Acer griseum, the paperbark maple

Anthony S. Aiello[1], Kris R. Bachtell[2], Michael S. Dosmann[3], and Kang Wang[4]

Introduction and cultivation

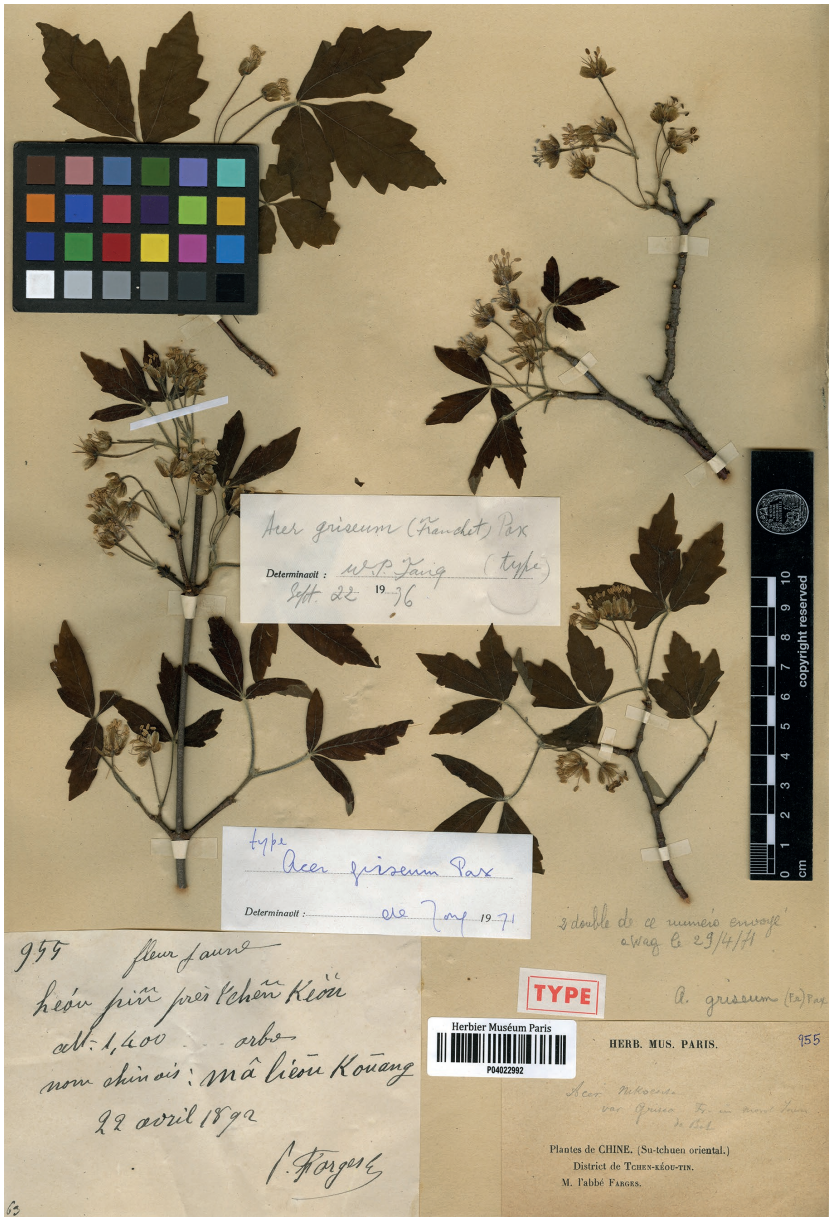
Ever since it came into Western cultivation, numerous authors have extolled the virtues of *Acer griseum*, and a perfect description is that of Vicary Gibbs, who wrote that, '…the nearest approach to a perfect tree that I can think of, which indeed owns "every virtue, every grace"…is *Acer griseum*, 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' (Gibbs, 1929).

As one of the most beloved and desirable small shade trees, *Acer griseum* is well-known for its dense, uniform crown, exquisite cinnamon-copper-colored bark, and excellent orange and bright red autumn color. Less well-known is that despite its popularity, paperbark maple is listed as endangered in its native habitat in central China (Crowley *et al.*, 2020).

The introduction of *Acer griseum* follows a path similar to that of numerous other familiar garden plants from China. It was first collected in 1892 by Père Paul Guillaume Farges (#955) at Héou piu near Tchen Keou (modern day Houping and Chengkou) in what at the time was Sichuan Province and is now Chongqing Municipality. Farges's botanical contributions were remarkable, despite (or perhaps because of) his isolation and deprivation in remote Chongqing. In his decades of botanizing, Farges sent several thousand herbarium specimens to Paris, documenting for the first time numerous well-known garden plants. Plant names honouring Père Farges (*Abies fargesii*, *Decaisnea fargesii*, *Fargesia*, and *Ilex fargesii* to name a few) are numerous, and have become closely associated with the regions in which he collected, indicating the locality, hardiness, and adaptability of these species.

Based on Farges's collection, Adrien Franchet described it as *Acer nikoense* var. *griseum* (Franchet, 1894) noting that it differed from Japanese plants (of *Acer nikoense*, now known as *A. maximowiczianum*) and basing his distinction on the grey leaf undersides and the more coarsely toothed leaflets. In 1902 Ferdinand Pax elevated *A. griseum* to a species, again based on the grey pubescent leaves and petioles ('*folia et adulta cum petiolis cano-pubescentia*') and the divergent samara wing angles ('*fructus, alae angulo fere recto divergentes*') (Pax, 1902). Included with Pax's description is a wonderful line drawing, which as far we can determine, sadly was lost in Berlin during World War II.

[1] Longwood Gardens, Kennett Square, Pennsylvania 19348 USA.
[2] The Morton Arboretum, Lisle, Illinois 60532 USA.
[3] Arnold Arboretum of Harvard University, Boston, Massachusetts 02130 USA.
[4] Beijing Botanical Garden, Beijing, People's Republic of China, China.



The Pax herbarium sheet of Farges's 1892 collection which is in the Muséum national d'Histoire naturelle in Paris.

Living material was twice introduced into Western cultivation by Ernest Henry Wilson: seed collected in Hubei Province in 1901 through James Veitch and Sons Nurseries (Wilson/Veitch #1291); and also from Hubei, two seedlings collected in 1907 (Wilson #719) for the Arnold Arboretum. In *A Naturalist in Western China* Wilson 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' (Wilson, 1913). The 1901 seed collection was an auspicious one, with fortuitously good seed germination, resulting in 100 seedlings at the Veitch nurseries (Wilson, 1925). It is this collection that forms the basis of the vast majority of plants in Europe and in the US, as we will discuss below.

