

A Hybrid's Tale

A new intergeneric hybrid between

Franklinia and Schima reunites ancient flora and enhances conservation efforts.

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Everyone, whether a green industry professional or the average homeowner, has at times been awed by Mother Nature's splendor, wanting to recreate some of her beauty in their own landscapes. Yet sometimes spectacular plants fail miserably in the landscape because they can't defend themselves against the ravages of the real world. Breeding, however, can fortify a plant and help meld beauty and brawn. This is what happened when Franklinia (*Franklinia alatamaha*) was reunited with a distant relative, the Schima tree (*Schima argentea*), to create an exciting new hybrid.

In the Beginning. The story behind the discovery and rescue of Franklinia is legendary. John and William Bartram, on a father and son botanical excursion, lost their way and were forced to camp along the banks of the Altamaha River in Georgia in the fall of 1765. A brief journal entry describes how they "... found severall [sic] very curious shrubs ..." that they "... could form no opinion to what class or tribe it belonged."

However, these shrubs must have made quite an impression, because William later returned to the spot to collect seed and complete botanical illustrations of Franklinia

in full bloom, describing the plant as "... a flowering tree, of the first order for beauty and fragrance of blossoms." What makes the story even more extraordinary is the tree has not been seen in the wild since; it appears that all the plants in existence have descended from William's collections. The Bartrams — without realizing it at the time — saved Franklinia from extinction!

Ever since its discovery, there has been considerable speculation, discussion and disagreement on the origin, taxonomy, nomenclature and systematics of this plant. In North America, the closest relative to Franklinia is the loblolly bay (*Gordonia lasianthus*). In fact, when William first saw Franklinia in flower, he wrote: "On drawing near the fort, I was greatly delighted at the appearance of two new beautiful shrubs, in all their blooming graces. One of them



Although *Franklinia alatamaha* (left) is a beautiful species, it is typically short-lived and very susceptible to a number of diseases. However, a close relative — *Schima argentea* (right) — is tolerant of a wide range of environments.

appeared to be a species of *Gordonia* [referring to *Franklinia*], but the flowers are larger, and more fragrant." Loblolly bay is native throughout the southeastern US and was described just a few years before the discovery of *Franklinia*.

Deciphering North American flora was a monumental feat. *Gordonia* was originally given the pre-Linnaean name of *Alcea floridana*. Botanist Carolus Linnaeus was puzzled by the plant and classified it as *Hypericum lasianthus*, a member of the Guttiferae (St. John's worts). After later being reclassified as a *Hibiscus*, it was eventually elevated to its own genus — *Gordonia*.

The taxonomic placement of *Franklinia* was equally unclear. After extensive study, William concluded the plant was sufficiently distinct from *Gordonia* and coined the new genus, *Franklinia* — named after the illustrious Dr. Benjamin Franklin. The Europeans, however, did not see it that way and quickly renamed it *Gordonia pubescens*. Even today, the debate has never really been settled.

An Elegant Tree. From an ornamental standpoint, *Franklinia* is a beautiful species. The flowers are showy and reminiscent of large camellia blossoms. It blooms from midsummer into late fall, and the combination of white flowers

overlaying the maroon fall foliage can be spectacular. Despite its southern nativity, this tree is surprisingly cold-hardy, tolerating winter temperatures as low as -30° . However, *Franklinia* is not as common in the landscape as one might expect.

The plant is typically short-lived and very susceptible to a number of diseases, particularly *Phytophthora cinnamomi*. This has proved to be a substantial problem and has severely limited how useful the tree is in a landscape.

Franklinia has also proved frustrating for plant breeders who would like to better its disease resistance. Improvement is difficult, as there is little genetic diversity to work with within the species, and it is generally considered the only species in the genus. This leaves the challenging opportunity of trying to hybridize *Franklinia* with other genera found within the tea family (Theaceae).

At one point, Dr. Elwin Orton, a research professor in ornamental horticulture at Rutgers, The State University of New Jersey, New Brunswick, attempted to hybridize *Gordonia* and *Franklinia* and was successful in rearing a handful of seedlings. Unfortunately, he reported they all declined and eventually died within a few years. Going even a bit further than Orton, Dr. William Ackerman, a retired research geneticist with The US

National Arboretum, Washington, DC, attempted to hybridize *Camellia* species with *Franklinia*. Yet, after completing thousands of crosses, he reported on two putative hybrids that were weak growers and, therefore, never introduced.

