



# *Acer griseum*

## in cultivation and in the wild

ANTHONY AIELLO looks at a popular maple and starts a project to investigate its genetic diversity in China and in US and UK gardens

IF THERE WAS an 'A-list' for trees, then *Acer griseum*, with its beautiful copper-red bark, bright autumn colour, and usefulness in a diversity of settings, would certainly make it. This well-loved tree is a garden favourite, so it was a shock to see it on the cover of BGCI's *Red List of Maples* (Gibbs & Chen 2009).

Having known and promoted this plant for years, I had not stopped to think that it is endangered in its endemic range in central China. With this in mind, starting in 2013, I began a project, along with several colleagues, to determine whether the genetic diversity of *A. griseum* in cultivation adequately reflects that of trees in the wild. We would then see if further conservation efforts needed to be made.

This project became a journey through the history of the introduction and distribution of paperbark maple into Western cultivation. It was also an exploration of the current status and range of the species across its distribution in China. What developed was a project that has taken me to the UK, both coasts of the US, and across central China. The goal was to take leaf samples for DNA of cultivated trees of known origin and compare them to plants from as many native populations as possible.

Over the years numerous authors have extolled the virtues of *A. griseum*, and one of the best of these is from Vicary Gibbs (1929), who wrote that, 'the nearest approach to a perfect tree that I can think of, which indeed owns "every virtue, every grace"...is *Acer griseum*, which carries lovely foliage with a dove-coloured underside, gorgeous autumn colour, polished golden-brown stem and shown to him who has seen the sun shining through the shreds of separated, but not yet dropped, nut-brown bark, a sight for the Gods'.

All photographs by Anthony S Aiello



They are many impressive specimens of paperbark maple at Dyffryn Gardens in Wales (left, above left and above right), and all will be subjected to DNA analysis.

### Introduction history

*Acer griseum* was first collected in 1892 by Père Paul Guillaume Farges (#955) near Chengkou in Chongqing municipality. Based on Farges's collection, Franchet (1894) described it as *Acer nikoense* var. *griseum* before it was elevated to a species by Pax (1902).

Living material was twice introduced to Western cultivation by Ernest Wilson; by seed (Wilson/Veitch #1291) collected in 1901 through James Veitch and Sons Nurseries, and two seedlings (Wilson #719) in 1907 for the Arnold Arboretum. Wilson (1913) describes an encounter with *A. griseum* and wrote that 'Maples in variety are very common, but one large tree of *Acer griseum*, with its chestnut-red bark, exfoliating like that of River Birch, was the gem of all'. The 1901 seed collection was an auspicious one, with unusually good seed germination, resulting in 100

seedlings at the Veitch nurseries (Wilson 1925). It is this collection that forms the basis of the majority of plants now in Europe and the US.

In February 1903, less than two years after Wilson collected seed, Augustine Henry (1903) described *A. griseum* as 'a most remarkable tree', and mentioned that plants were in cultivation at the Veitch Nurseries at Coombe Wood. Only three years later, Henry wrote that these 'young plants at Coombe Wood are about 3 feet high' (Elwes & Henry 1906). For those of us who have struggled to germinate and grow *A. griseum*, it is hard not to envy these early descriptions. Henry is often mentioned (e.g. Veitch 1906) as having collected *A. griseum* in his travels, but I can find no documentation that supports this claim.

It was not long until *A. griseum* started to make its way from Coombe Wood into various collections. Veitch Nurseries first

listed it for sale in their 1912 catalogue, under the heading 'New Hardy Plants from Western China'. Two years before that it was stated (Anon 1910) that 'Messrs. J. Veitch & Sons have sent a very fine collection of Chinese trees and shrubs, including the following rare and interesting species:- *Acer griseum*'. Curiously, VN Gauntlett & Co, Japanese Nurseries, of Surrey listed *A. griseum* in its catalogues in the early 1910s. Because there is no evidence of introductions other than Wilson's, I can only speculate that Gauntlett was serving as a broker, perhaps proffering plants that originated at other nurseries.

As gardeners became more familiar with *A. griseum* they continued to write about its value in the garden. Charles Sargent (1919) wrote 'This is the most distinct and the handsomest of the Maples introduced from China in recent years which have proved perfectly ►

hardy in the [Arnold] Arboretum, but unfortunately it is still extremely rare in western gardens'. This rarity was bemoaned by Euan Cox (1924) who wrote that the supply of *A. griseum* simply did not meet its demand, and that trees were just beginning to produce viable seed, nearly 25 years after its introduction.

