

Arboriculture in Northeast America



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Acknowledgements

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Trip overview

The Northeast of America is home to a plethora of world renowned gardens, arboretums and urban parks. Many of these feature carefully curated tree collections that are managed by expert arborists with a wealth of knowledge. This would therefore be a perfect location for me to visit, learn new skills and expand upon my limited tree knowledge.

My trip began in Pennsylvania where I spent 10 days working alongside the arborists at the Morris arboretum, getting involved in their day to day work and being able to fully immerse myself in a unique tree collection which featured many stand out specimens. From here I would take a short train up to New York where I would spend 4 days visiting various sites including Central Park, New York Botanical Gardens and Brooklyn Botanical Gardens. Finally I would finish my trip in Boston where I had the pleasure of visiting the Arnold arboretum.

The primary goals of my trip were:

- 1) Gain valuable experience working with arborists from outside the UK to learn new arboriculture practices and expand my arboricultural knowledge.
- 2) Visit multiple different gardens and arboretums with the aim of viewing some unique specimens and learning about tree species I am unfamiliar with.
- 3) View trees in other urban landscapes besides Kew and observe management practices and species selection. I was particularly interested in seeing if climate changes were influencing management and species selection of new trees.

The Morris Arboretum

The first part of my trip involved working at the Morris Arboretum located just outside of Philadelphia in the state of Pennsylvania. The Morris Arboretum is a 92 acre public arboretum established in 1887 by siblings John and Lydia Morris, children of a prominent local Quaker family, who carefully cultivated an initially barren landscape into a diverse collection of trees and shrubs from all across the temperate world. Upon Lydia's death in 1932 the arboretum was left to the University of Pennsylvania, opening officially to the public in the next year in 1933 as per Lydia's wishes. The arboretum is now home to over 11,000 plants including several truly remarkable specimen trees which I was fortunate enough to see. This included the arboretum's signature *Cercidiphyllum japonicum*. Planted in 1902, this impressive specimen boasts a spread of roughly 96 feet with one of the larger lower limbs now being supported by a wooden X brace to help stabilize this ageing ground reaching limb and prevent it from failing. I was told this was inspired by a recent visit to Burnham beeches in the UK, a site that has many well preserved and managed veteran trees. The arboretum also features a dense grove of *metasequoia glyptostroboides*, a species of tree that is a particular favourite of mine because of their beautiful shape and impressive growth rate. Growing in ideal temperate conditions, adjacent to moisture providing stream bed and facing competition from each other, quite a few of these trees are already over 100 ft tall some of which were planted as recently as 1975.

The arboretum's trees are managed by Chief arborist Peter Fixler, assistant arborist Andrew and their apprentice Brendan. Peter and Andrew both have over two decades worth of experience and knowledge and so they were able to guide me through some tasks that I had no prior experience with. This included helping to install a dynamic cable bracing system in a *Quercus bicolor* which we installed to prevent a potentially problematic stem union from overextending during periods of high wind

loading. I also had the opportunity to help install a very different bracing system which involved drilling through the partially split stem of an *Ulmus parvifolia* and inserting a metal rod which was screwed in place to pull the stem back together and reduce the risk of it splitting further and failing entirely. Bracing is a practice, particularly metal bolt bracing, that is not as commonly used here in the UK so it was a unique opportunity to gain first hand experience at it. It is definitely a good alternative to consider when dealing with problematic branch unions and union tears as opposed to making reduction cuts or entire removals as it can help preserve specimens and mitigate future risk both of which are important factors to consider when working in an arboretum.

Structural pruning was another new practice that I was able to gain some experience with as I had the opportunity to help prune some young *Quercus palustris* trees within the arboretum's wetland area. Structural pruning is a task they carry out at the Morris on most young trees and is done on multiple occasions during a tree's early development. The goal of structural pruning is to encourage young trees to put their energy into growing one central stem leader and to remove any branches that could become an issue in the future. It is performed when trees are young so as to keep the size of the pruning wounds small enough so that they can be effectively compartmentalized and sealed over with wound wood quickly. In practice this means reducing or removing less favorable central stems and leaving the desired central lead stem intact, removing crossing branches and those that have formed weak branch unions, and reducing larger side limbs with the hope of eventually removing them to stop the development of heavy side limbs which are more prone to failure when trees mature. This was another useful learning experience as it is something we do not usually consider doing on our younger trees and instead they are often left untouched letting them take their natural form. I think this practice of structural pruning could be applied effectively to certain young trees in high-risk areas of the gardens that are exposed to high visitor foot fall as it may help to reduce the likelihood of future limb failures.

