International Oak Society

Oak News & Notes

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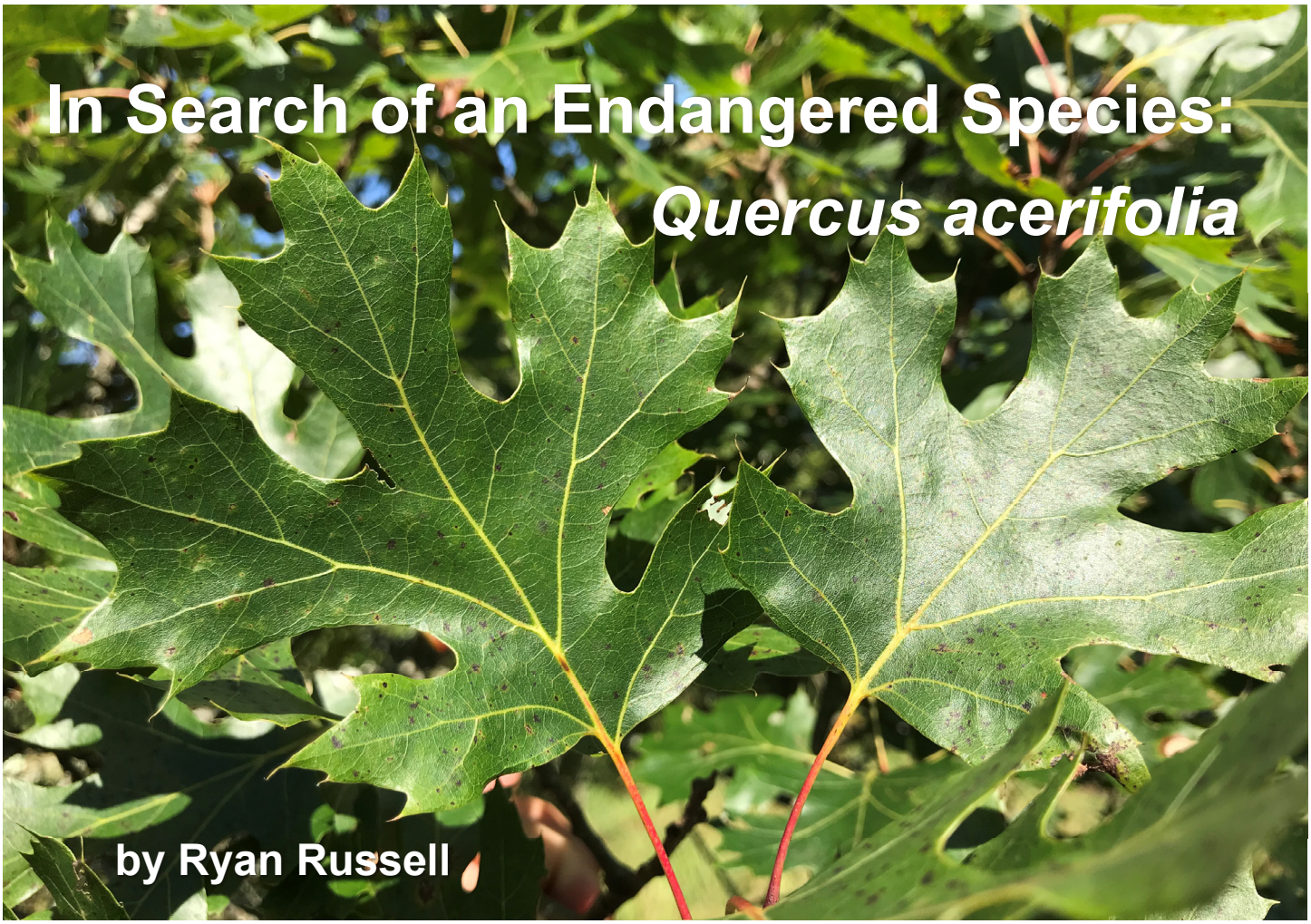


In Search of an Endangered Species: *Quercus acerifolia*

by Ryan Russell

As most oak enthusiasts will know, *Quercus acerifolia* (maple-leaf oak) is listed as Endangered in the IUCN Red List of Threatened Species™ and is a highly sought-after species in cultivation. Extant in only four known locations in Arkansas, the species is of conservation concern due to its reduced wild population and restricted range. It was originally described in 1926 by renowned botanist Ernest Palmer as *Q. shumardii* var. *acerifolia,* and promoted to species status in 1990 by authors Nick Stoynoff and Bill Hess. At that time, only one site (Mt. Magazine) was known to science. Three more sites have been located in recent years, and maybe (hopefully) more sites will be located in the future.

Intrigued by the rarity of this species, driven by the desire to help conserve it, and confident that it would survive in my area, I decided to grow a grove of maple-leaf oaks. This planting will comprise individuals from each site. Three to five plants of seedling origin and three to five grafted plants from each site will make up the final planting. Given the nature of each site and the relatively few individuals in existence, preservation is a concern. In time, the trees we propagate will be planted at Stephens Lake Park Arboretum in Columbia, Missouri and will become an important ex-situ germplasm repository for the species.