Acer griseum is classified in *Acer* section Trifoliata, which includes other garden-worthy species, from China, Russia, Korea, and Japan (Hsu *et al*. 2008):

- *Acer griseum:* China (southeast Gansu, southwest Henan, west Hubei, northwest Hunan, south Shaanxi, south Shanxi, east Sichuan)
- *Acer mandshuricum*: China (southeast Gansu, Heilongjiang, Jilin, Liaoning, south Shaanxi); Korea; east Russia
- *Acer maximowiczianum* (syn. *A. nikoense*): China (south Anhui, west Hubei, Hunan, north Jiangxi, east Sichuan, northwest Zhejiang); Japan
- *Acer triflorum*: China (Heilongjiang, Jilin, Liaoning); Korea
- *Acer sutchuenense*: China (west Hubei, northwest Hunan, Sichuan); endangered—the rarest maple of this section, not in Western cultivation.

In the early 1900s, with the rapidly increasing number of new introductions from Asia, keen interest in these filled horticultural literature with descriptions of many novel species. Astonishingly, in February 1903, less than two years after Wilson collected his seed, Augustine Henry described *Acer griseum* as 'a most remarkable tree', and mentioned that plants were in cultivation at the Veitch Nurseries at Coombe Wood (Henry, 1903). Only three years later, Henry wrote that these 'young plants at Coombe Wood are about 3 feet high' (Elwes and Henry, 1906). For those of us who have struggled to germinate and grow paperbark maple, it is hard not to envy these early descriptions. Augustine Henry is often mentioned as having collected paperbark maple in his travels (Veitch, 1906) but we can find no documentation that supports this claim.

It was not long until paperbark maple started to make its way from Coombe Wood into various collections with Veitch Nurseries first listing it for sale in their 1912 catalogue, under the heading 'New Hardy Plants from Western China' (Veitch Nurseries, 1912). The 1910 *Kew Bulletin of Miscellaneous Information* states 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*…' (Kew, 1910). Curiously, V. N. Gauntlett & Company, Japanese Nurseries listed *A. griseum* in its catalogues in the early 1910s. Very little is

photograph © Anthony Aiello

Acer griseum (Wilson #719) growing in the Explorers Garden at the Arnold Arboretum comes from a seedling introduced by Ernest Wilson from Hubei Province in China, in 1907.

known about this nursery and because there is no evidence of introductions other than Wilson's, one can only speculate that Gauntlett was serving as a broker, perhaps proffering plants that originated at other nurseries.

As gardeners became more familiar with paperbark maple, they continued to write about its value in the garden, 'a sight for the Gods' indeed. In 1919,

Charles Sargent 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' (Arnold Arboretum, 1919). This rarity was bemoaned by Euan H. M. Cox who described *A. griseum* as '…probably the finest of all maples. It is handsome in summer, turns a fine colour in autumn, and has an added advantage in that its bark peels in large flakes, showing the new orange-coloured bark underneath.' Cox wrote that the supply of paperbark maple simply did not meet its demand, and that trees were just beginning to produce viable seed, nearly 25 years after the plant's introduction (Cox, 1924).

Despite this, by the 1920s paperbark maple was becoming established in gardens, earning the Royal Horticultural Society's Award of Merit in 1922 and Award of Garden Merit in 1936 (Hunt, 1980; this AGM was re-conferred in 1993). By this time, Wilson, wanting to set down the story of its discovery, 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"' (Wilson, 1925).

Unlike other plants that follow the vagaries of fashion, 50 years 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 illustrate the interest and availability of *A. griseum*. Plants were added to their collection nearly every decade from the 1940s through 1980s, but generally represent the shared garden flora, with plants coming from cultivated sources. For example, we received seeds from RBG, Kew in 1949, seedlings from the USNA in 1953, a grafted plant from the Arnold Arboretum in 1955 (derived from a plant purchased by T. A. Havermeyer of Long Island, from Veitch Nurseries, so one of the 1901 Wilson seedlings), and plants from local nurseries in the 1960s and 1980s.

One of the most remarkable plantings dating to the mid-twentieth century is the allée of trees that lines the drive at Hergest Croft (Kington, Herefordshire). These trees were received from Marchants Nursery and planted in the mid-1950s (Lawrence Banks, pers. comm.). Among numerous articles in the Journal of the RHS of this period, Sir Frederick Stern of Highdown Gardens, wrote that 'The best colouring maple in the garden is *Acer griseum*… the leaves turn a wonderful colour of bronze-red and gold in the autumn and it is attractive all the year round with its brown-red peeling bark' (Stern, 1957). The young plant that Stern purchased from Wilson's 1901 collection is a beautiful specimen, still alive and well at Highdown, uprighted and staked after the famous gale of 1987. This tree is a testimony to the longevity and durability of paperbark maple, and serves both as an important source of germplasm and an insight into the conservation value of living and documented collections. Additionally,

The plant of *Acer griseum* which came to the Arnold Arboretum in 1925 vegetatively propagated from a plant purchased by T. A. Haermeyer of Long Island from Veitch Nurseries in 1901.

this tree regularly occurs as the seed source for paperbark maples at other private and botanic gardens.

The *Acer griseum* Conservation Project

As mentioned above, despite its prominence in gardens, *A. griseum* is listed as threatened in its native habitat in China. Having known this plant so well for so many years, it was surprising to learn this. With this in mind, starting in 2013, we initiated the *Acer griseum* Conservation Project to determine whether the diversity of cultivated plants in the United States and United Kingdom accurately reflects the diversity of trees in the wild, or if further efforts were needed to collect and conserve this species. It has been our working hypothesis that plants grown from the 1901 Wilson seed collection are the source of the vast majority of plants currently in commerce and cultivation; if true, this

Left, three *Acer griseum* at Newby Hall in Yorkshire, England, planted in the 1930s and thought to be the first generation of seedlings from Wilson's 1901 introduction.

Opposite, one of many open-grown specimens of *Acer griseum* at Dyffryn Gardens in Wales.

would represent a genetic bottleneck hampering the *ex-situ* conservation of the species but potentially its broader application to horticulture.

This project became a journey through the history of the introduction and distribution of paperbark maple into Western cultivation, and an exploration of the current status and range of the species across its distribution in China. What developed was a project that has taken two of us (Anthony Aiello (ASA) and Kris Bachtell (KB)) to Great Britain, to both coasts of the US (ASA), and all four of us across central China. The goal was to take leaf samples of cultivated trees of known origin and compare them to plants from as many native populations as possible.