The arboretum, along with all of the other places that I visited along the Northeast, face threats from many different pests and diseases including beech leaf disease and emerald ash borer both of which are particularly damaging to the native beech trees (*Fagus grandifolia*) and ash trees (*Fraxinus americana* and *Fraxinus pennsylvanica*) respectively. I saw evidence of both when observing beech and ash trees during my trip with many specimens being in significant decline. Beech leaf disease is caused by the pathogenic nematode *Litylenchus crenatae mccannii* which attacks the newly formed buds on beech trees, causing distinct dark bands to form on the resultant leaves, death often occurs within 5 years. The emerald ash borer *Agrilus planipennis* is a highly destructive pest whose infestations can kill mature ash trees within 3-4 years. When discussing how the Morris was managing the effects of both beech leaf disease and emerald ash borer with Peter, he informed me that the use of a phosphite soil drench had been effective in helping beech trees fight off the disease and by injecting an insecticide into the stem of ash trees they were able to target the larvae of emerald ash borer and prevent further damage.

Since 2014, the Morris arboretum has increasingly began to source seed material from warmer and drier regions with the hope that these trees will be more resilient in the predicted future climate of the arboretum. Director of Horticulture Vince Marrocco described how this has included collecting trips to Azerbaijan and even being able to source *Parrotia persica* seeds from Iran. Vince also explained to me how more recently they have begun to think how they can do this more sustainably to reduce air mileage. This has meant sourcing seed material from the drier regions of America in states such as Alabama, Texas and Virginia with the arboretum currently in an experimental phase testing the viability of trees collected from seed in these southern regions such as *Quercus virginiana*.

Central Park

The next location on my trip was New York and the first place I visited was Central Park. Central Park is a huge 843 acre urban park located in Manhattan that features vast wooded areas and plenty of large mature trees many of which date back to the park's initial development in the late 1850s and early 1860s. Whilst here I was able to walk through an elm grove which is lined with mature *Ulmus americana* specimens planted in the 1920s. It was a truly unique experience to walk amongst such a large and healthy collection of elm trees given the devastating impact Dutch elm disease has had on most elm populations in the western world.

New York Botanical Gardens

The following day I traveled up to New York Botanical Gardens where I was able to meet up with the gardens curator of woody plants, Melissa Finley who kindly gave me a guided tour of the gardens before dropping me off to explore the tree collection in my own time and so I took the opportunity to walk through the Thain family forest, a 50 acre portion of the gardens which endured the industrialization around it and is now the largest area of undisturbed old growth woodland left in New York. Walking through the woodland I saw an abundance of native trees including *Carya ovata*, *Betula lenta*, *Acer saccharinum* and the spectacular *Sassafras albidum* which although features mainly as an understory tree, I was instantly drawn to it due to its unique leaf variation.

Brooklyn Botanical Gardens

My final stop in New York was down in Brooklyn at the Brooklyn Botanical Gardens. Here I met Head of Collections Rowan Blaik who generously donated his afternoon to showing me round the 52 acre gardens. Although the smallest garden of my visit, Brooklyn botanics felt so much larger than 52 acres and is packed with many different features including cherry esplanade, the Japanese hill and pond garden, Ginkgo Allée and its historic bonsai museum. I was particularly impressed by two tree specimens whilst walking around the gardens, a gnarly veteran *Pterocarya fraxinifolia* dating back to 1922 and a towering *Celtis occidentalis*. Rowan also pointed out a particularly large *Fagus grandifolia* that although was suffering from beech leaf disease, had responded well to the phosphite soil drench mentioned earlier and is now looking much better than it had in previous years.

The Arnold Arboretum

The final destination on my trip was Boston to visit the Arnold Arboretum, a 281 acre public arboretum established in 1872 making it North America's oldest public arboretum. The arboretum features over 17,000 plants and it was here I was fortunate enough to see their two prized *Franklinia alatamaha*, which sprawl side by side along the arboretums southwest slope on top of Bussey Hill. Grown from cuttings in 1905, they are the largest and oldest specimens left in cultivation with the species becoming extinct in the wild not long after its initial discovery in the late 1700s. I feel very privileged to have seen the two best specimens of an extremely rare species and this was definitely one of the highlights of my trip.

