GROWING KNOWLEDGE

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A tale of two lilacs: Part I — *Syringa*

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Above left: Two-loculed hybrid seed of *Syringa vulgaris* in the breeding program at OSU. *Right*: *Syringa* × *hyacinthiflora* 'Old Glory' displaying its distinctive purple foliage.
PHOTOS BY JASON D. LATTIER

THE FRAGRANCE of lilacs permeates the history of horticulture. Species scattered from the Balkan-Carpathian region of Europe to the farthest reaches of Asia have graced the halls of power, as well as the homes of peasants.

Phylogenetic analyses partition the lilac genus (*Syringa* L.) into six series, but from these emerged two clades that are as different as they are important to the horticulture industry — *Syringa* and *Pubescentes*. (Part II: *Pubescentes* will be published in an upcoming edition of *Digger*.)

History of *Syringa*

Most lilac species hail from the Orient, but the native range of common lilac, *Syringa vulgaris*, extends from the Black Sea through Bulgaria and Romania down to the Danube (Fiala and Vrugtman, 2008). This lilac took a circuitous route to the gardens of the West. It first travelled east to the gardens of Istanbul and then west to Vienna in the 1500s (Fiala and Vrugtman, 2008; Verdoorn, 1944).

The Dutch, French and English brought common lilac across the Atlantic to the New World. Here, gardeners and breeders charted a »

Jason D. Lattier creates controlled crosses on emasculated parents of series *Syringa* at OSU.
PHOTO BY RYAN CONTRERAS

new history for the common lilac.

A world away, in the valleys of China's Loess Plateau near the Great Wall, the early blooming lilac was discovered — *Syringa oblata*, the only other member of section *Syringa*. These distant cousins of common lilac were first discovered in vast, temperate forest floors of Hebei and Shandong provinces. The reunion of these two far-flung flowers would create magic in gardens of early lilac hybridizers (Fiala and Vrugtman, 2008).

Breeding lilacs was rare prior to the late 1800s. Most cultivars arose from selected seedlings planted by nurserymen and the occasional botanical aficionado. Early selections focused on improving form, flower colors, and the coppery flush of spring leaves in common lilac (Fiala and Vrugtman, 2008).

French nurseryman Victor Lemoine became a student of genetics and made the transition from selector to hybridizer. Lemoine's genius was to painstakingly pollinate tiny, deformed pistils of little-known, double-flowered cultivars with pollen from single-flowered selections of *Syringa vulgaris* and *Syringa oblata* (Fiala and Vrugtman, 2008). This resulted in a collection of giant, double-flowered lilacs in varied colors, forms and bloom times, many of which were a new interspecific hybrid, *Syringa* × *hyacinthiflora* (Lemoine, 1878).

Much of the boom in lilac cultivars during the 1900s can be directly attributed to this family of breeders and the 214 cultivars they released (Fiala and Vrugtman, 2008; Hirtz, 1993).

In North America, several hybridizers emerged to have a lasting impact on lilac breeding. Hulda Klager's life was spent as a pioneer, travelling from her native home of Germany in 1864 to Washington state by her teenage years (Fiala and Vrugtman, 2008). She became an avid student of botany and corresponded with the great hybridizer Luther Burbank.

Starting with only her "magic three" cultivars, Klager created a panoply of exquisite, disease-resistant, colorful hybrids of lilacs through intercrossing and back-crossing (Fiala and Vrugtman, 2008). Though she named 100 new cultivars, only 13 cultivars were released commercially before a devastating flood destroyed her garden in 1948. In response, a community of friends, gardeners and customers helped rebuild the garden — a public garden and National Historic Site in the small town of Woodland, Washington (Collins, 1948; Fiala and Vrugtman, 2008).

In the early 1900s, the Lemoines received a visit from New York gardener T.A. Havemeyer. After an inspirational trip to France, he returned with bundles of plants and a mission to breed more colorful, large, single-flowered lilacs. No records exist of his crosses, but Havemeyer was a distinct contrast to Klager's approach in that he built an extensive breeding collection of the finest specimens from France and North America (Fiala and Vrugtman, 2008). His 42-acre estate on Long Island produced 45 new cultivars of improved lilacs with another 11 released posthumously (Fiala and Vrugtman, 2008; Wister, 1953).

Southern California must have seemed like a strange place to find a lilac breeder in the 1950s. However, Walter Lammerts at the Descanso estate was busy selecting forms of *S.* × *hyacinthiflora* for bloom in mild climates (Fiala and Vrugtman, 2008). Most lilac experts understood the importance of long winters for lilac flowering, but his cultivar 'Lavender Lady' ignored all the rules and brought the fragrance of lilac south. Descanso would go on to release 18 low-chill cultivars (Fiala and Vrugtman, 2008).