It's all Relative. One might assume that *Franklinia*'s closest relative is found in North America. However, in some cases, very closely related taxa can be found in both North America and Asia. In paleobotany terms, these close relatives are referred to as "disjunct Tertiary relics." Geological evidence indicates that prior to the Cretaceous period (144 million years ago), there existed one very large supercontinent — Pangaea — which comprised Laurasia and Gondwana. Eventually the supercontinent fractured, and Laurasia moved toward the Northern Hemisphere, and Gondwana toward the Southern Hemisphere.

Laurasia then broke apart in the Tertiary period (26 to 66 million years ago). This disjunction separated North America from Eurasia and separated the plants that eventually gave rise to Asian and North American species. Due to common ancestry, some plants can be closely related, even though they are found continents apart. This pattern exists for many plants, including species



The new intergeneric hybrid — *×Schimlinia floribunda* — combines the ornamental qualities of *Franklinia alatamaha* and the adaptability, utility and genetic diversity of *Schima argentea*.

found within *Calycanthus*, *Cotinus*, *Hamamelis*, *Liriodendron* and *Magnolia*. It appears this is the case for plants in the tea family as well.

Taxonomy, like all science, is a process of ongoing study, revision and reassessment. Some traditional taxonomists working with the tea family recognized there were certain similarities between *Franklinia* and plants in the Asian genus *Schima*. More recently, the emerging field of molecular phylogeny (comparing similarities in DNA sequences to elucidate evolutionary patterns) has provided tremendous insight into the relatedness of plants. In a recent study by Drs. Linda Prince, then a graduate student, and Clifford Parks, a retired professor of botany at the University of North Carolina at Chapel Hill, new molecular data indicates *Franklinia* appears to be more closely related to *Schima* than *Gordonia*.

Although not well-known in the US, *Schima* is a diverse and interesting group. The taxonomy is a little hazy, but there are more than 25 species that are native to warm and tropical regions throughout Nepal, India, China, Japan and Indonesia. These different species range from shrubs to large trees and are often used for fodder, fuel and timber. They are commonly found in forests and are often used for reforestation efforts due to their adaptability and tolerance to a wide range of environments, including dry sites, low soil fertility and clay soils. Some *Schima* species have been

used for medicinal purposes, while others have been planted as firebreaks.

A Breeding Chance? Some of the unique qualities exhibited by *Schima* prompted the question: Could *Schima* provide new opportunities for breeding with *Franklinia*? Hybridization between *Franklinia* and *Schima* could potentially combine the cold hardiness and desirable ornamental characteristics of *Franklinia* with the adaptability, utility and genetic diversity of the *Schima* tree.

The first challenge in pursuing this project was actually finding some *Schima* species to work with. Thankfully Parks, who traveled extensively and collected plants throughout China, generously provided some plants for the project. In 1999, we initiated controlled crosses between *F. alatamaha* and *S. argentea* at the North Carolina State University's Moun-

tain Horticultural Crops Research Station in Fletcher. Amazingly, it worked.

Seedlings from these crosses are vigorous, very floriferous and share characteristics from both parents. A morphological comparison of the parents and progeny has been published, and the hybrids were assigned a new name: mountain schimlinia (*×Schimlinia floribunda*).

Although the results of this work are promising, tree breeding is a long-term prospect. Since our initial undertaking, we have produced hundreds of hybrid seedlings between these genera and continue to evaluate populations for possible introduction. The greatest opportunities may arise from working with subsequent generations in order to combine desirable traits of interest. It will be exciting to watch.

As species near extinction, limited genetic diversity, compounded by the problem of inbreeding, can lead to genetic erosion — the accelerated decline of a species. When the Bartrams discovered *Franklinia*, only a small population remained, and conservation efforts have resulted in further inbreeding. No longer able to survive in the wild, *Franklinia* had become a genetic museum piece reminiscent of the last passenger pigeons held in captivity. The hybridization with *Schima* provides a genetic liberation for *Franklinia* and a revitalization of its biodiversity.

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In an attempt to enhance conservation efforts directed at *Franklinia alatamaha*, research exploring controlled crosses of *F. alatamaha* and *Schima argentea* was initiated.