

Paperbark Maple – A New Look at an Old Favorite

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Although it is a well-known and beloved garden plant, *Acer griseum* (paperbark maple) is endangered in its native habitat in China. Despite this, there have been a limited number of introductions of paperbark maple from the wild, with four into the United States, one into the United Kingdom, and one into Finland. As a result of this genetic bottleneck, there is probably limited genetic diversity among the plants in North America or Europe.

With this in mind, I have been working on a project with Kris Bachtell, Andrew Hipp, and Murphy Westwood, colleagues from the Morton Arboretum (Lisle, Illinois), to determine whether the diversity of cultivated plants in the U.S. and U.K. accurately reflects the genetic diversity of plants in the wild, or if further efforts are needed to conserve this species. We have sampled plants of known wild origin in the United States and Great Britain, and travelled to China to sample trees from a number of wild populations. (Sampling means simply taking one or two leaves, and placing them in silica gel, before shipping them to the Morton Arboretum where the DNA extraction and analysis takes place.)

This article will focus on the work that we have completed in the U.S. and U.K. and will be followed by a second installment that highlights our travels in China. In the summer and fall of 2013 we sampled trees throughout the U.S. With support received from The Maple Society and the Chanticleer Foundation, in July 2014 Kris Bachtell and I visited mature trees throughout the U.K., visiting a total of nine locations and sampling 24 paperbark maples.

The five known introductions of *Acer griseum* include two by E.H. Wilson (in 1901 through Veitch and Sons Nurseries, and in 1907 for the Arnold Arboretum), one by the North America China Plant Exploration Consortium (NACPEC) on its 1994 expedition to Hubei Province, seed collected in China for Arboretum Mustila (Elimäki, Finland), and seed received in the late 1980s by Heritage Seedlings (Salem, Oregon).

We began this project by taking leaf samples from trees of known wild origin in the U.S., where there are only a few trees known to have come from Wilson's two collections. While travelling for Veitch Nurseries, Wilson collected seed of *Acer griseum* in October 1901 in Hubei Province, China. Remarkably, there was good germination from this seed, something that is highly unusual for this species, and by 1912 Veitch was offering paperbark maple for sale in its catalogue.

In the early 1900s, it was possible to purchase plants from Europe or Japan, and there are a few known instances of American trees that were purchased from Veitch Nurseries. These include four

trees at Highland Park (Rochester, New York), one tree here at the Morris Arboretum, and two trees at the Arnold Arboretum of Harvard University (actually, the two trees at the Arnold are propagated directly from 1901 Wilson trees.) Subsequently, Wilson collected two seedlings for the Arnold Arboretum in 1907, and these two trees are still alive and well.

Other than this, I know of no other wild collections until the 1994 NACPEC expedition. On this expedition, 16 seedlings were collected, and 10 of these are still alive: four at the Morris, three at the Arnold, and three at the U.S. National Arboretum in Washington D.C. One other tree of wild origin was included - in the garden of plant explorer Dan Hinkley (Seattle, Washington) - although I recently learned that Dan's tree has unfortunately and suddenly died. Our initial DNA analysis included these 20 trees of wild-origin (nine from E.H. Wilson, ten from NACPEC, and one from Hinkley) plus six plants of nursery origin from the Morton Arboretum.

For the next phase of this project, we visited venerable *Acer griseum* specimens in the U.K. The gardens that we visited were as wide-spread as the Royal Botanic Garden Edinburgh (Scotland), Newby Hall and Gardens (North Yorkshire, England), Dyffryn Gardens (Vale of Glamorgan, Wales), and Highdown Gardens (West Sussex, England). This excursion was a wonderful opportunity to visit plant collections that were assembled during the "golden age of plant collecting". Many of these collections include original introductions from China, and together they provide an intriguing insight into the world of collecting 100 years ago. I would like to highlight some of the many gardens that we visited on our two-week trip.

Our trip began in London with visits to The Savill and Valley Gardens of the Royal Landscape, Buckingham Palace, and the Royal Botanic Gardens, Kew. Although there is no longer an original Wilson tree at Kew, there are trees that date to 1928 and 1930, and one of the former is an especially handsome tree growing outside the Princess of Wales Conservatory.

From London we travelled south, stopping first to admire many remarkable trees at Borde Hill, and then further on to Highdown Gardens in Worthing (both in West Sussex). Highdown was developed by Sir Frederick Stern who was noted for his writings, especially his book *A Chalk Garden*. There we were met by head gardener Jo Hooper, who graciously showed us this interesting garden, filled with many wonderful old specimens from Stern's day, but also a thriving, busy garden. We were most impressed by their Wilson *Acer griseum* - a plant purchased from Veitch Nurseries that blew over in the famous gale of 1988, and was uprighted, but still stands today.

From the south coast of England we headed to Cardiff, Wales, and spent a morning exploring Dyffryn Gardens, a fascinating place that has been managed by the National Trust since 2013. If ever there was an epicenter for *Acer griseum*, then it is Dyffryn, which not only holds the holy grail in the

national champion paperbark maple, but numerous other impressive specimens, many of which in their own right would be champions in any other location.