Trees in cultivation

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 plants (sampling means simply taking one or two leaves, and preserving them in silica gel, before DNA extraction and analysis take place). 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 of Harvard University (propagated directly from 1901 Wilson trees.).

In addition, there are the two trees at the Arnold Arboretum that Wilson collected as seedlings in 1907. There were no other known wild collections until the 1994 North America China Plant Exploration Consortium (NACPEC) expedition to Wudang Shan, Hubei Province (WD-172). Ten of the 16 seedlings collected in 1994 are still alive at the Morris Arboretum (four trees), Arnold Arboretum (three trees), and the US National Arboretum (three trees).

For the next phase of this project, ASA and KB visited venerable *Acer griseum* specimens throughout the UK in July 2014 (Aiello and Bachtell 2015). The gardens that we visited were as widespread 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). Many of these collections include original introductions from China, and together they provided an intriguing insight into the world of collecting 100 years ago. In addition to those mentioned above, several trees and locations made the greatest impression. Among these were a number of paperbark maples at Dyffryn Gardens, 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 would be champions in their own right in any other location. At Westonbirt Arboretum (Gloucestershire, England), among the extensive maple collection is a lovely open-grown *A. griseum* near their Down Gate, which after parsing their records we realized was from the Wilson 1901 collection. At Newby Hall, a trio of paperbark maples that were planted in the 1930s likely represent the next generation of seedlings from the first introduction.

photograph © Anthony Aiello

A huge *Acer griseum* (left of centre on the photo) in its native habitat in Shaanxi, China. This 30 m tall tree first branched at 4 m and had a diameter of 84 cm.

Finally, at RBG, Edinburgh, there were three *Acer griseum* of great interest. The largest and best known of these stands across from the Palm House; its exact origin is cloudy but its size and stature indicates that it is probably an early introduction. Near to it 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. Again, its age makes one wonder where Milne might have received it. The third tree was perhaps the most intriguing: it stands in the rear garden of one of George Forrest's many homes (Lancaster, 2008) which abuts the 'yard' of the Botanic Garden. This is an impressive specimen but how and when it came to 17 Inverleith Place remains a mystery.

Wild populations

In September of 2015, our focus shifted from cultivated plants to wild populations, travelling to sample *A. griseum* across its native range in central China (Aiello, 2016; Sun et al., 2014). We travelled within an approximately 800 km (500 mile) radius of Xi'an, the capital of Shaanxi Province. Our travels took us to paperbark maple populations stretching east to west from Shanxi and Henan to Shaanxi provinces, and south into Sichuan and Chongqing.

The trip was especially informative because we were exposed to a wide range of conditions and habitats across the range of *A. griseum*. In total, we came away with 66 samples of paperbark 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 density of trees within a very restricted area. In most situations we encountered very few young seedlings, indicating that one reason for the species' decline is a lack of recruitment. Fortunately, *Acer griseum* is a distinctive plant, known by the Chinese as *xue pi feng* or blood-bark maple, and this made it easier to ask for guidance. We also observed that there was great uniformity in the leaf shape, bark, and habit of trees, something that is certainly true among cultivated plants.

photograph © Kris Bachtell

An old coppiced *Acer griseum* growing on a precipitous slope in Chongqing, China.

There are many highlights from that expedition to China, and among these was a location that we visited in far northeast Sichuan Province. Here, paperbark maples were seen regularly but not frequently on a rigorous day's hike along the Swallow Hill trail of at Guangwu Mountain (Seven Fairy Peak). After first finding a much-abused and cut-back tree, we then encountered three large trees of 14, 20, and 31 cm (5.5, 8, and 12 in.) diameter at breast height (DBH), one of which had a few seedlings beneath it. We quickly learned that the growth habits of forest-grown trees are much different than the full and rounded-crowned trees that are so familiar in cultivation. When grown with other trees in a natural setting, paperbark maples are stretched towards the light, often with the first branches many metres from the ground. The trees are also generally found on the edge of cliffs or rock faces, often making access to them precarious.

Another memorable location was in Chengkou, Chongqing, only 100 km from where Farges had made the first collection in the 1890s. Here, in a small village not far from the border with Shaanxi Province, after scrambling up a hazardously steep slope covered in loose shale, we encountered one of the two largest populations of our travels. It was all that we could do to stand upright on this slope and the only way to keep from sliding downhill was to

wedge ourselves into the bases of trees. This group of at least 25 trees had been successively coppiced for firewood for several decades, and many of them had very large bases from which grew new stems. These re-sprouts maintained remarkable vigour, stretching for light and competing with *Illicium henryi* and *Quercus aliena*. The largest of these trees had a basal diameter of 45 cm (18 in.) with individual stems that each would make a respectable tree in any garden.

Moving east, we visited southern Shaanxi Province, as the crow flies about 70 km from our location in Chongqing, but even with modern highways and countless tunnels, an eight-hour drive through mountainous countryside. In this case, we were looking for a tree that was described on the 1995 NACPEC expedition (SHX-018; Meyer, 2010). Driving three hours south from the city of Angkang, we arrived in the small village of Long Shan Cun in Baixian Forest Station. It did not take long before we found the same massive tree growing next to an abandoned farmhouse, along with several seedlings. This was by the far the largest tree that we would see in China; it first branched at 4 m, had an 84 cm DBH (33"), and was 30 m tall.

In western Henan province, close to where Josef Hers collected a number of herbarium specimens between 1919 and 1924, we visited Baotian Man Nature Preserve. Here, in a beautiful mixed deciduous forest of *Acer davidii*, *Carpinus cordata*, *C. turczaninovii*, *Cornus kousa*, and *Quercus aliena* subsp. *acuteserrata*, we first encountered paperbark maples as we had come to expect them—perched on the edge of rock outcroppings and stretching for the light—but then came across 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 37 cm (15 in.) DBH. 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.

photograph © Anthony Aiello

An old tree of *Acer griseum* in a mixed deciduous forest, Henan Province, central China.

photograph © Anthony Aiello

Heritage Seedlings in Oregon have produced thousands of *Acer griseum* seedlings since 2000.

Elsewhere in Henan, in Xi Xia County, the population was more scattered, and we observed seven trees scattered over an area of several kilometres. *Acer griseum* was growing in the edges of fields of maize and terraces of *Cornus officinalis* orchards, part of the local flora that grew spontaneously in areas not regularly cultivated. As we had seen in other locations, these trees had also been coppiced, but had substantial regeneration.