In order to collect the acorns and scions needed to build this collection, I had to apply for the proper permits and visit each site. Two sites are located in the Ouachita National Forest, one at Mt. Magazine State Park and another, the newest location, on private property. In June 2019 I met up with Amanda Wu, PhD candidate from University of Missouri–St. Louis, staff from Missouri Botanic Garden, and Brent Baker, Botanist for the Arkansas Natural Heritage Commission, at the first location in the Ouachita NF. Amanda and Brent were working on separate projects, and I was there scouting for a return trip in the fall. This location was a mile hike from the parking spot, with an overall 800 ft elevation increase. It was a steep and arduous hike, and at times I thought my knee would hit my chest with each step. The maple-leaf oaks here are growing in a narrow band along an exposed ridge top just over 1,600 ft elevation with around 30 individuals. I noted a few putative hybrids with *Q. marilandica* and *Q. rubra,* as well as other noteworthy species such as *Ilex vomitoria*, *Ilex opaca*, and *Fagus grandifolia.* Interestingly, as the sides of the ridge fell off in any direction, the *Q. acerifolia* disappeared. This site was overrun with catbrier (*Smilax* sp.), making each step difficult. I left that site with multiple holes in my pants and bloody legs and hands.

The following day, Brent Baker and I continued to the second Ouachita NF site. This site proved a tougher hike than the day before. It had the added problem of a locked National Forest Service gate, but luckily Brent had secured a key to the front gate, saving us an extra two miles of hiking. With more than a mile still to hike, we set off across the side of the mountain on a steep incline through poison ivy (*Toxicodendron radicans),* more catbrier, loose gravel, and signs of bear activity. After what seemed like an eternity, we finally arrived at the maple-leaf oaks. This ridge is a little wider than the first one, higher in elevation (up to 2,000 ft), and more individuals of *Q. acerifolia* were found there (~40). Typically for the species, both sites produce multi-stemmed, shrubby plants around 15-20 ft tall by 10-15 ft wide with variable maple-like foliage. Associated species included *Amorpha ouachitensis*, *Q. stellata*, *Q. marilandica*, and loads of *Polygonum serotinum.*

Developing *Quercus acerifolia* acorns © Ryan Russell

***Quercus acerifolia* on private property near the Arkansas-Oklahoma border © Ryan Russell**

The next day I quickly hit Mt. Magazine State Park as well as the spot on private property near the Oklahoma border. Since I was just scouting, I could move a lot faster than the others, so we had parted ways the day before. Mt. Magazine has around 15 individuals (that I found) and the highest elevation where I recorded specimens was more than 2,500 ft. Associated species were similar to the first two sites with some other species not mentioned previously, like *Baptisia* sp., *Crataegus engelmannii*, and *Chionanthus virginicus.* I noted the locations of the oaks and headed an hour or so west to the other location. After scouting the last location for only a few minutes, it became clear it had the largest population I had seen yet. I didn't stop to count, but easily over 100 individuals were seen, with some very old, large specimens; one nearing 30 ft tall with a stem diameter of over 12 inches. This site was over 1,900 ft in elevation, and at the top of the ridge the maple-leaf oaks dominated. Occasionally a *Q. muehlenbergii* or *Q. rubra* could be seen, but these species seemed to stay on the slopes of the ridge.

Unfortunately, I was unable to obtain a collection permit from the Mt. Magazine/Ozark National Forest, but I shall again try next year. However I did get proper documentation from the other sites, so in September I returned ready to collect. I had followed the direction of members of a 2017 collection trip, which included people from The Morton and Dawes Arboretums. They collected on September 11-12, and I went

View from a ridge in Ouachita National Forest, with maple-leaf oak in foreground © Ryan Russell

a week later, but as temperatures hit 97 °F, I wished I had waited. That 2017 group was not aware of the fourth location, so I collected extra for them as well. In October, Amanda and David Gunn from Missouri Botanical Garden returned and were able to collect from one site I had missed, and David graciously shared a few spare acorns for my project.

I plan to return this winter (2020) or next to collect scions from each site in hopes to get a good number of grafted plants. The grove should be ready for initial planting at Stephens Lake Park Arboretum, where I work, in 2021. Our planting will be added to the wild-collected consortium currently held at The National Arboretum, The Morton Arboretum, and The Dawes Arboretum, but will hopefully have the grafted trees not found at those locations.

I received a good deal of help from colleagues at The Morton Arboretum, the Ouachita National Forest, Arkansas Natural Heritage Commission, and a couple of private citizens. Without them, I couldn't have even begun this project. I'm also grateful that I have support from my employer, the City of Columbia Parks and Recreation Department, the Missouri Community Forestry Council, and the International Oak Society, all helping out in some way with this project.

There are many other endangered species out there that could use ex-situ conservation efforts like this, and it doesn't take much work to begin. The Morton Arboretum has begun an ambitious oak conservation project focusing on the most endangered species. They are partnering with arboreta and municipalities with the capacities for this work across the country. To see a list of threatened species and consider if you can help the efforts, visit their website: https://bit.ly/IOS-Morton

Hayrettin Karaca (1922-2020)

by Roderick Cameron

Hayrettin Karaca, an IOS member and one of Turkey's best-known environmentalists, died January 20 at the age of 97. He received a Lifetime Service Award from the IOS in 2012 in recognition for his work restoring eroded environments in Turkey by planting acorns to establish oak forests and rehabilitate oak stands and coppices.

Hayrettin was born on April 4, 1922, in Turkey's western province of Balikesir, and built a successful textile business in the first part of his life. However, in the 1970s, he became increasingly concerned with the environmental degradation he witnessed during his travels around Turkey, especially soil erosion.

