

# The Search for Two Rare Maples

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For most people in eastern North America, the first maple trees that come to mind are native species such as sugar maple (*Acer saccharum*), red maple (*A. rubrum*), or the box elder (*A. negundo*). When it comes to introduced species, the most familiar ones are widely planted Japanese maple (*A. palmatum*) and Norway maple (*A. platanoides*). From a worldwide perspective, maples occur across all temperate areas in the Northern Hemisphere, with a slight extension to the subtropics and tropics of Southeast Asia. Of the approximately one hundred and fifty species that have been described, over two-thirds of them occur in Asia. The vast majority of maples are deciduous, and justifiably famous for producing brilliant fall color, but a few of the Asian species are evergreen.

From an evolutionary perspective, the genus *Acer* has been around for at least 40 million years, during which time it has undergone extensive speciation and extinction. From a more modern perspective, the genus *Acer* was established by Linnaeus in 1753, and since then more than 200 species of maple have been described, of which about 150 are commonly recognized by botanists. Some of them have extremely wide geographic distributions, such as box elder which grows across most of North America, while others are restricted to a single, remote location. Because roughly two thirds of maples occur in China and because one of my research focuses has been on elucidating the maple “family tree,” I have been collaborating with colleagues in China for the past few years to visit the areas where maples grow and to collect herbarium specimens and DNA samples. More recently, I have been anxious to obtain material of two very rare species—*Acer yangjuechi* and *Acer wardii*—to fill in some prominent gaps in my taxonomic study. Below is the story of my search of these elusive species in their native habitats.

## *Acer yangjuechi*

The species name of this maple, “yangjuechi,” is derived from the local name of the plant, which literally translates as “sheep’s horn” and refers to the similarity of the shape of seeds to the horns of a sheep. It was first described in 1979 based on specimens collected from Mt. Tianmu in Zhejiang Province in eastern China (Fang, 1979). It is similar to Miaotai maple (*A. miaotaiense*), a species in southwestern Shaanxi and southern Gansu Provinces, but differs by virtue of its larger fruits and hairy branchlets and leaf undersides. Sheep-horn maple also resembles the Japanese species, *A. miyabei* but differs in its overall hairiness.



Figure 1. *Acer yangjuechi* in cultivation on Tian Mu Mountain, Zhejiang Province, China.

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Figure 2. The seeds of *Acer yangjuechi*.



Figure 3. *Acer acutum* on Tian Mu Mountain.



Figure 4. *Acer maximowiczianum* on Tian Mu Mountain.



Figure 5. *Stewartia sinensis* on Tian Mu Mountain.

Upon arriving at the Mt. Tianmu Reserve in April 2007, we learned from our official guide, Mr. Mingshui Zhao, that only a few sheep-horn maples were still alive. Mt. Tianmu is located about 60 miles (100 kilometers) west of Hangzhou and is famous for the gigantic trees of *Ginkgo biloba* and *Cryptomeria fortunei* (Del Tredici et al., 1992). In an effort to preserve genetic resources of this species in case the plants disappear from natural or artificial causes, my students—Jinhua Jiang and Mimi Li—and I spent a day with Mr. Zhao looking for specimens of the sheep-horn maple. Mr. Zhao had seen the species a few years before, but was not certain whether it still existed today. To make sure that we obtain genetic material of the species, we first visited two trees cultivated in the resort village located at the foot of the mountain (Figure 1). The trunk was grayish and covered with moss and the yellowish-green leaves

had three to five lobes with coarsely toothed margins. The plants were covered with immature samaras with reddish wings spread out at a nearly horizontal disposition (Figure 2).

Around 8:30 in the morning, we took a tourist van up the mountain to the entrance of the nature reserve not far from the Old Temple, a landmark building on Mt. Tianmu at an elevation of about 900 meters. Near the entrance to the Temple we saw two other maple species, both young saplings without fruits. The first was the pointed-leaf maple (*A. acutum*), which belongs to the Norway maple group which produced 6 to 7-lobed leaves with sharply toothed margins (Figure 3) and a drop of the milky sap oozes when the leaf stalk was broken. The other species was the Tianmu maple (*A. sino-purpurascens*) with beautifully veined 3 to 5-lobed leaves, which is similar to the devil maple (*A. diabolicum*) of Japan.



Figure 6. Mr. Zhao next to the largest specimen of *Acer yangjuechi* on Tian Mu Mountain.



Figure 7. The crown of *Acer yangjuechi*.