### Highly recommended

Despite this, by the 1920s paperbark maple was slowly becoming established in gardens, earning an RHS Award of Merit in 1922 and Award of Garden Merit in 1936 (Hunt 1980; this AGM was re-conferred in 1993). By this time, wanting to set down the story of its discovery, Wilson (1925) wrote that, 'It was May, 1901, that I first saw *A. griseum* and straight-way became captive to its charms. Looking over my notes I find the terse statement – "Hupeh's best Maple". Now, twenty-three years afterwards and with fuller knowledge of the flora of Eastern Asia, I do not find my judgement at fault, though it might be enlarged to read "China's best Maple"'.

Unlike other plants that follow the vagaries of fashion, a half century after its introduction, paperbark maple continued to be sought after and widely recommended. If botanic garden records are any indication of broader trends in horticulture, then those at the Morris Arboretum in Pennsylvania, where I work, illustrate the interest in *A. griseum*. Plants were added to its collection nearly every decade from the 1940s to the 1980s, but mostly sourced from cultivated plants.

### American trees

As mentioned above, this project began in 2013 with sampling of American trees, focusing on those known to have come from Wilson's collections plus other wild-collected



Heritage Seedlings is the largest grower of *Acer griseum* seedlings in the US

plants. The sampling simply consists of taking one or two leaves, and preserving them in silica gel for later DNA extraction and analysis.

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 at the Morris Arboretum, and two trees at the Arnold Arboretum, Massachusetts, that had been propagated directly from 1901 Wilson trees. In addition are two trees at the Arnold Arboretum that Wilson collected as seedlings in 1907.

Other than this, I know of no other wild collections until the 1994 North America China Plant Exploration Consortium expedition to Hubei. Ten of the seedlings collected are still alive at the Morris Arboretum, Arnold Arboretum and the US National Arboretum.

### UK specimens

For the next phase of this project, Kris Bachtell of the Morton Arboretum, Illinois, and I visited venerable *A. griseum* specimens throughout the UK in July 2014. The gardens that we visited included Royal Botanic Garden Edinburgh (Scotland), Newby Hall and Gardens (North Yorkshire, England), Dyffryn

Gardens (Vale of Glamorgan, Wales), Hergest Croft (Herefordshire), Westonbirt Arboretum (Gloucestershire, England) and Highdown Gardens (West Sussex, England). Many of these collections include original introductions from China, and together they provide an intriguing insight into the world of collecting 100 years ago.

A few trees and locations made a great impression. Among these were a number of paperbark maples at Dyffryn Gardens, managed by the National Trust since 2013. If ever there was an epicentre for *A. griseum*, then it is Dyffryn, which not only holds the UK champion paperbark maple, but numerous other impressive specimens, many of which would be champions in their own right in any other location.

One of the most remarkable plantings from the mid 20th century is the avenue of trees that lines the drive at Hergest Croft in Herefordshire. These trees were received from WJ Marchant nursery in Dorset and planted in the mid 1950s (Lawrence Banks, pers. comm.).

Sir Frederick Stern (1957) wrote that 'The best colouring maple in the garden is *Acer griseum*...the leaves turn a wonderful colour of bronze-



An avenue of *Acer griseum* at Hergest Croft was planted in the 1950s (above left). The specimen at Highdown (above) and the one at Westonbirt (left) are from the Wilson 1901 collection.



The third tree is perhaps the most intriguing one. It stands in the rear garden of one of George Forrest's many homes (Lancaster 2008) which abuts the yard of the botanic garden. How it got there is something of a mystery but it is an impressive specimen.

### In the wild

In September 2015 we completed the next step of the project, which was to sample wild populations of *A. griseum* across its native range in central China. Together with Kris Bachtell, Michael Dosmann (Arnold Arboretum, Massachusetts) and Kang Wang (Beijing Botanical Garden), I explored within an approximate 800km radius of Xi'an, the capital of Shaanxi province. Our travels took us to paperbark maple populations in five provinces: Chongqing, Henan, Shaanxi, Shanxi and Sichuan.

The trip was especially informative because we witnessed a wide range of conditions and habitats across the range of *A. griseum*. In total, we came away with 66 samples of paperbark ➤

red and gold in the autumn and it is attractive all the year round with its brown-red peeling bark'. The young plant that Stern purchased from Wilson's 1901 collection is a beautiful specimen, albeit upright and staked after the gale of 1988, at Highdown in Sussex, the garden he established. This tree is testimony to the longevity and durability of *A. griseum*, and serves both as an important source of germplasm and an insight into the conservation value of living and documented collections. It was one of the most impressive trees that I visited in summer 2014 as part of the

*A. griseum* conservation project.

At Westonbirt Arboretum, among the extensive *Acer* collection, is a lovely open-grown *A. griseum* near their Down Gate. After examining their records we realized it was from the Wilson 1901 collection.