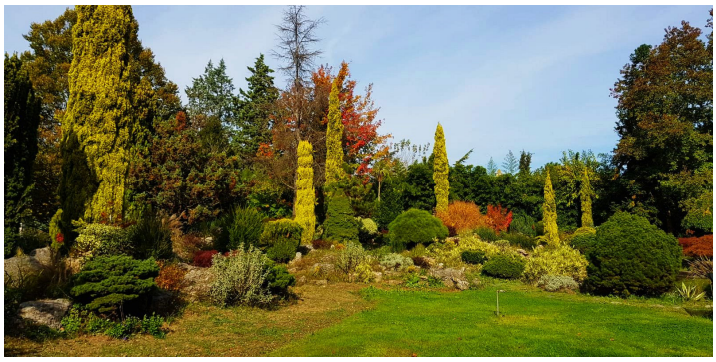
In 1992, together with fellow businessman Nihat Gökyiğit, Karaca founded TEMA Foundation (Türkiye Erozyonla Mücadele Ağaçlandırma ve Doğal Varlıkları Koruma Vakfı – The Turkish Foundation for Combating Soil Erosion, for Reforestation, and the Protection of Natural Habitats). Its mission is to raise public awareness of environmental problems, specifically soil erosion, deforestation, biodiversity loss, and climate change. TEMA has launched numerous initiatives to influence government and business practices. It has designed and carried out around 150 demonstration projects on sustainable rural development, reforestation, biodiversity conservation, and sustainable land management across the country.

Due to his environmental activism, Karaca became a well-known and beloved public figure in Turkey, where he was known affectionately as "Toprak Dede" ("Grandpa Earth"). He often took the opportunity to educate children and young people about the importance of protecting nature.

Hayrettin Karaca - Source: TEMA Foundation

His numerous awards include the Forest Hero Award from the UN in 2013 and the Right Livelihood Award, commonly known as the Alternative Nobel Prize, in 2012 "for a lifetime of tireless advocacy and support for the protection and stewardship of our natural world, combining successful entrepreneurship with effective environmental activism."

"One should not consume more than one needs," he often said. "You might have the money that allows you to consume, but you don't have the right." He stopped spending money on clothes and was known for wearing the same red sleeveless sweater for decades, particularly at tree events. It was given to him by his son, made from left-over yarn.



Karaca Arboretum in autumn - Source: Karaca Arboretum

"The carrying capacity of the ecosystem is not unlimited," Karaca told the Right Livelihood Foundation in a 2012 interview. "I cannot exist without the Earth's vital life-support systems. Therefore I should not destroy what is necessary for me to live. I do not have the right to ruin or destroy the ecosystem."

In 1980 he founded the first private arboretum of Turkey. Located in the northwestern province of Yalova, Karaca Arboretum's story began as a house garden project in 1976 when Karaca's botanical interest led him to transform his garden into an arboretum. While traveling around Turkey searching for plants, he witnessed massive erosion, disappearance of plant varieties, ruined grasslands, springs that had run dry, and the sad remnants of forests claimed by fire, developers, or farmers looking for new croplands.

Karaca Arboretum covers an area of 13.5 hectares and contains rock gardens, rosaries, iris gardens, miniature plants, and indigenous bonsai plant collections. Special plant collections include *Acer*, *Prunus*, *Malus*, *Magnolia*, *Quercus*, *Betula*, *Pinus*, *Abies*, and *Picea* species. It holds over 7,000 species, subspecies, and varieties of plants and received an Arboretum Distinguished for Merit Award from the International Dendrology Society in 2004.

Hayrettin joined the International Oak Society in 2000 and attended the 3rd IOS Conference in Asheville, North Carolina. In the fall of 2002, TEMA hosted a seven-day IOS Tour of Turkey, which included a visit to Karaca Arboretum, where Hayrettin fed the group so generously that they were late arriving at their hotel! During the visit the oak enthusiasts spotted an unusual oak, apparently a hybrid of *Q. rysophylla*: it was propagated and later named *Quercus* 'Zehra', after Hayrettin's daughter (see "Cultivar Close-Up", p. 6).

"I recall so many things about Hayrettin," said former IOS President Guy Sternberg, "his attention to detail, his glorious arboretum, and his passion for trees certainly are among them. But personally, two things stand out in my mind.

"The first was during the North Carolina Conference in 2000, when he and Nihat Gökyiğit serenaded me at dinner with the Turkish version of Happy Birthday. I had just turned 53 during that event, and those two dapper gentlemen spontaneously brought down the house with everyone there stomping their feet and clapping in unison. This was a fun side of him I had not realized existed.

"The other, surely more important one, came a little later when I was in Turkey with a few other oak nuts. We learned about the project he and Nihat had begun with their TEMA Foundation. The goal was to 'plant 10 billion acorns to hug the soils of Anatolia' (the Turkish region which had suffered so much from millennia of overuse and soil degradation). Their profound motto was 'Interfere in matters that are none of your business'!

"What better motto should we all share than that, and what better reason to recognize this and so many other environmental actions than with our Lifetime Service Award? I hope his arboretum, and his memory, will live forever."

Species Spotlight:

Quercus tarokoensis Hayata

by Joeri Strijk

Quercus tarokoensis (local name 太魯阁栎 tai lu ge li, "oak of Taroko") is a fairly unknown oak species, restricted to eastern Taiwan. It occurs throughout low

Acorn and leaves of *Quercus tarokoensis* © Ming-I Weng

to mid elevation on steep slopes (400–1,300 m) and is often reported on calcareous substrates, such as limestone complexes. According to the first description by Hayata (1918), the species is somewhat similar to *Q. spinosa* but can be distinguished by the "more acute, smaller, thinner and less wrinkled leaves." The species epithet refers to Taroko Gorge in Taroko National Park, where the specimen described by Hayata was found. The name ultimately derives from a word in the Truku language (spoken in northern Taiwan) which means magnificent or beautiful, applied in reference to the landscape.

