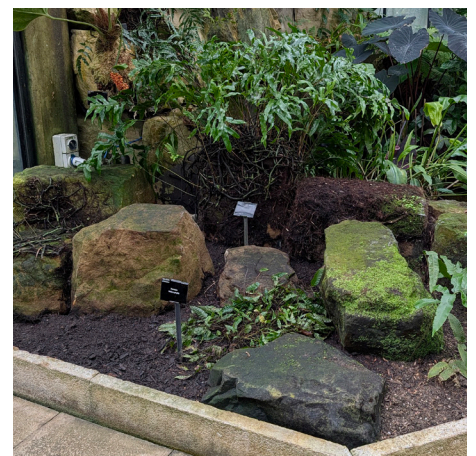
Crinan Wood

- Tree branches and rocks are all covered in moss, lichen and ferns.



Conclusion

Thanks to this opportunity to visit other glasshouses and nature areas, I feel more equipped to further improve my planting in the glasshouse. After I returned from this trip, I mounted new epiphytic ferns on the vertical surfaces of walls, rocks and tree fern trunks; and reduced the size of an overgrown *Polypodium* to expose lots of rocks and soil space for layered planting in the future.



3. Improve on my fern knowledge

From attending lectures in the BPS national meeting, I learnt about Royal Botanic Garden Edinburgh's conservation project of reintroducing *Woodsia ilvensis* (classified endangered) in Scotland, and their decision to use hybrids from plants collected from both native (Scotland, England, Wales) and foreign (Switzerland, Norway, Canada) provenances to increase their success rate in self-regenerating in the wild.

I was also particularly interested in the lecture by Dr. Sundue who discovered that epiphytic ferns evolved from terrestrial ancestors after they moved up from lowland to montane forests, where the habitats between epiphytes and terrestrial plants are less distinct, and hemiepiphytic ferns evolved from epiphytic ancestors after they migrated from higher altitude back to lowland.

Conclusion

I really enjoyed listening to everyone generously sharing their work experience with ferns because it made me feel more enthusiastic about my work. I also feel more confident in knowing that there are many people with expertise in ferns whom I could contact when I need help in the future.