Although the primary focus of the 2015 Chinese expedition was to collect leaf samples, we made seed collections at two locations. One was at the northeastern Sichuan location (Seven Fairy Peak) and the second was from a tree of wild origin in the nursery at the new Xi'an Botanical Garden. This tree had been moved from the older Botanic Garden in central Xi'an and was likely collected in the nearby Qinling Mountains. Among us we currently have seedlings of both of these collections (those from Sichuan at the Morris Arboretum and those from Xi'an at The Morton Arboretum), both welcome new infusions of germplasm into the US.

The sampling phase of the project concluded in July 2016 when ASA travelled to the Pacific Northwest, to visit Heritage Seedlings (Salem, Oregon), the North Willamette Research Station (Aurora, Oregon), and Washington Park

Arboretum (Seattle, Washington). Heritage Seedlings is the largest grower of seedlings in the US, producing hundreds of thousands of seedlings (!) since the early 2000s (Mark Krautmann, pers. comm.). The trees at the Willamette Station were among the oldest and most impressive encountered in Oregon and were likely planted in the 1970s. Like many open-grown paperbark maples, these had strong trunks and full, rounded crowns, and showed no signs of stress from the hot and dry summers of the Willamette Valley.

To help round out our molecular analysis, we also obtained samples from these locations:

- Hubei Province, China (2014), samples collected by Michael Dosmann
- Hunan Forest Botanical Garden, China (2015)
- Hangzhou Botanical Garden, Zhejiang Province, China (2016)
- Hubei Province, China (2018), NACPEC18-037, -038, -039
- Samples from Arboretum Mustila, Elimaki, Finland (2016): these plants were grown from seed that was collected in Gansu Province in 2010.
- Trees from other sites on the East Coast of the USA (autumn 2015 and summer 2016)

DNA was extracted from all of the sites' leaf samples and RAD-sequence analysis applied to answer the question of comparing the degree of genetic diversity represented in cultivation compared to that in the wild. Andrew Hipp, Systematist and Director of the Herbarium at The Morton Arboretum, has collaborated with us to conduct these molecular analyses. Our results support the idea that Wilson's 1901 collection provides the basis for all trees sampled in the UK and the vast majority of what has been sold and grown in the US. It appears that all of the cultivated material is nested within this initial Wilson collection, in contrast to the wild populations that we sampled. Based on the molecular evidence, these wild populations appear quite distinct, indicating broad genetic diversity among the various Chinese locations, with differentiation among the groups of trees that were sampled. This distinction—between the plants in cultivation and those in the wild—further supports the importance of *in situ* preservation of wild populations in conserved areas and shows the need for propagation and *ex situ* preservation of those trees on unprotected land.

Propagation

Attempting to collect and germinate viable seed from *Acer griseum* is a confounding experience. Often trees—whether alone or in groves—will parthenocarpically produce copious amounts of hollow seed. On the other hand, there are occasionally lone trees with no sign of cross-pollinators anywhere that set fertile seeds. The reproductive biology of *A. griseum* is complex and poorly understood, with variation in expression of anthesis between male and female flowers both within and among individual trees (de Jong 1976). Further study is certainly needed to gain a better understanding of the relationship between floral biology and viable seed production.

photograph © Christophe Crock

The female flowers of *Acer griseum* at Herkenrode in Belgium.

Traditionally much of the commercial production of paperbark maple has been by growing plants from seed (Fordham, 1969). To avoid the problem of infertile seed, nurseries have developed seed orchards, systematically selecting plants with high levels of fertility. As mentioned previously, Heritage Seedlings in Oregon has produced huge quantities of seedlings. A succession of seed orchards—from one at their original office in Salem, Oregon to another in Turner, Oregon (1800 trees!) to the current orchard of 250 trees at Stayton, Oregon—has allowed them to progressively cull these orchards to select better trees. In the process they have selected plants with tighter and more upright branching, deep green summer leaves, reduced interior branch die-off from shading, drought tolerance, and the best orange and red autumn color (Mark Krautmann, pers. comm.). Likewise, at the former Princeton Nurseries in Allentown, New Jersey, a group of remaining *Acer griseum* that were included in the molecular sampling was used as a seed orchard for their production efforts (Richard Hesselein, pers. comm.).

Various studies have examined the possibility of vegetatively propagating *A. griseum* from stem cuttings (Fordham, 1969). Kling and Meyer (1987) showed excellent results utilizing cuttings from two-year-old seedlings that were presoaked in IAA rooting hormone and catechol. Maynard and Bassuk (1987) were successful (although at lower rates) using a technique of producing and rooting etiolated cuttings. As far as can be determined neither of these techniques is widely used for either commercial or conservation purposes.

With the onset of cultivars of *A. griseum* and its hybrid with *A. maximowiczianum*, there arose a need for vegetative propagation. This is generally completed by using either *A. griseum* or *A. saccharum* as understock. But a novel approach has been described using double-working to overcome compatibility issues. This technique utilizes *A. griseum* scions, *A.* 'Purple Haze' (an *A. griseum* × *A. pseudoplatanus* hybrid) as an inter-stem, and *A. pseudoplatanus* as rootstock

(Humphrey, 2019). This technique adds to the arsenal of propagating difficult-to-propagate clones or plants of conservation value and may provide more certainty of long-term compatibility.

Building on the techniques developed at Cornell University, as an additional way to propagate much-desired plants ASA has been working on a much lower-tech method of vegetative propagation. Using a technique for vegetative propagation of *Quercus* (Amissah and Bassuk, 2009). ASA has successfully cutback stock plants to produce adventitious rooting on vigorous young shoots. Following the Amissah and Bassuk protocol, field-grown *Acer griseum* were cut to about 30 cm (12 in.) and new shoots were forced and etiolated. These shoots were painted with rooting hormone and then mounded with potting medium. It took two years for roots to form on these shoots but the technique was eventually successful and there are now four young plants in the propagation area at the Morris Arboretum. While this is not a technique for commercial production, it is another tool to propagate those rare and unusual individuals and to ensure that they can be replicated in *ex situ* collections.

Cultivar descriptions

Cultivars of *A. griseum* and of hybrids of *A. griseum* × *A. maximowiczianum* are listed below, with several of the descriptions based on Dirr and Warren (2019).

