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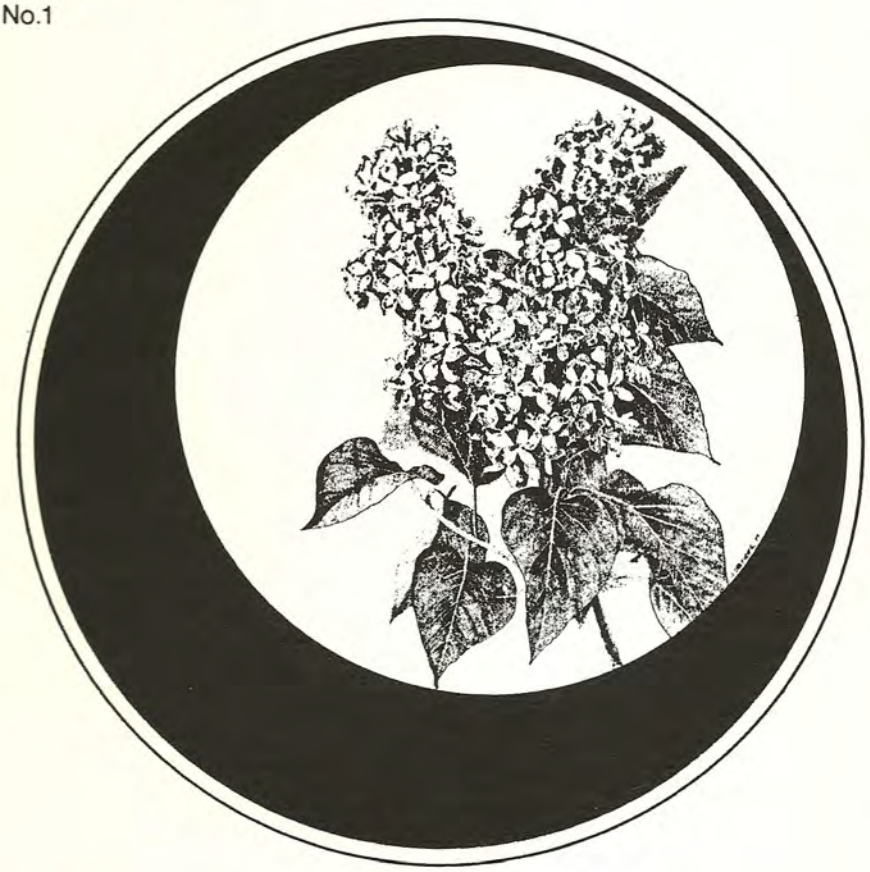

PROCEEDINGS

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INTERNATIONAL LILAC SOCIETY is a non-profit corporation comprised of individuals who share a particular interest, appreciation and fondness for lilacs. Through exchange of knowledge, experience and facts gained by members it is helping to promote, educate and broaden public understanding and awareness.

Published May 1980

THE NEWEST AND THE BEST OF R.B.G. LILACS

By: Charles D. Holetich

The title in itself may be a bit misleading, because neither are all the newest lilac cultivars the best, nor should the old ones be forgotten. Among the old cultivars there are still a number which are superb, and rightfully among the 20 best.

Most, but not all, of my observations took place in the "Katie Osborne" lilac collection which lies on 16 acres of rolling terrain, interspersed with ash, black cherry, oak, hickory and walnut, left there as remnants of the original forest. The collection is part of the Royal Botanical Gardens Arboretum which currently displays 631 taxa with the genus *Syringa.* (See list of lilacs currently in collection.)

There are numerous sections within the collection, each featuring a specific group of lilacs such as "Double French Hybrids", "Prestoniae Hybrids", "Hyacinthiflora Hybrids" etc.