While the main path leads people up to the summit from the Old Temple, we followed the trail down the mountain and then veered off into the woods to look for the sheep-horn maple. Here we saw several saplings of another maple species with trifoliate leaves which were densely hairy on their undersides (*A. maximowiczianum*) (Figure 4). A few other plants were in bloom or fruiting including *Helwingia japonica*, *Stachyurus chinensis*, *Daphniphyllum macropodium*, *Arisaema sikokianum*, and an unidentified *Iris* species.

After eating our lunch in the woods, we climbed up to a mountain ridge and were greeted by some azaleas (*Rhododendron simsii*) blooming in various shades of red, white, and light blue. I was particularly pleased to see a large specimen of Chinese stewartia, *Stewartia sinensis*, that looked very much like the one growing at the Arnold Arboretum that had been sent from the Nanjing Botanical Garden in 1934 (Figure 5). Given that I have been working on the phylogeny of *Stewartia* for several years, it was particularly exciting to see this tree—covered with flower buds—growing in the wild.

From the mountain ridge we had to go downhill to find the sheep-horn maple. The understory vegetation was different here from the other side of the mountain, the dominant plant

being a bamboo in the genus *Indocalamus*. Since bamboos are tall and form interlocking thickets, it took some effort to get through it. Mr. Zhao led the way but had to stop frequently to find his direction. Three years earlier he searched for the sheep-horn maple but ended up getting lost, so I kept my fingers crossed that we would have a better luck this time around. After about an hour or so of plowing through bamboo, Mr. Zhao shouted out that he found the tree. I pushed my way through the thicket and saw him standing next to a stately tree with a grey trunk (Figure 6). We searched the surrounding area for seedlings or saplings of sheep-horn maple but could only find those of a different species with three leaflets (*Acer henryi*). The lack of seedlings is probably due to a number of factors including intense competition from the bamboo and predation by insects.

After finishing our search of the area, I finally took a break to examine the old sheep-horn maple closely. The task filled me with a mixture of excitement and sadness because the tree, which was 20 meters tall with a diameter of 30 centimeters at the breast height, was decidedly unhealthy (Figure 7). The trunk had a gaping hole in it and insects have so damaged the foliage that it failed to produce any fruits. Luckily, we did manage to get a few undamaged leaves

to preserve the genetic blueprint of this rapidly disappearing species. We left the area filled with a great sense of accomplishment, thankful that the time spent trekking around the mountain through bamboo thickets and winding pathways in the hazy and humid weather had not been wasted.

Upon our return to Hangzhou, Mimi Li, one of graduate students at Zhejiang University, obtained some DNA sequence data from both chloroplast and nuclear genomes of the sheep-horn maple. Our preliminary analyses indicate that it is indeed closely related to the Japanese species *A. miyabei*, but we need to include another Chinese species, *A. miaotaiense*, in our analysis in order to determine what its closest relative is.

### *Acer wardii*

The quest for the next maple brought me to Yunnan Province in the southwestern part of China, an area long considered the botanical treasure land of the country. More than sixty species of maples occur naturally in Yunnan, and so it is no surprise that Ward's maple (*Acer wardii*) should also be one of them. This rare species, whose leaves have only three lobes, was named by W. W. Smith in 1917, to honor Frank Kingdon Ward (1885–1958) the English plant hunter who first collected it in Upper Myanmar (the country formerly known as Burma). The species also grows in Assam, India and in Yunnan and Xizang Provinces, China. Ward's maple was first introduced to England by George Forrest at the end of 19th century. Unfortunately

the plant did not survive, and it is probably still not in cultivation in the West.

In early May of this year I was fortunate to visit Mt. Gaoligong in northwestern Yunnan with a group of researchers from the Kunming Institute of Botany (KIB). Prior to the trip, I had gotten a few specks of leaf tissue of Ward's maple from Peter Wharton of the University of British Columbia Botanical Garden and had been able to extract DNA sequences of the sample for several genome regions. Despite this limited success, it was still unclear which group of maples *Acer wardii* was most closely allied with. Based on morphological features alone, it seemed to stand between the Japanese maple and the American stripe bark maple (*A. pensylvanicum*). The primary goal for my trip, therefore, was to collect specimens to further resolve the question of its affinity to other maples.