- **'AROY'** BRONZE TABLET (hybrid): bright exfoliating bark on young branches, foliage with red shades in autumn. Selected by Roy Klehm of Song Sparrow Nursery, Avalon, Wisconsin.
- **'Cinnamon Flake'** (hybrid): darker green foliage, finer flaking cinnamon-brown bark. Rounded canopy and orange-red fall color. Selected by Dr Sid Waxman, University of Connecticut.
- **'Fertility'** ('Fertilis'): a fertile form, originated from scion wood from Dyffryn Gardens, likely from their original Wilson 1901 tree. Regularly produces up to 70% fertile fruit and even now some years later there are many seedlings in the area occupied by the original tree. Selected at Sir Harold Hillier Gardens, Romsey, Hampshire. (Brian Humphrey, pers. comm.).
- **'Ginzam'** GINGERBREAD (hybrid): vigorous grower with larger leaves and cinnamon-brown flaking bark. Selected by Lake County Nursery, Madison, Ohio.
- **'Girard's Hybrid'** (hybrid): the first of the hybrids with cinnamon-orange to brown flaking bark with foliage typical of *A. griseum*. Originated from Durand Eastman or Highland Park, Rochester, New York and was grown by the Girard Nurseries, Geneva, Ohio.
- **'Golden Lucky'**: variegated leaves of creamy yellow and green. RHS lists as a tentatively accepted name.

Acer griseum from a painting by Christabel King commissioned to illustrate an article by Dr David Hunt published in *Curtis's Botanical Magazine*, Vol. CLXXIII, Tab. 795 (1980).

- **'JFS KW22AGRI'** COPPER ROCKET: narrow form and upright branch structure, with satin smooth bark exfoliating in coppery curls. Brilliant red fall color. Selected by Keith Warren of J. Frank Schmidt & Son, Co., Boring, Oregon.
- **'JFS-KW8'** FIREBURST: selected for straight trunk, upright oval crown, orange-brown exfoliating bark, and bright red fall color. Selected by Keith Warren of J. Frank Schmidt & Son, Co., Boring, Oregon.
- **'KLMEE'** SHAVED CHOCOLATE (hybrid): cinnamon, curling flaking bark with vibrant red fall color. Selected by Roy Klehm of Song Sparrow Nursery, Avalon, Wisconsin.

- **'Molly Fordham'** CINNAMON GIRL (hybrid): considered possibly the best of the hybrids, with good growth rate, spreading habit, and deep brownish flaking bark. Selected by Al Fordham, retired from the Arnold Arboretum, and introduced by Bold Springs Nursery, Hawkinsville, Georgia.
- **'Tilgates'**: RHS lists as a tentatively accepted name.

***Ex situ* conservation**

After having visited a number of populations in China and observing that all but two of these were in areas with some level of conservation protection, we realized that the most vulnerable populations were those on unprotected land, the ones in Chongqing and in rural Henan. Because of the challenges of acquiring viable seed from these two groups of plants, we decided to target them for clonal propagation and *ex situ* conservation in China, the US, and if possible, Europe.

In February 2018 we conducted a grafting trial to determine the best understock to use and to hone our grafting skills with *Acer griseum*. Two different bare-root rootstocks, sycamore maple (*A. pseudoplatanus*) and sugar maple (*A. saccharum*) were used in the trial. The scions for this trial were collected from trees growing at the Morris Arboretum and Arnold Arboretum from plants of the 1994 NACPEC expedition. More than 70% of the grafts were successful using the *A. pseudoplatanus* rootstock—this species has the remarkable trait of being a 'universal rootstock' for many maples, including *A. griseum* (van Gelderen, 2004). None of the grafts using the *A. saccharum* rootstock were successful (Bachtell *et al*., 2019).

Having completed our grafting trial, in February 2019 Kang Wang traveled to the two unprotected populations in China to collect and ship scions. In late March of 2019 they reached the USDA National Plant Germplasm Quarantine Center in Beltsville, Maryland. Based on the results from the 2018 grafting trial only *A. pseudoplatanus* rootstock was used. Many of the scions were exceedingly thin likely due to the non-vigorous growth of the parent trees, making for challenging grafting (Bachtell *et al*., 2019). An additional set of grafts was taken successfully at a nursery in Henan, China.

Despite the vagaries of shipping scion wood from China, trees from both Chinese locations were successfully grafted both at Beltsville and at the Chinese nursery. The US grafts remain under quarantine and are scheduled for release sometime in 2021 whereupon they will be distributed to members of NACPEC for further observation, cultivation, and propagation. Likewise, the Chinese grafts will be shared among botanic gardens there. Both groups of young plants will provide the basis for *ex situ* conservation of the two unprotected populations. It will be interesting to observe their growth performance and to see if this new genetic material improves the viability of the seed set by other *A. griseum* already well-established in these NACPEC member gardens.

How do we ensure the preservation of the small number of grafted plants and seedlings representing wild populations that are not elsewhere in cultivation? First and foremost, we will make sure that these plants are distributed among several institutions. Additionally, we are working with Knight Hollow Nursery, of Middleton, Wisconsin to develop tissue culture techniques for paperbark maple, a species notoriously difficult to introduce into culture. If successful, these techniques will allow us to multiply those rare genotypes and replicate them at other arboreta.

Notable specimens

Unlike some of the previous Trees of the Year, *Acer griseum* is a relatively common garden plant, so it would be difficult if not impossible to include a comprehensive list of all specimens found in cultivation. Instead, this list is meant to be illustrative and largely represents specimens that we have seen in our travels. No offence is intended to any reader who knows of or grows equally impressive trees. In fact, we would be happy to hear from those readers and always welcome photos and descriptions of paperbark maples. After all, one can never have enough images of this plant!

These descriptions are meant to represent the wide range and plasticity of the species, which can be grown on both coasts of the US and well into the Midwest, across much of Europe, throughout China, and in New Zealand.

Eastern, southern, central United States and Ontario

There are two notable groups of trees in Rochester, New York. One is in Highland Park, the former location of George Ellwanger and Patrick Barry's highly regarded Mt Hope Nurseries, where a beautiful grove of trees grows tucked away across from the Lamberton Conservatory. These are among the oldest trees in the US having originated from Veitch Nurseries, and representing plants from the 1901 Wilson Hubei collection. At Durand Eastman Park there are three extraordinarily large and vigorous trees. These originated as seedlings from the Arnold Arboretum, and despite being second-generation plants, they have grown remarkably well.

Since the 1970s, nurseryman Howard Ecker, West Webster, New York, has been collecting extensively and sold seedlings from the Rochester trees. He has been selling seedlings for close to 50 years and for the early part of this time was one of the few sources of viable seed and young seedlings. He has also probably been responsible for many of the early *Acer griseum* × *A. maximowiczianum* hybrids (Tim Brotzman, pers. comm.).

Some two dozen *Acer griseum* trees grow in the collections at the Arnold Arboretum of Harvard University, the oldest representing the two seedlings that Wilson collected in Hubei Province in 1907, accessions 12488*A and *B. The former grows in the maple collection proper, stretching to 15 m in height and with a dbh of 78 cm, resembling in some ways the tall, upright trees we

The grove of paperbark maples in Highland Park, Rochester, New York, known to be the some of the oldest trees in the USA.