Up to 18 species of oaks have been reported from Taiwan, in addition to 25 species in other Fagaceae genera (*Fagus*: 1; *Lithocarpus*: 15; *Castanopsis*: 9). Of the oaks, 7 are endemic to Taiwan[1]: *Quercus hypophaea*, *Q. liaoi*, *Q. longinux*, *Q. morii*, *Q. stenophylloides*, (all section *Cyclobalanopsis*), *Q. tarokoensis*, and *Q. tatakaensis* (both section *Ilex*).

The topography in Taiwan is extreme—the west has flat to gently rolling plains while the eastern part is dominated by mostly rugged forest-covered mountains running northeast-southwest, with over 200 peaks above 3,000 m. Over 55% of the island remains forested, with most of it contained within the eastern mountain ranges. A full overview of all species on the island is being prepared in advance of the IOS Conference to be held in Taiwan in 2021 and can be found on the Asian Fagaceae webportal: (www.asianfagaceae.com).

***Quercus tarokoensis* in flower © Ming-I Weng**

Quercus tarokoensis can occur as a shrub, but can also grow as trees up to 12 m tall. Petioles are short (3–5 mm), usually brownish, tomentose. Leaves are narrowly oval, leathery, 2–4 cm long and 1.5–2.8 cm wide. Midrib above occasionally reported with or without brown stellate hairs. Basal section of the midrib below sometimes with stellate hairs. Leaf apex acuminate, base (sub-)cordate. Margin with spiniform teeth, apically with 1–2 (3–5) pairs of teeth. Midvein and secondary veins (5–10 pairs), adaxially inconspicuous.

[1] The subspecies *Quercus spinosa* subsp. *miyabei* is also endemic to Taiwan.

Shrub form of *Quercus tarokoensis* © Ming-I Weng

Branchlets are generally slender, grayish to grayish-brown pubescent, glabrescent and lenticellate, becoming glabrous at later stages. Lenticels are brownish and orbicular. Bark reddish to grey-brown. Cupule cup-shaped, 5–7 mm wide × 1–1.3 cm deep, enclosing up to ¼–½ of the nut. Bracts covering the cup appressed, ovate, ca. 1 mm long, densely grayish brown pubescent except for apex. Nut ovoid to narrowly ovoid, 1.4–1.8 cm long and 0.8–1 cm across. Nut glabrous, carrying a scar ca. 3 mm in diameter. Flowering commonly occurs in June–July, resulting in fruiting throughout November–December of the following year.

Preliminary phylogenetic analyses[2] using molecular data have suggested a close relationship of *Quercus tarokoensis* with *Q. variabilis*, *Q. dolicholepis*, and *Q. baronii*.

A Global Conservation Consortium for Oak

by Amy Byrne

The Global Conservation Consortium for Oak (GCCO) has launched! Developing the GCCO was a collaborative effort—and involvement from passionate IOS members was an integral component. Sharing your expertise, knowledge, and experience with oaks at the last Triennial Conference workshop at UC Davis was vital to successfully launching the GCCO. Thank you for your contributions.

Led by The Morton Arboretum, in partnership with Botanic Gardens Conservation International (BGCI), the GCCO aims to mobilize a network of institutions and experts to work collaboratively in order to develop and implement a comprehensive conservation strategy that prevents the extinction of the world's oak species. It was formed to deliver integrated conservation of oak species through practical ex-situ (in

[2] Yang, Y., Zhou, T., Zhu, J., Zhao, J. and Zhao, G., 2018. Characterization of the complete plastid genome of *Quercus tarokoensis*. *Conservation Genetics Resources,* 10(2), pp.191–193.

cultivation) and in-situ (in the wild) conservation and to disseminate species recovery knowledge. There are various roles and tiers of membership for the Consortium: Consortium Lead (held by The Morton Arboretum), Consortium Steering Committee (CSC), Species Champions, Safe Sites, and Affiliates. Please see the "Global Conservation Consortia Roles and Responsibilities" document available on the IOS website (https://bit.ly/IOS-GCCO) to learn more about each tier of GCCO membership and to identify the level at which you would like to participate.

The Morton Arboretum will be hosting a GCCO kick-off meeting **May 28–29th, 2020 at The Morton Arboretum in Lisle, Ill., USA**. If you would like to be included on the mailing list, have any questions, or want to submit your RSVP, please email Amy Byrne (abyrne@mortonarb.org).

Prior to the GCCO kick-off meeting, we will be hosting an informational webinar on **February 26th** at 11 am CT (UTC -6:00 hours) to review the GCCO governance structure and long-term goals. This will be an opportunity for you to ask questions and learn more about the Consortium. We will try to record the webinar so those who can't attend can view it later. If you would like to receive a calendar invite to join the webinar, please email Amy Byrne.

GLOBAL CONSERVATION CONSORTIUM
OAK

Cultivar Close-Up:

Quercus 'Maya' and 'Zehra'

by Ryan Russell

There are a growing number of unique hybrid selections that feature *Quercus rysophylla* as one parent. *Quercus rysophylla* is apparently quite prone to outcrossing with other *Lobatae* section oaks, or maybe it just seems that way as most of these selections have come out of cultivated collections. In any case, the two selections featured here are a couple of the older cultivars, but two newer selections, *Q.* 'Belle d'Aquitaine' (selected by Béatrice Chassé from a plant growing at Arboretum des Pouyouleix, France) and *Q.* 'Chocha' (selected by Francisco Garin from a plant at Jardín Botánico de Iturraran, Spain), exist as well, and you can read up on all of these in greater detail in the 2015 International Dendrology Society Yearbook article by Allen Coombes.[1]

[1] Coombes, A. 2015. Tree of the Year: *Quercus rysophylla* Weath. *International Dendrology Society Yearbook* 2015*: 22-52.* (https://bit.ly/Coombes2015)

Quercus 'Maya' is a medium-sized evergreen tree grown for its ornamental immature leaves which emerge bright pinkish-red and slowly turn a glossy green. Of the *Q. rysopyhlla* hybrid selections, 'Maya' is most like its known parent species, differing notably in the variable lobed and toothed margins of its leaves.