I flew to Kunming from Hangzhou on the afternoon of April 30 and early the next morning our van left for Mt. Gaoligong with 15 people on board, all from KIB except for myself and Dr. Jin Xiaohua, who was from the Beijing Institute of Botany. Since the week of May 1st was a vacation week in celebration of the World Labor Day the highway teemed with buses, cars, and vans. However, the bustling traffic did not dampen my spirits: I had not visited the area for about fifteen years and was excited at the prospect of seeing how everything had changed. Whereas before there was no highway between Kunming and Dali, the one-way trip took an arduous twelve hours, but with the new road, the time travel between these two cities



Figure 8. *Acer oligocarpum*.



Figure 9. *Leycesteria formosa* in fruit.



Figure 10. The foliage of *Acer wardii*.

was reduced to four hours. Change was clearly happening as rapidly in Yunnan as it was everywhere else in China.

Be that as it may, it still took us nearly two days to get from Dali to Gongshan Xian, the town where we were to begin our hike. By the time we reached our destination, the long and tiring journey had taken its toll on me and I was feeling pretty sick. I was also worried that it would not get better and would hold up the rest of the group. Xiaohua suggested that I stay in the inn for the day to rest up while he went out to look for the maple with the guide. However, no one but me knew what the plant looked like and I hated to miss the opportunity to find the plant after coming such a long way. So we compromised by taking a taxi instead of hiking the first half hour of the trip.

We went down to the valley from the dirt road where the taxi dropped us off, crossed a suspension bridge (see inside front cover), and hiked along the river. Not far from the bridge we saw a Schneider maple (*A. schneiderianum*) with five, deeply lobed leaves. Several yards from it was a semi-evergreen maple, *A. oligocarpum* (Figure 8), with simple, entire leaves and aborted terminal buds similar to those of the Japanese maple. We found a plant of the Himalayan honeysuckle, *Leycesteria formosa* (Caprifoliaceae), with many young fruits (Figure 9) and we saw patches of a common orchid in



Figure 11. The distinctive leaves and unopened flower buds of *Acer wardii*.

bloom with greenish yellow flowers. We also found the giant *Cardiocrinum* lily in its vegetative state with large leaves and immature flower. By noon we were still four hours from where the specimen of *Acer wardii* had been collected and I did not feel any better. Following the guide's advice we decided to turn back. It was clearly a good decision since just climbing up the hill from the valley to where the taxi dropped us off took more than half an hour. It was getting dark when we got back to the inn.

The next morning we drove back to Liuku town for the night. The next day our van followed the winding mountain road to the summit pass called Pianmayakou where we saw many interesting plants including *Ranunculus* (buttercup), *Lindera* (spicebush), and *Arundinella* (bamboo) and the top of the mountain was covered with rhododendron thickets. After half an hour botanizing at the summit we went back to the winding road and drove downhill to the other side. About noon we got to the city of Pianma bordering Myanmar. Here we visited a museum housing a United States C-53 cargo aircraft which had been restored from wrecks that were discovered near the border in 1996. It was built as a memorial to the hundreds of US pilots who died while transporting supplies between New Dehli and Kunming (known as the "hump") during World War II. I found the display deeply moving because it reminded

me of the great sacrifices the American people made in helping the Chinese defend their country against the Japanese invasion.

While our van took the others back to the pass where we had collected specimens in the morning, Lianming Gao (a researcher at KIB), Xiaohua, and I walked back up the mountain botanizing and collecting. My focus was again on finding *Acer wardii* since this area is part of Mt. Gaoligong. The maples were easy to spot because the reddish color of their emerging leaves made them stand out like flames against the mountain. Unfortunately, almost all of the maples we saw had leaves with five lobes. To my surprise and great joy, however, I spotted a small tree with red, three-lobed leaves next to a maple with five-lobed leaves growing on a ten-foot high cliff above us in full sun. Xiaohua climbed up and threw a small twig down to me. It was clearly *Acer wardii*, with each of its leaf lobes terminating with a long, sharp-pointed tip. The flowers were typical for a maple, but were not yet open. We saw a few more individuals in the area, which were absolutely beautiful under the blue sky with their reddish leaves (Figures 10 and 11). Finding *Acer wardii* was the highlight of my brief trip to Mt. Gaoligong, and seeing how beautiful it was in the wild makes me believe that Ward's maple would

make a great ornamental tree, albeit somewhat tender and in need of protection in areas with a harsh winter.

Maples are one of the most diverse tree groups in the Northern Hemisphere and they play an important role in both natural and man-made forest ecosystems. It is important to conduct detailed studies on the diversity, geographic distribution, ecology, evolution, and biology of maples in their native habitats before they disappear forever. Such information will not only help to preserve and protect endangered species, but will also help people learn how to use maples in a sustainable manner.

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