Conclusion

My trip to Northeast America has been highly beneficial for my professional development as an arborist as I learnt new practices and management methods such as installing cable bracing systems and structural pruning. Previously I had no experience with such activities however now I would feel much more comfortable using them here at Kew as in certain situations practices like installing bracing systems can be a great alternative to pruning or removals particularly when working in an arboretum where mature trees play such an important role in the landscape. Being able to visit different arboreturns and gardens on my trip was also very valuable as I was able to see such a diverse range of different species many of which I gained new knowledge about and I now feel much more confident in identifying them. Finally, I would like to thank the Hardy plants society (Kenneth Black Bursary scheme), the Merlin trust and the Bethan-Moxon trust again, my trip would not have been possible without their generous support.

Images



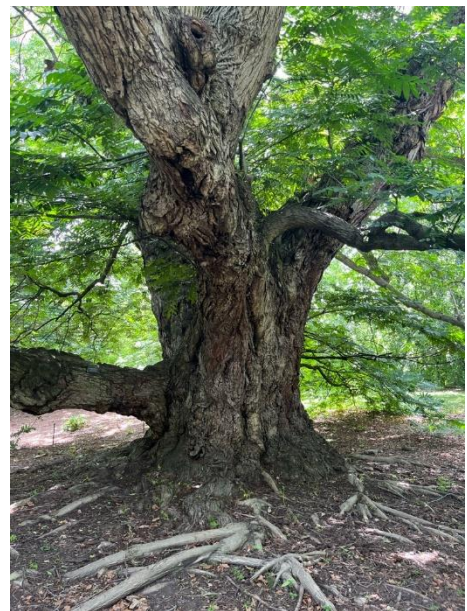
Franklinia althama at the
Arnold Arboretum Boston



Elm grove comprised solely of
Ulmus americana, Central Park
New York City



An impressive *Celtis occidentalis*
growing along the boundary of
Brooklyn Botanic



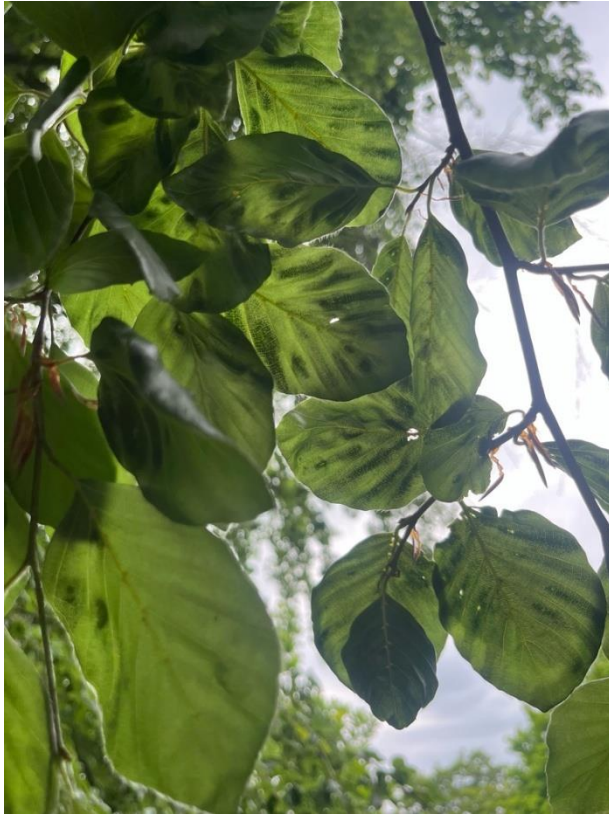
Pterocarya fraxinifolia growing well
at Brooklyn Botanic



A huge *Cercidiphyllum japonicum*
growing at the Morris Arboretum,
Pennsylvania



Sassafras albidum growing as an
understory tree in the Thain family
forest, New York Botanic Gardens



The typical leaf discolouration associated with beech leaf disease. The Morris arboretum.



Installing a dynamic bracing system in a *Quercus bicolor*. The Morris Arboretum.



Two *Fraxinus americana* side by side both with confirmed cases of emerald ash borer, the one to the right had been treated with an insecticide. The Morris Arboretum.