New growth on *Quercus* 'Maya' © Dirk Benoit

'Maya' was originally received as a seedling at Bömer Nursery, Zundert, the Netherlands, from Mallet Court Nursery, UK. 'Maya' has been offered by European nurseries such as Bömer Nursery and Pavia Nurseries, Belgium. In addition to its spring color and overall beauty, it has become popular in Europe for its hardiness. 'Maya' was designated as "Best Novelty" at the Groot Groen exhibition in Zundert, the Netherlands in 2006.

Quercus 'Zehra' is a tree of medium size, grown for its ornamental evergreen habit. Leaves are unique in that they typically display three prominent lobes reminiscent of *Q. falcata*, and subsequent observations have suggested that *Q. falcata* could be the other parent. It was discovered at Karaca Arboretum, Yalova, Turkey during a 2002 IOS tour. Though labeled as *Q. rysopyhlla*, it was of obvious hybrid origin. Scions

***Quercus* 'Zehra' leaves © Dirk Benoit**

were sent to Pavia Nursery where it was propagated and named 'Zehra' after the daughter of the late Hayrettin Karaca, owner of Karaca Arboretum (see p. 3).

This selection has proven hardy to temps as low as -29 °C.[2] The ortet of 'Zehra' originated in the US, but exact origins are unclear. It is possibly a sister seedling to a hybrid at Rosemoor Gardens, Devon, UK, also thought to be a *Q. rysophylla* × *falcata*. Ultimate size is unknown, but the original plant at Karaca Arboretum is over 10 m tall.

Reviewers Sought for Red List of Asian Oaks

by Editorial Staff

Christina Carrero at The Morton Arboretum is looking for reviewers of threat assessments for oak species in Asia, the final stage of a project Red Listing all the oaks of the world. The majority of the species for this review occur in China and Southeast Asia. This is a general call for anyone with knowledge of oaks in this region or contacts who would be willing to be a reviewer for these species. The data mostly concerns population demographics and trends, distribution, and species' threats. As a reviewer you will be listed in the species' publications on the Red List. Several IOS members have already responded to our previous call sent out via email, but multiple reviewers would be helpful for the project. If you are interested in participating in this effort, please email Christina at ccarrero@mortonarb.org

Readers of our recent publications may be familiar with the Oak Red Listing Project: In January, 2015,

***Quercus austrocochinchinensis*, a Southeast Asian oak currently listed as Vulnerable in the IUCN Red List**
© Qian-sheng Li & Min Deng

[2] Chassé, B. 2013. Taking Oaks to the Limit in the Czech Republic. *International Oaks* 26: 77-88. (https://bit.ly/Chasse2013)

***Quercus brevicalyx*, a Southeast Asian oak currently shown as Data Deficient by the IUCN Red List, illustrated by Keiko Tokunaga © (http://www.donguriworld.com/)**

The Morton Arboretum launched a project in collaboration with Botanical Gardens Conservation International and the International Union for Conservation of Nature/Species Survival Commission Global Tree Specialist Group, which aims to complete IUCN Red List threat assessments for all of the world's oak species. Many oak species are known to be facing habitat destruction, climate change, invasive pests and pathogens, and competition from invasive plants. Therefore, it is important to have an up-to-date understanding of the threats facing this globally important tree genus.

To complete the Red List assessments, the team at The Morton Arboretum has been gathering extensive data on oak distributions, threats, population trends, and human uses. Oak species of the United States were the first group targeted, and in September 2017 the Red List of US Oaks was published, covering 91 species, of which 20 were determined to be of conservation concern. European oaks have also been assessed (30 species) and assessment of 162 Mexican and Central American oak species has recently been completed.

Asian oaks are particularly challenging for this project: these oaks are not only the most threatened group globally (about a third of species in Asia will likely be assessed as threatened) but also have the highest number of Data Deficient species (about 20%). This raises serious concerns because data needed to determine appropriate threat categories are largely lacking. Many Data Deficient species turn out to be threatened once the necessary demographic information is obtained.

A complete Red List of all oak species will be published later this year. Red List assessments can then be used to influence conservation policy and to prioritize species for protection and propagation. "In addition to being iconic and beloved tree species in many parts of the world, oaks support many important ecosystems, such as oak savannas in the American Mid-

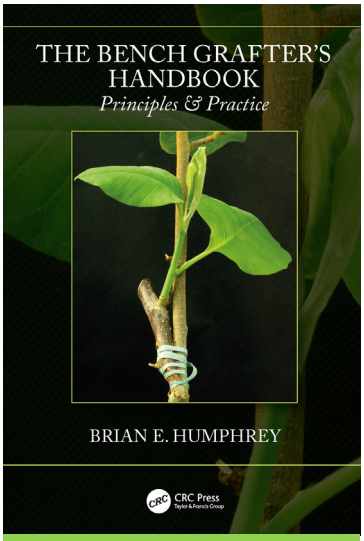
west and cloud forests in Mexico and Central America," said project lead Murphy Westwood, director of global tree conservation at The Morton Arboretum. "Countless animals and other plants depend on oak-dominated habitats for survival. So, as oaks disappear, there will be a tangible, negative impact on wildlife, potentially upsetting the balance of forest habitats. With the IUCN Red List assessments and associated report, we now have a baseline from which to determine how to best conserve oaks and reverse the trend toward extinction for these important trees."