A typically branched plant of *Acer griseum* in Maryland. It is of uncertain origin.

found in the wild. Its stouter, broadly spreading and low-branching sibling grows in the Explorers Garden. It reaches 9 m in height and has a diameter of 98 cm measured just below the lower, horizontal branch at 60 cm. While these two are oft celebrated and photographed, a third impressive specimen (18148*C) grows in the *Viburnum* collection. A 1925 layer from Havemeyer's 1901 Wilson seedling, the upright tree reaches 11.5 m in height, with three primary stems of 42 cm, 43 cm, and 48 cm. Surrounding this individual are four young clones of other wild-collected *Acer griseum*, the start of a new grove dedicated to the species.

As mentioned above, there are several generations of *A. griseum* at the Morris Arboretum with the oldest among these a plant growing in the Mercury Ravine. This individual (MOAR # 1932-0950*A) appears on the 1914 *Atlas of Compton*, one of the original plant maps of the Arboretum; our records indicate that it was purchased by John T. Morris directly from Veitch Nurseries in 1912, making it one of the 1901 Wilson collections.

The multistem paperbark maple at the New York Botanical Garden was accessioned in 1948.

As visitors travel along the entrance drive at Winterthur gardens, they are met by a free-standing tree planted on a small prominence and announcing one's arrival at the visitor center. This specimen was planted sometime in the 1960s and it possibly originated from Gulf Stream Nursery, Wachapreague, Virginia.

A handsome, full-crowned tree is growing at the former USDA Plant Introduction Station at Glenn Dale, Maryland. Its origin is unclear and is either PI #38992 collected in Darjeeling, India around 1914 or PI #143713, received as seed from F. C. Stern of Highdown Gardens in England.

Dr Michael Dirr reports that there are many trees in Atlanta–Athens gardens, including a 7 m (20 ft) tall tree in the State Botanical Garden of Georgia.

A nursery in Good Hope, Georgia (100 km east of Atlanta) raises field-grown seedlings with excellent success using drip irrigation. Further south in Hawkinsville, Georgia it is reported that *Acer griseum* × *A. maximowiczianum* hybrid is more heat tolerant than straight *A. griseum* (Michael Dirr, pers. comm.). In summary light shade and supplemental water is essential for success in USDA zone 8a, where average high-temperatures are 33°C (91°F).

Scott McMahon (Atlanta Botanic Garden) relates similar information, that paperbark maple does passably well in Atlanta, where it is far from common and performs better in gardens rather than in the urban heat island. There are good specimens at ABG and at their Gainesville Garden (100 km northeast of Atlanta) but it tends to be slow growing, rarely planted, and almost never sold.

The oldest trees growing at The Morton Arboretum (USDA hardiness zone 5b, with average annual minimum temperature between -26 and -23 °C (-15 to -10 °F), Lisle, Illinois are from the early 1950s (119-53 and 349-54), with both accessions received from the USNA. The Morton Arboretum's most prominent specimens were received in 1958 (836-58), from the Monroe County Parks department as plants, making these approximately 65 years old. Additionally, there is unique hybrid of *A. griseum* × *A. triflorum* (70-2011) that resulted from a cross made by Dr Susan Wiegrefe, former tree breeder.

An even more impressive indication of the cold-hardiness of paperbark maples are trees found on the campus of Iowa State University (Ames, IA; zone 5a: 29 and -26 °C (-20 to -15 °F)) there are quite a few handsome specimens on campus, with some in protected sites while others strike a jaunty pose in more challenging situations (Dr Jeffery Iles, pers. comm.). It has been observed in all four corners of Iowa, the state, but varies in performance based on exposure (Kelly Norris, pers. comm.).

Acer griseum grows quite well around southern Ontario with many nurseries in the area producing it. For example, Uxbridge Nurseries and Dutchmaster Nurseries grow it at their farms north and east of Toronto. Additionally, there are nurseries that sell it in the Ottawa area, as demonstrated by trees growing in protected areas at the CFIA Central Experimental Farm. Several specimens grow at Royal Botanical Gardens, Hamilton, including a 1958 cutting-grown tree from the Arnold Arboretum (Jon Peter, pers. comm.).

British Columbia, Oregon, and California

A beautiful tree at the University of British Columbia Botanical Garden's Alpine Garden was received in 1976 (UBC #1976-0036.01) from Gossler Farms in Springfield, Oregon. *Acer griseum* is frequently planted on residential streets throughout Vancouver, British Columbia, Seattle, Washington and Portland, Oregon. ASA has observed numerous trees planted in boulevard strips throughout Portland and many of these seem to be roughly the same age and size (approximately 5–6 m tall), indicating recent advances in seed viability and field production of paperbark maple.

photograph © Anthony Aiello

One of several paperbark maples in the parterre at Spetchley Park in Worcestershire.

At the San Francisco Botanical Garden (Strybing Arboretum) there are three specimens of *A. griseum*, and it is not uncommon in the Bay Area. They grow quite well there, but do need an exceptional amount of water and tend to suffer in dryer inland locations (Ryan Guillou, pers. comm.).

Further south in California, at the Huntington Botanical Gardens, there is a good specimen planted in 1993 in the Japanese Garden that has done well with minimal care, irrigation, and some shade. It survived 50 °C (121 °F) on 6 July 2018 without issue! Several trees were recently planted in the Penjing Court and walkway to the Stargazing Pavilion in the Chinese Garden and despite being completely exposed, survived two days of 48 °C (118 °F) in early September 2020 (Tim Thibault, pers. comm.).

Europe

Several trees throughout the UK are described above but a few others stand out from our travels. Among the numerous specimens at Royal Botanic Gardens, Kew, the most impressive one (Kew #1928-74301) sits outside the north end of Princess of Wales Conservatory, and like many others, originated at Highdown Gardens. At Spetchley Park Gardens, Worcestershire, there is a wonderfully sited tree in the parterre, a garden designed in the early 1900s by

Ellen Willmott, the renowned horticulturist and plantswoman, in conjunction with her sister Rose Berkeley. At Arley Arboretum and Gardens, Upper Arley, Worcestershire, one of the tallest trees that we visited was approximately 15 m, reaching for light among its neighbors.

A handsome paperbark maple grows in the Magdalen College Rose Garden in Oxford. This maple was likely planted as part of the landscape designed by Sylvia Crowe in the 1950s to commemorate the development of penicillin as an antibiotic in Oxford during the 1940s (Mark Brent, pers. comm.). It is worth considering what trees we might plant to honour the scientific contributions that have helped to solve our current pandemic.