Finally, at RBG Edinburgh, there were three *A. griseum* of great interest. The largest and best known of these stands across from the Palm House, while nearby is a tree 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.



In deciduous forest in Henan many paperbark maples cling tenaciously to rock outcrops



The largest specimen seen in China was this one in Shaanxi, just left of the centre of the photograph

maple, from nine locations in five provinces. Visiting the isolated populations, often a day's drive apart, provided a graphic understanding of what it means for a species to be endangered. In some of the sites we encountered trees scattered across a wide area, while in other sites there was a high density of trees in a restricted area. In most situations we encountered very few young seedlings, indicating a possible reason for the species' decline. We also observed that there was great uniformity in the leaf shape, bark, and habit of trees, something that is also seen among cultivated plants.

There were many highlights on a trip such as this. One was in Chongqing, near where Farges had been in the 1890s, where a group of trees grew on a hazardously steep slope covered in loose shale. Although on private land, and despite being coppiced for firewood for several decades, they had resprouted and maintained remarkable vigour, stretching for light and

competing with *Quercus aliena*.

Another location was in southern Shaanxi. Although only 70km as the crow flies from the site in Chongqing, even with modern highways and countless tunnels, it was an eight-hour drive through mountainous countryside. In this case we were looking for a tree (designated SHX-018) that was described on the 1995 NACPEC expedition (Meyer 2010). Driving three hours south from the city of Ankang we arrived in the small village of Long Shan Cun at Baixian Forest Station. It did not take long to find the same massive tree, growing next to a small farmhouse along with several seedlings. This was by the far the largest tree that we saw in China; it first branched at 4m, had a diameter at breast height of 84cm, and was 30m tall. An added bonus in this village was finding an enormous *Corylus fargesii*, from which we were excited to make a seed collection (Aiello 2016).

A third population, in western



The first branches of the large specimen in Shaanxi emerge at 4m above the ground

Henan, was near where Josef Hers collected a number of herbarium specimens between 1919 and 1924. Near here, we visited Baotian Man Nature Preserve. Here, in a beautiful mixed deciduous forest of *Acer davidii*, *Carpinus cordata*, *C. turczaninowii*, *Cornus kousa* and *Quercus aliena* subsp. *acutiserrata*, we first encountered paperbark maples as we had come to expect them – perched on the edge of rock outcrops and stretching for the light. But then we found the healthiest population of our trip. Growing for a few hundred metres along either side of a small stream valley was a group of well over 100 trees. These were of all sizes, from seedlings and mid-sized trees a few centimetres in diameter, to mature specimens as large as 37cm diameter at breast height. This area was unlike anything that we had seen previously, with the mixture of sizes and ages indicating a healthy population actively recruiting young seedlings.

### American seedlings

The sampling phase of the project concluded in July 2016 when I visited the Pacific Northwest in the US. There I visited Heritage Seedlings (Salem, Oregon), the North Willamette Research Station (Aurora, Oregon), and Washington Park Arboretum (Seattle, Washington).

Heritage Seedlings is the largest grower of paperbark maple seedlings in the US. They have produced 200,000 since 2011, and similar numbers since the late 1990s (Eric Hammond & Mark Krautmann, pers. comm.). Although our molecular work should sort this out, the original sources of seed at Heritage Seedlings were two older trees at North Willamette Research Station of unknown origin, seed from Highland Park Arboretum in Rochester, and perhaps trees that came from Beijing Seed Company that were probably collected in Henan.

### Analysis

Now all sampling is complete, Dr Andrew Hipp of Morton Arboretum will be analysing the DNA of the cultivated trees to answer our first question of how much genetic diversity is represented in cultivation. Early results support the idea that Wilson's 1901 collection provides the basis for all trees in the UK and most of what had been in the US in the 20th century. Once we have full results we can make decisions about the next steps for conservation efforts.

### Conclusion

Working with *A. griseum* has provided an opportunity to explore collections that were assembled during the 'golden age' of plant collecting. It has led me to fascinating places across the US, UK and China, which in turn have demonstrated the value of cultivated plants in helping to preserve an endangered species.

One of my impressions of *A. griseum* is of its longevity and resilience, with plants more than 100 years old showing excellent health. But this should not be mistaken for complacency. A message to all gardeners is that it is easy to underestimate the conservation value of even familiar garden plants. The Franklin tree (*Franklinia alatamaha*) is perhaps the best example of how collections in botanic gardens and private gardens can preserve a species. However, with increasing threats to natural habitats, an old friend such as *Acer griseum* has great conservation value in cultivation.

ANTHONY S AIELLO is the Gayle E Maloney Director of Horticulture and Curator of the Morris Arboretum of the University of Pennsylvania.

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