Book Review:

The Bench Grafter's Handbook

by Gert Fortgens

In the introduction the author clearly defines what this book is about: "the fusion of skills and knowledge involved in grafting temperate woody plants." Bench grafting is the term used for any grafting not carried out in the field.



The Bench Grafter's Handbook: Principles & Practice
Brian E. Humphrey
CRC Press, Taylor & Francis Group, Boca Raton, 2019.
638 pages.

Since starting his working career in 1954, Brian Humphrey has worked for the renowned Hillier Nurseries and Notcutts Nurseries in Great Britain. Now retired and living in coastal Suffolk, England, Brian has compiled his life-long experience in all aspects of grafting trees and shrubs in a 638-page volume. This is a book for study as well as a great reference for all who want to learn about grafting or gain deeper knowledge of the craft. The paperback is large and quite a handful, but it opens very well and is easy to use and makes comfortable reading.

The book is divided into eight parts covering different aspects of grafting, from background knowledge ("Why Grafting?") to a most usable checklist with details of more than 200 genera, encompassing over 2,000 species, varieties, and cultivars.

In Chapter 12, "Compatibility" (in Part Three: "Achieving the Union") the author is not afraid to touch on the bias against the use of grafts: "Several genera with known compatibility problems present a particular challenge, *Quercus* being a prime example." Most interesting is to read about his thoughts on how future investigation may reveal the mysteries of this problem. Recognizing incompatibility, causes of incompatibility, predicting incompatibility, and strategies to overcome incompatibility are all clearly dealt with.

Unusual grafting techniques and suggestions are offered to overcome this incompatibility problem. One of them involves hybrid seedlings as rootstocks. Another technique described is double-working, which, according to the author, has particular relevance for *Quercus*. In this technique, a portion of interstem is grafted to the rootstock, then scion is grafted to the interstem. As an example, Brian describes his limited but promising success in grafting *Q. lamellosa* to *Q. myrsinifolia.* He suggests that the success may be due to the particular characteristics of the *Q. myrsinifolia* rootstock used, and that this plant could be vegetatively propagated to create a mother plant that would in turn provide interstems for grafting *Q. lamellosa* on *Q. myrsinifolia* using the double-working technique. Although the success was only one of very few in a trial batch, the result could be a big step forward in finding ways to overcome the difficulties of grafting oaks in section *Cyclobalanopsis*. He is likely one of the few to ever have been successful in grafting species of oaks within this section!

Chapter 19 is about the role of grafting in conservation. Not only for plants of interest in cultivation but

Oak Conservation & Research Fund Update

A huge "Thank you!" to all who have donated so far to the new Oak Conservation & Research Fund! If you haven't contributed yet, don't worry—it is not too late! We have already received $12,000 toward our $20,000 goal to match the generous donation by Mark and Jolly Krautmann that kick-started this exciting and urgently needed funding opportunity. Please help us bridge this gap!

The Oak Conservation & Research Committee is in the process of recruiting additional members so that we can develop a call for proposals this year. Please reach out to Murphy Westwood (mwestwood@mortonarb.org) if you would like to learn more. To donate to the Fund, please visit the webpage: https://bit.ly/IOS-Appeal-2019

also for naturally occurring species, subspecies, and natural hybrids. An example given is grafted *Magnolia omeiensis* from a range of genotypes that are due to be planted back on Mount Omei in China to supplement those in existence on the mountain.

Chapter 49 (in Part Seven: "Genera-Specific Requirements") is about the genus *Quercus* (as the author states: "the most challenging of temperate genera to achieve long-lasting compatible graft unions"). In 11 pages (only the chapter on *Rhododendron* extends to more pages—18!), all aspects about grafting oaks are presented. For each section, the author recommends what rootstock to use for which species. In addition, the appropriate season for grafting, grafting methods, type of scion wood, and physiological and environmental factors are all clearly dealt with and practical information is provided. Although mentioned in chapter 4, but not specifically for *Quercus*, I missed in this overview the aspect of grafting as low as possible (at or below the hypocotyl). The objective being that when planted deep (with the graft union planted beneath the soil) the scion will start rooting and eventually will develop into a tree growing on its own roots, thus overcoming delayed incompatibility.

Throughout the whole book, photographs and line drawings accompany the text. The book ends with a plant index, a subject index, and an extensive bibliography of works cited that elicits respect for the enormous amount of work the author went through to compile this handbook. To summarize: this book will certainly be a long-term standard reference book for all who are propagating by grafting and for all who show an interest in grafting and want to know more about this subject!

Burr Oak Canyon Symposium 2019

by Dan Kostka

On October 17, 2019, 80 participants gathered in McCook, Nebraska for a two-day conference and field trip titled "Growing Better Trees Across the Great Plains". The event was sponsored by the Norris Institute, Nebraska Statewide Arboretum, Nebraska Forest Service, Mid-Plains Community College, and others. Uniquely arranged, the Nebraska Statewide Arboretum (NSA) has small, satellite collections throughout the state, designed to generate interest and demonstrate what grows best in each region. NSA also propagates and sells native plants.

Thursday morning began with workshops and lectures and ended with a tree planting in the nearby park. The evening festivities included a barbecue at IOS member Bruce Hoffman's nursery, Common Scents. Bruce did a tremendous job (along with several others) organizing and planning this event.

Group photo at Burr Oak Canyon © Dan Kostka

From the lectures, here are a few highlights that might be interesting to the IOS membership:

Greg Morgenson, Woody Plants Specialist at North Dakota State University, explained that *Quercus alba* and *Q. bicolor* can be grown in North Dakota if they are grafted on *Q. macrocarpa* rootstock. He showed photos of fossils illustrating that *Ginkgo biloba* and *Cercidiphyllum japonicum* were once native in the state.