On a 2011 visit to Meise Botanic Garden, north of Brussels, Belgium, ASA remembers enjoying two impressive trees, one of unknown provenance and one from Plantentuin Esveld planted in 1979. Koen Camelbeke informs us that there are several trees growing at Wespelaar, where they do not thrive except for one growing on the portion of the estate known as *The Potager*. This attractive specimen derived from Van Pelt nursery in Belgium and was planted in 1985.

At Plantentuin Esveld, Boskoop, the Netherlands, the two mother plants

photograph © Anthony Aiello

One of the mother plants of *Acer griseum* at Plantentuin Esveld in the Netherlands; this originated from seed collected at Hergest in England.

The paperbark maple at the Botanischer Garten der Technischen Universität Darmstadt could possibly be from Wilson's 1901 seed introduction.

in their maple collection originated from seeds collected at Hergest Croft. Currently, seedlings grown in their nursery come from seeds in the collection garden or from seedlings grown by Domique Duhaut (east Flanders, Belgium), who has an excellent stand of trees from which he harvests seeds (Cor van Gelderen, pers. comm.).

A large and stately tree at Botanischer Garten der Technischen Universität Darmstadt may have an intriguing and somewhat mysterious story. Based on its size and older photographs, it is possible that this tree dates to the early 1900s and could possibly be one of the Wilson 1901 seedlings. Some of the supposition for this was the close relationship between Joseph Anton Purpus, head gardener and inspector at the botanic garden, and Alfred Rehder, who was employed at the Arnold Arboretum from 1898 and with whom Purpus had worked at Darmstadt (Dr Stefan Schneckenburger, pers. comm.).

The northernmost paperbark maples in Europe are growing at Arboretum Mustila, near Elimäki in southern Finland (slightly over 100 km northeast of Helsinki). These are the plants from the aforementioned Chinese (Gansu) seed lot, which has been the only hardy *A. griseum* that they have. The plants are hardy but growing very slowly. The site is somewhat poor in nutrients and, until recently, was too shaded as well. Jaakko Saarinen reports that he is unaware of plants in Finland, although it could likely survive on the south coast. Furthermore, the nursery strain in Central Europe is not as hardy as this new Chinese seed source.

There is one large specimen in the garden at Gothenberg Botanical Garden, a very beautiful tree planted in 1983 that is 7 m tall and 8 m wide with a stem diameter at 1 m of 43 cm. *Acer griseum* is a fairly common garden tree in Sweden and one can find rather large trees in private gardens from the southern part of the country up to Stockholm. The species is common in garden centers and available in quite large sizes (Henrik Sjöman, pers. comm.).

Piotr Banaszczak provided an excellent summary of growing *A. griseum* at the Rogów Arboretum in central Poland, where they currently have approximately 21 trees, all of which are of garden origin. About 40 to 50 years ago, when the first paperbark maples started to be planted there, the species was not fully hardy and during very cold winters trees were often frozen to the snow level. Some of the remaining paperbark maples produce a large amounts of viable seeds and currently most of *A. griseum* available in the Polish nursery trade and in neighbouring countries begins from seeds from Rogów. With a warming climate, and despite paperbark maple being fully frost-resistant over the past decade, it remains uncommon in Polish gardens.

Acer griseum does well in the moist, warm climate of southwestern France (near Toulouse) and coastal northern Spain areas that are hardiness zones 8 and 9. In the Iturraran Botanical Gardens near San Sebastian in northern Spain, there are many fine specimens, growing well without the need for watering. In the drier Mediterranean climates of southern France, Italy and Spain they

The grove of *Acer griseum* at Trelinnoe Park in New Zealand is thought to have been planted sometime between 1986 and 1990.

can also be successfully grown but with supplementary watering in the summer and in settings where they are protected from scorching afternoon sun (Augustin Coello, pers. comm.).

In northern Italy, Guido Piacenza relates that *Acer griseum* grows well in Pollone (Biella, Piedmont) both in his garden and at Parco Burcina. Similarly, there is a 4 m tall, 30-year-old tree at the Borromean Islands Botanic Gardens on Isola Madre. In contrast, *A. griseum* struggles at Villa Boccanegra, along the Ligurian coast, where it is only a few metres high after many years. Likewise, at the nearby Hanbury Botanical Gardens there is a tree whose main stem dried out but was substituted by a new one, having grown into a 4 m tall tree with a trunk diameter of 13 cm (Guido Piacenza, pers. comm.).

The cultivation of paperbark maples is not limited to the Northern Hemisphere, as IDS Yearbook Editor (Caroline Boisset) has mentioned a beautiful grove of trees at Trelinnoe Park, the garden created by John and Fiona Wills in Napier, New Zealand. An online search yielded three accessions of *A. griseum* at Auckland Botanic Gardens but as of this writing no further information was available.

Surprisingly, *Acer griseum* is not widely cultivated in China but a group of 11 trees grows at the Beijing Botanical Garden (North Garden). Equally surprisingly, these trees were grown from seeds that were received in 1996 through a seed exchange with National Botanical Gardens of Ireland. Three of these trees are excellent but half of them do not have good form because of too much shade. The DBH of the largest one is about 20 cm and among the group several possess outstanding red fall color.

Conclusion

More than 100 years after its introduction into Western gardens, *Acer griseum* remains one of the choicest small maples for any garden setting. Its many seasons of interests, its durability and fine habit, make it an outstanding garden plant. Tracing the history of its introduction and cultivation from the late 1800s to the present provides a fascinating insight into the history of plant introduction, garden development, plant propagation and improvement, and conservation. Unlike other plants whose popularity fluctuates with horticultural fashion, interest in paperbark maple has remained over the decades, and its celebrity has increased in recent years due to the wider availability of plants.

The story of *A. griseum* represents an aspect of botanic gardens and private horticulture that often goes unnoticed, namely the role of collections in conserving threatened species. It is our hope that this project can not only contribute to the conservation of paperbark maple, but as importantly can serve as a model for the understanding and preservation of other threatened species. In fact, with 20% of Earth's plant species threatened with extinction (including 1 out of 5 maple species), exploration efforts must now focus more upon these plants' conservation value rather than purely their contributions to ornamental horticulture. *Acer griseum* is graced by charisma, yet far too many other rare species are not.