While Lammerts and Sobeck of Descanso focused on mild-climate lilacs, the legendary Frank Skinner was selecting for improved cold hardiness in his frigid USDA Plant Hardiness Zone 2b of Manitoba (Fiala and Vrugtman, 2008). Wild *S. oblata* (Korea) given to him by Arnold Arboretum proved a unique parent that produced 20 of the best cultivars of *S.* × *hyacinthiflora* for cold-weather gardens (Fiala and Vrugtman, 2008).

Occasionally, hybridizers become infatuated with mutations that others overlook. A funny thing happened in Rochester, New York, when director of parks Alvan Grant collected seeds of the large, double-flowered Lemoine introduction 'Edith Cavell'.

One plant was not double, but was a

Flower exhibiting the primrose form found in the Rochester Strain of *Syringa vulgaris*. *Right*: Photomicrographs of pollen from a lilac producing 7 percent unreduced gametes (left) that are approximately 30 percent larger than diploid pollen (right). Parents such as this provide an opportunity for developing polyploid cultivars. PHOTOS BY JASON D. LATTIER

waxy, multi-petaled, single white dubbed the "primrose" form. What's more, it was smaller, slow growing with thick leaves (Fiala and Vrugtman, 2008). This specimen was named 'Rochester' and Richard Fenicchia of Highland Botanical Park recognized how special a parent this would become for breeding (Millham, 2004). Using 'Rochester' as a seed parent, Fenicchia hybridized it with other elite cultivars producing new compact, colorful, large-flowered lilacs known as the Rochester Strain (Fiala and Vrugtman, 2008; Millham, 2004).

In Ohio, the parish priest, professor and plant enthusiast John Fiala, was busy building one of the great modern lilac collections. Fiala improved cultivars of *S. vulgaris* and *S.* × *hyacinthiflora* and experimented with wide hybridization among rare species (Fiala and Vrugtman, 2008). Fiala also experimented with colchicine, a chemical that doubles plant chromosomes (polyploidy) and induces novel, ornamental mutations.

Many of Fiala's named cultivars resulted from his colchicine experiments, yet few have been confirmed as polyploids using modern tools (Fiala and Vrugtman, 2008). His gardens at Falconskeape produced 50 named cultivars. His research and breeding notes were documented in extensive publications, providing reference material for all future works on lilac, including this article.

Don Egolf of the U.S. National Arboretum focused on combining two previously mentioned traits: disease resistance and low chill. Egolf determined the best way to begin such a breeding program was to survey thousands of marketed cultivars of *S. vulgaris* and *S.* × *hyacinthiflora* and assess their breeding potential for traits including powdery mildew resistance (Fiala and Vrugtman, 2008).

Egolf sought to extend the southern limits of lilacs through selective hybridization. The posthumous release of three cultivars, 'Betsy Ross', 'Declaration' and 'Old Glory' provided new possibilities for southern low-chill lilacs free from powdery mildew (Fiala and Vrugtman, 2008).

Lilac research in Oregon today

The ornamental breeding program at Oregon State University is a newcomer in the 500-yearlong craze of garden lilacs. Our efforts focus on producing compact, disease-resistant, floriferous cultivars of lilacs in section *Syringa* through controlled crosses of elite cultivars. Between 2013 and 2015, we have performed around 25,000 pollinations.

In addition, we made crosses designed to evaluate heritability of traits such as disease resistance, low chill, foliar pigments, flower forms and flower colors. The Willamette Valley provides high disease pressure for two ailments that perpetually plague lilac enthusiasts: bacterial blight and powdery mildew.

Bacterial blight can be devastating

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to lilacs flushing in the cool, wet spring of the Pacific Northwest. While not as damaging, powdery mildew's frustrating coat of cottony mycelium can turn a lilac into an unsalable eyesore.

Breeders continue to probe the genetic diversity within lilacs for weapons to combat these common diseases. Toward that goal, we are currently evaluating progeny from hundreds of cross combinations. We are also conducting cytological and molecular studies to investigate presence of modes of naturally occurring polyploidy as well as to identify molecular markers associated with important traits.

Newton said, "If I have seen further, it is by standing on the shoulders of giants." Echoing this sentiment, we continue the journey toward new cultivars of lilac that fit modern gardening trends. There are still improvements to be made for modern landscapes by increasing disease resistance, enhancing flower and foliage colors, and improving growth habit.

We are in the enviable position of having access to our predecessors' work while also having the advantage of modern tools such as flow cytometry and molecular markers. The golden age of lilac breeding may not be in our past, after all. It may be just around the corner.

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