IOS Member Tim Buchanan, retired City Forester of Fort Collins, Colo., presented photos and a list of oak species generally recommended for his area.

- Section *Quercus: Q. macrocarpa, Q. muehlenbergii, Q. prinoides, Q. turbinella, Q. ×undulata, Q. gambelii.*
- Section *Lobatae: Q. shumardii, Q. buckleyi.*

Tim mentioned that many other species are currently under evaluation. Surprisingly, one 15-year-old *Q. nigra* has performed very well and survived -20 °F. Also of note, a seed selection of *Q. buckleyi* known as "Collins" is grown from seed of the best *Q. buckleyi* in Fort Collins, and this mother tree was grown from wild-collected seed from the Lubbock, Tex. area. The forester from Cheyenne, Wyo. recommends the hybrids *Q. macrocarpa* × *robur* and *Q. macrocarpa* × *turbinella.*

Brian Byers, co-owner of Great Plains Nursery, de-

Interesting leaf variation on specimens found in Burr Oak Canyon © Dan Kostka

scribed how they grow their woodies in RootTrapper® grow bags and RootMaker® air-pruning containers, so the plants grow numerous fibrous roots and few circling roots. They are growing and selling the "relict bur oak" from Burr Oak Canyon and "Collins" *Q. buckleyi*. He noted the *Q. macrocarpa* from the Black Hills of South Dakota tend to be plagued with galls, even when they are grown in Nebraska.

Eric North, University of Nebraska–Lincoln, gave us the following tree statistics: there are an estimated 3 trillion trees on the planet; 60,000 species; 750–1,000 species north of Mexico; and about 50 species in Nebraska. The United States has both the oldest (*Pinus aristata*, 4,900 years) and tallest (*Sequoia sempervirens*) known trees.

Tim McDonnell of the Kansas Forest Service provided a list and photos of his tree recommendations for a diverse and sustainable landscape. Diversification to him means having 15% or less of one family, 10% or less of one genus, and 5% or less of one species. He has ventured into recommending non-natives that are well behaved. For example, there is a planted male *Pistacia chinensis* in Manhattan, Kan. that survived -25 °F. Tim mentions that they have many trees under evaluation currently. He told me that *Q. laceyi* is being grown as far north as Kansas City, Mo. and encouraged me to try it another 100 miles north. Someone have seed to share :o)?

Friday afternoon we traveled to the area known as

"Tree talk" under a mysterious oak © Dan Kostka

Burr Oak Canyon. This area is privately owned by cattle ranchers Roger and Lisa Lewis who graciously granted access to this location found on their 3,900 acres. Both Roger and Lisa attended the barbecue, and Roger joined us in the canyon. Great people!

Once inside the canyon, Tim Buchanan, Bruce Hoffman, and Steve Rolfsmeier (Chadron State College botanist) swung into action and made sure we understood what we were seeing.

A number of questions come to mind when exploring this canyon, such as why does this isolated population of oak trees exist? One reason may be introgression, and we saw potential evidence of genetics from *Q. gambelii* and *Q. stellata* along with the *Q. macrocarpa.* One individual looked like mostly pure *Q. gambelii*, complete with small unfringed cups.

There was great variation in form and leaf. Overall, the twigs are thicker and the branches more descending than the "average" *Q. macrocarpa* form. The consensus was this was due to both environment and genetics. I do not recall seeing any trees that grew above the top of the canyon. This is an area of high wind and annual precipitation that averages 14 in, with occasional flash floods. Several individuals had exposed roots that had grown bark—and one of these roots had grown a twig with a leaf!

Efforts are underway to help these trees. There was not a good mix of oak tree sizes as most were old, mature trees. The owners are taking steps to exclude their cattle. Several relict oak seedlings have been planted inside cages to exclude deer (a.k.a. pasture rats). At least two parties are collecting seed and growing seedlings to be planted in the canyon and elsewhere. *Juniperus virginiana* was present, but not in large numbers. No birds or squirrels were seen, although Roger noted he hunted squirrels when he was younger. There were few acorns this year, and Bruce and the critters had already removed them.

Thanks again to the ranch owners Roger and Lisa Lewis. I was encouraged by their appreciation for these trees, as well as the number of younger participants at the Symposium.

Researchers Map the Evolutionary History of Oaks

by Editorial Staff

A new paper published in October 2019 provides the most detailed account to date of the evolution of oaks, recovering the 56-million-year history that has made the oaks one of the most diverse, abundant, and important woody plant groups to the ecology and economy of the Northern Hemisphere.

How oaks are related has long posed a challenge to scientists. Dr. Andrew Hipp, senior scientist at The Morton Arboretum, led an international team of 24 scientists to unravel the history of global oak diversity for the first time using DNA sequencing of 260 oak species, combined with genomic mapping and fossil data.

Fundamental questions about relationships between organisms and the genes that drive ecological diversification underlie the secrets of biodiversity. Understanding the past of this ecologically, economically, and culturally important group provides a baseline of knowledge that will allow scientists to address additional questions about oaks and other trees, as well as help with conservation efforts.

"This paper demonstrates that oaks have repeatedly and globally diversified in response to ecological opportunity," says Hipp. "The changes in the global landscape have given us the gift of the oak diversity we observe today."