References

Aiello, A.S. (2016). Paperbark Maple—A New Look at an Old Favorite (Part 2). *Maple Society Newsletter*. Summer 2016, Vol. 26 (2): 25–31.
Aiello, A.S. & K. Bachtell. (2015). Paperbark Maple—A New Look at an Old Favorite. *Maple Society Newsletter*. Winter 2015, Vol. 25 (4): 9–16.
Amissah, J. N. & N. Bassuk. (2009). Cutting Back Stock Plants Promotes Adventitious Rooting of Stems of *Quercus bicolor* and *Quercus macrocarpa*. *J. Environ. Hort*. 27(3): 159–165.
Arnold Arboretum. (1919). Unfolding Leaves. *Bulletin of Popular Information* n.s. 5(2): 5.
Bachtell, K., A. S. Aiello, M. S. Dosmann, & K. Wang. (2019). Paperbark maple (*Acer griseum*) conservation project. *Proc. Intl. Plant Prop. Soc.* 69:87-93.
Cox, E. H. M. (1924). Supply and Demand. *The Garden* 88(2765): 771.
Crowley, D. M. Barstow, M. Rivers & Y. Harvey-Brown. (2020). The Red List of *Acer*, revised and extended. Botanic Gardens Conservation International, Richmond, England.
de Jong, P. C. (1976). Flowering and sex expression in *Acer* L.: a biosystematic study. Wageningen: Veenman.
Dirr, M. A. & K. S. Warren. (2019). The tree book: superior selections for landscapes, streetscapes, and gardens. Timber Press, Portland, Oregon.
Elwes, H. J. and Henry, A. (1906). *The trees of Great Britain & Ireland*. Vol. 3: 641.
Fordham, A. F. (1969). *Acer griseum* and its propagation. *Proc. Intl. Plant Prop. Soc.* 19: 346–348.
Franchet, A. (1894). Plantes Nouvelles de la Chine Occidentale. *Journal de Botanique* 8 (17): 290–297.
Gibbs, V. (1929). Robinias at Aldenham and Kew. *J. Royal Hort. Soc.* LIV: 145–158.
Henry, A. (1903). Chinese Maples. *The Gardeners' Chronicle* Ser. 3, vol. 33: 100.
Humphrey, B. E. (2019). Double-working—A method of overcoming compatibility issues with *Acer griseum* grafts. *Maple Society Newsletter*. Winter 2019, Vol. 29 (4): 13–18.

Hunt, D. R. (1980). *Acer griseum*. *Curtis's Botanical Magazine* CLXXXIII Tab. 795: 13–15.
Royal Botanic Gardens, Kew. (1910). V. Miscellaneous Notes. *Bulletin of miscellaneous information*: 24
Kling, G. J. and M. M. Meyer. (1987). Effects of phenolic compounds and indoleacetic acid adventitious root inititation in *Phaseolus aureus*, *Acer saccharinum*, and *Acer griseum*. *HortScience* 18(3): 352–354.
Lancaster, R. (2008) *Plantsman's paradise: travels in China*. Garden Art Press / Antique Collecters' Club, Woodbridge.
Maynard, B. K. and N. L. Bassuk. (1987). Stockplant etiolation and blanching of woody plants prior to cutting propagation. *J. Amer. Soc. Hort. Sci.* 112(2): 273–276.
Meyer, P. W. (2010). Paperbark Maple *Acer griseum*. *Arnoldia* 6(2): 48–50.
Pax, F. (1902). Aceraceae. In A. Engler, *Das Pflanzenreich*. 8 Heft (IV 163): 29.
Stern, F. (1957). Gardening on Chalk. *J. Royal Hort. Soc.* LXXXII: 370–378.
Sun, S., Yu, X., Zheng, Y., Chen, P., & Zhang, C. (2014). Isolation and characterization of twenty-seven polymorphic microsatellite loci in endangered Chinese paperbark maple, *Acer griseum* (Dicotyledoneae: Aceraceae). *Biochemical Systematics and Ecology* 56: 99–103.
Van Gelderen, C. (2004). Hidden Frontiers in *Acer*. Proceedings of the International Maple Symposium 2002. Westonbirt Arboretum. Tetbury, England. Pages 36–43.
Veitch, J. H. (1906). *Hortus Veitchii*. J. Veitch & Sons, London.
Veitch, James & Sons. (1912). *New hardy plants from western China (introduced through Mr. E. H. Wilson)*. J.
Veitch & Sons, Chelsea.
Wilson, E. H. (1913). *A Naturalist in Western China*. Methuen & Co., London.
Wilson, E. H. (1925). *Acer griseum*. *The Garden* 89 (2773): 20.
Xu, T., Y. Chen, P. C. De Jong, H. J. Oterdoom, & C. Chang. (2008). Aceraceae. In: Wu, Z. Y. & Raven, P. H. (eds.). *Flora of China* 11: 515–553. Science Press, Beijing and Missouri Botanical Garden Press, St. Louis.

Acknowledgements
We would like to express our thanks to the many collection holders who provided us with information on their holdings: Piotr Banaszczak, Rogów Arboretum, Rogow, Poland; Mark Brent, University of Oxford Botanic Garden and Arboretum, Oxford, England ; Caroline Boisset, Bradford-on-Avon, Wiltshire, England; Tim Brotzman, Brotzman Nursery, Madison, Ohio; Augustin Coello, Toulouse, France; Dr Michael Dirr, University of Georgia (retired), Athens, Georgia; Linda Eirhart, Winterthur Museum, Garden & Library, Winterthur, Delaware; Ryan Guillou, San Francisco Botanical Garden (Strybing Arboretum), San Francisco, California; Dr Jeffery Iles, Iowa State University, Ames, Iowa; Matt Lobdell, The Morton Arboretum, Lisle, Illinois; Stefan Lura, US National Arboretum, Washington, DC; Scott McMahon, Atlanta Botanic Garden, Atlanta, Georgia; Muséum national d'Histoire naturelle, Herbier national (P).; Kelly Norris, Greater Des Moines Botanical Garden, Des Moines, Iowa; Jon Peter, Royal Botanic Gardens, Hamilton, Ontario; Guido Piacenza, Pollone, Biella, Italy; Jaakko Saarinen, Arboretum Mustila, Mustila, Finland; Dr Stefan Schneckenburger, Botanischer Garten der Technischen Universität Darmstadt, Germany; Dr Henrick Sjöman, Gothenburg Botanical Garden, Sweden; Tim Thibault, The Huntington Library, Art Museum, and Botanical Gardens, San Marino, California; Cor van Gelderen, Plantentuin Esveld, Boskoop, Netherlands; Keith Warren, J. Frank Schmidt & Son Co (retired), Boring, Oregon.

★ ★ ★

Tree of the Year 2021

For 2021, the chosen taxon is *Toona sinensis*, Meliaceae. Please send your comments, photographs—particularly some of the species growing in its wild habitat, and any other information (in any language) to Dr David Mabberley, david_mabberley@yahoo.co.uk