Dyffryn was developed by Reginald Cory, who in the early 1900s created large formal gardens and an extensive arboretum. Along with the immense national champion (diameter at breast height (DBH) = 79 cm / 31 inches), there are trees that seemed to date from each successive generation at Dyffryn. These include two trees that we sampled with DBH of 58 cm (23") and 61 cm (24"), and many trees of smaller sizes.

Not too far from Dyffryn is Westonbirt Arboretum, familiar to many of our readers for its famous and extensive maple collection. Mark Ballard and Dan Crowley showed us around and pointed out a few particularly interesting paperbark maples. My favorite was a tree near their Down Gate, which after parsing through their records we realized was from the Wilson 1901 collection. This open-grown, broad-crowned tree had a DBH of 56 cm (22"). I had last been to Westonbirt in 2011, and was amazed by the progress made in the intervening three years. On this day, we had only a long afternoon to spend, so we made a point of returning at the end of our trip to spend a few more hours (still not enough time) touring their remarkable collections (and even looking at more than maples!).

From Tetbury, we travelled through beautiful countryside to Hergest Croft, the Herefordshire garden of Lawrence and Elizabeth Banks, which marches on the Welsh border. Hergest is well-known for the alleé of *Acer griseum* that runs up to the house, where one is greeted by a pair of container-grown paperbark maples. Elsewhere in their mature arboretum are two trees that originated from the renowned horticulturist Vicary Gibbs. Gibbs' original tree, mentioned in W. J. Bean's *Trees and Shrubs Hardy in the British Isles*, was certainly a Wilson collection, and is long gone; so these two trees give us a glimpse into the origin of that tree. Along with a memorable collection of champion trees, we visited their new arboretum with many unusual plants from modern explorations to China and elsewhere.

After spending an enjoyable Sunday visiting Spetchley Park and Arley Arboretum (both in Worcestershire), we headed north to Royal Botanic Garden, Edinburgh. We had a few days to explore the various aspects of this great botanic garden, namely their living collections, library, and herbarium, and all three of these resources helped us in this research project. Greeting us at RBGE was Peter Brownless, whose wealth of knowledge and experience were of great assistance during our visit. There were three *Acer griseum* of specific interest at Edinburgh, with the largest and best known of these (DBH= 58 cm / 23") standing across from the Palm House. Nearby is a tree that Edinburgh received in 1938 from Admiral Sir (Archibald) Berkeley Milne, an avid horticulturist, who commanded the British Mediterranean Fleet at the outbreak of the First World War. The third tree was perhaps the most intriguing one. In Roy Lancaster's *A Plantsman in China*, he mentions having

seen an old specimen of *A. griseum* in the garden of George Forrest's home. Forrest lived in many locations, but the house in question backs up to the Botanic Garden. In May of 2014 Peter Brownless was able to sample this tree for us. When we visited the owners were away, so we could only peer over the garden wall and see the top of the tree. How it got there is something of a mystery but with a DBH of 48 cm (19") it is an impressive specimen.

Heading south from Edinburgh we stopped at Newby Hall and Gardens, one of the most beautiful gardens that Kris and I have visited throughout the U.K. The assistant head gardener and propagator Ian Forbes toured us through this remarkable place, and in particular showed us a trio of paperbark maples that were planted in the 1930s and likely represent the next generation of seedlings from the first introduction. Nevertheless, this grouping was one of my favorite on the trip, and if you are near Newby Hall, the paperbark maples are not the least of the reasons to visit. Before finishing our journey south we stopped and visited Castle Howard and the extensive collections at Ray Wood and the Yorkshire Arboretum. As I mentioned previously, from there we returned to Westonbirt to organize our samples and returned to the U.S. after a busy but exhilarating trip.

These samples from British and American gardens have been analyzed by Andrew Hipp. The results show that as expected, all of the trees in the U.K. have resulted from Wilson's 1901 Veitch collection. The results verify that the seven American trees also from the 1901 collection are closely related to those throughout the U.K. An unexpected result is that the six trees of nursery origin (at the Morton Arboretum) are also related to Wilson's first collection. Not surprisingly, plants grown from the 1907 and 1994 collections are more closely related to each other than to those from 1901.

As part of the second phase of the project, this past September we sampled wild populations of *Acer griseum* across its native range in central China where we had identified locations in eight provinces. Dr. Kang Wang of the Beijing Botanic Garden was essential to the success of this trip. We travelled within an approximately 500 mile radius of Xi'an, and visited Chinese populations stretching east to west from Shanxi, Henan, and Shaanxi to Gansu provinces, and south into Sichuan and Chongqing.

Now that we have the Chinese material, the genetic diversity of the leaf samples from wild populations will be compared to those in cultivation. If there is not sufficient representation of wild material in cultivation, then we hope to collaborate with our Chinese colleagues to expand *ex-situ* conservation efforts. By providing an understanding of the number of *ex-situ* collections needed to sufficiently conserve this species, this project will serve as a model and benefit anyone interested in maple conservation.

This has been a rewarding and interesting project, allowing us to delve into the history of plant exploration, visit fascinating places in the U.K. and China, and meet many wonderful people who have

kindly helped our efforts. I would like to thank everyone who has so far helped to make this project a huge success.

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