The study, entitled "Genomic landscape of the global oak phylogeny" and published in *New Phytologist*, provides an account of the evolutionary history of the world's oaks. Investigating which parts of the oak genome distinguish species from one another, researchers at The Morton Arboretum, in collaboration with 17 institutions around the world, discovered that each gene or stretch of DNA in the genome has the potential to record multiple histories; each section bears the history of speciation of one oak lineage, but it may record the history of hybridization for a different lineage. In other words, there is no one region of the genome that defines oaks: it is the patchwork of histories embedded in the genome that characterize the history of oak evolution.

In addition, this research shows that different oak lineages have repeatedly diversified in the same area. The several sections in the genus *Quercus* arose rapidly and segregated to either the Americas or Eurasia. All of these lineages can be found in part of their range with at least one other lineage. As oaks migrated, species interbred, hybridized, and diversified opportunistically in response to changes in the landscape. The highest rates of species diversification have been in response to migrations into new territory. Over and over, oaks have taken advantage of ecological opportunity to produce the enormous diversity we see today.

"For the first time, this paper demonstrates that the history of different [oak] lineages is driven by different sets of genes," said co-author Dr. Antoine Kremer from the French National Institute for Agricultural Research. "The story of oak evolution is especially fascinating due to the ecological and morphological convergence in different oak lineages that cohabit on the same continent."

Tour Updates

by Shaun Haddock

Our first oak event of 2020 will be in the Southern Hemisphere autumn, a two-day event on April 25 and 26 near Gisborne in New Zealand, organised in conjunction with the New Zealand Farm Forestry Association. The first day will be spent at Eastwoodhill Arboretum (the National Arboretum of New Zealand), the second at the late Bob Berry's famous Hackfalls Arboretum. This is a wonderful program of must-see collections, but will require a considerable journey for the majority of our members. Nevertheless, I am happy to report that several members from abroad have already registered for the event. New Zealand has unsurpassed scenery and friendly people, so why not combine the event with the holiday of a lifetime? For more details, visit the Events page on our website: https://bit.ly/NZOOD2020

View of Hackfalls Arboretum, one of the destinations of the New Zealand Oak Open Days to be held in April © Roderick Cameron

In July we hold our "European" Oak Open Days event in Wales in the United Kingdom. We commence on Saturday, July 11 at the beautiful Glanusk Estate in central Wales, where Harry Legge-Bourke continues the collection of his late father Bill. The following day we visit Thomas Methuen-Campbell, whose Penrice Castle estate on the south coast is in a stunning setting running down to the sea. A history of this ancient estate can be found under: http://penricecastle.co.uk/penrice-estate-history A part of the group has already planned to visit in addition the National Trust's Dyffryn Gardens near Cardiff on Monday 13; Dyffryn Gardens include some champion oaks and much else. Cardiff is on the most direct route back to England and has an eclectic collection of trees in its parks. This is promising to be a social event, as 20 members have already expressed interest.

Sadly, our anticipated tour to Cyprus has been cancelled, as our potential organiser and guide has decided that he should no longer fly. Good for the planet but fatal to our tour.

Ezra Barnea has put together a five-day tour in Israel at the end of October, commencing either October 18 or 25, and starting at the Jerusalem Botanic Garden. The programme for the tour can be found on the IOS website (https://bit.ly/IOS-Israel) and also more details and photographs concerning the other events above can be found under "Upcoming Events" on the site.

Please contact tours@internationaloaksociety.org to register interest in an event.

From the Board

by Shaun Haddock

There were fewer items than of late on the agenda of your Board's most recent meeting: here is a brief synopsis.

It was brought to our attention that IOS Journal articles were not appearing in Google Scholar searches. Research by our e-wizard Roderick Cameron revealed that certain adjustments and modifications would be needed to our website restrictions and our way of displaying these articles, which the Board approved. When modified, articles from more than three years ago will appear in searches by the general public, but for articles in the three most recent Journals only titles and abstracts will appear in searches and the full-text pdfs will remain available only to IOS members. A method of charging non-members for access will be researched.

Our budget for 2020 was discussed, but significant "known unknowns", particularly regarding postage, will remain until the 2020 Journal has been published and sent out. Aside from this, long-term members will have noticed that the Conference Proceedings issue of the Journal differs both in size and content from the non-Conference Journals, increasingly so in recent years, reflecting a change in scope and substance of the Conferences. In order to best manage Journal costs in our budget, it was resolved to move the cost of producing and mailing the Proceedings entirely into Conference budgets. This will allow us to focus fund-raising efforts to cover the cost of the Proceedings and will improve the long-term sustainability of our finances.

The very successful appeal on behalf of the Oak Conservation and Research Fund was of course on the agenda, but you will find more recent information elsewhere in this newsletter (see page 8).

Dan Kostka from Nebraska joined the Board in 2018, and has agreed to "shadow" and help our Secretary Jim Hitz with his duties. Thank you Dan! And this is perhaps the place to mention that the IOS is always on the lookout for potential new Committee and Board members. Our Committees include Editorial, Finance, Taxonomy, Tours, and Oak Conservation and Research, and we are always looking for members to help with website administration. So if you feel you have something to offer please contact postmaster@internationaloaksociety.org

Finally, many thanks to all members who renewed their membership this year. If your membership expired at the end of 2019, please renew as soon as possible. You can check your membership status and renew if need be by logging into the IOS website and clicking on "My Account" and "Renewal" in the Member Menu. If you run into difficulties, contact Secretary Jim Hitz by writing to membership@internationaloaksociety.org

2021 Conference in Taiwan

Mark your calendars! Conference organizers have announced dates for the 2021 Conference: **Sunday, October 24** through **Wednesday, October 27, 2021.** Conference Tour dates will be announced in due course. We will also soon share information regarding cost and registration. Hope to see you there!

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