I wish to draw to the attention of the delegates that many of the lilac cultivars to be shown on the screen and commented upon will be available at the lilac auction, so ably performed by Col. Schenker; so get your pencils and paper ready and make a list of the lilac cultivars that you like the most and would like to buy. Furthermore, if there are cultivars which are not readily available, that you would like to have, please pass their names to Col. Schenker, and we will try to have rooted cuttings available at one of the future lilac auctions.

(A slide presentation along with appropriate remarks and comments followed.)

S. v. 'A.M. Brand' - good, annual bloomer. Clusters heavy, rounded with single purple florets. Side branches are often bent toward the ground from weight of the clusters. Our 3 specimens are growing under a big Black Cherry (*Prunus serotina*) but are still producing a considerable amount of bloom, especially on the portion of the shrub facing away from the tree.

During wet summers and falls the foliage is affected by powdery mildew, which in our climate is not considered a serious problem.

S. v. 'Bright Centennial' - a very abundant bloomer annually. Our specimen started to bloom when it reached 4 ft. in height. Hardly any foliage is visible during the peak of bloom.

Clusters are uniform, pointed at the top with deep purple colour in bud stage and red-purple as the corollas open. Florets are single, medium in size.

S. v. 'Bleuâtre' - has very interesting bluish colour of florets, but must enjoy cool and rain-free days in order to retain good tone. Both

rain and/or hot and sunny days will quickly fade the colour of the florets, which is typical of all blue-flowered lilac cultivars that I have seen.

S. v. 'Charles Joly' - with its deep purple colour in bud and open-floret stage this old lilac still ranks high with many lilac lovers.

Our shrub has a very upright growth habit with the majority of bloom on the upper part of the shrub.

During May 1979 we experienced a number of hot days which forced rapid development of clusters. Then suddenly the weather turned cold. The clusters which were 8 cm long or larger at time of weather change were stunted, while those smaller than 8 cm did not seem to be effected. 'Charles Joly' had clusters 25% smaller then usual, while S.v. 'Etna', in contrast, was not affected at all by the weather change.

S.v. 'Congo' - has single, medium-sized florets with a deep red-purple colour in bud stage changing to light purple as they open.

Our specimens were obtained from two different sources, but both have similar blooming patterns, in that they have only a few clusters one year and an abundance the next. Luckily, with us, one specimen is on the low while the other is on the high blooming pattern, and vice versa.

S. v. 'Edward J. Gardner' - is the nicest double pink lilac that I have seen. Florets are about 2 cm in diameter in uniform clusters up to 22 cm long and 9 cm wide at base.

Our specimen seems to be more sensitive to sudden changes of temperature and to dry soil conditions than other cultivars. In short, it is a superb lilac which demands good climatic and soil conditions.

S. v. 'Erzherzog Johan' - has very uniform, pointed clusters up to 24 cm long and 9 cm wide at base. It has single florets with light purple-violet buds opening into lilac-violet.

Foliage unfortunately screens the bloom preventing the observer from seeing its complete beauty.

S. v. 'Frank Patterson' - with its enormous clusters and large florets, up to 3½ cm in diameter, as well as their deep purple colour, it is admired by many. Our specimens are quick growers and if not pruned regularly would become leggy plants in a few years.

S. v. 'Etoile de Mai' - with its petals which are deep purple on the upper side and white on the lower, this old double lilac draws the instant attention of many visitors. Our 3 specimens have rounded crowns and are good bloomers annually.

S. v. 'Krasavitsa Moskvy' - in translation means "Beauty of Moscow". It is probably the finest lilac cultivar that came to us from Russia.

The clusters are uniform, 9 cm wide at the base and up to 23 cm in length, pointed, with double corollas 2 cm across. Colour in bud is bronze-pink opening into creamy white.

S. v. 'Mrs. Harry Bickle' - is a single-flowered lilac that people fall instantly in love with.

The colour in bud stage is reddish-pink becoming lighter as it opens to almost translucent light pink, especially when viewed against the sky.

S. v. 'Rochester' - a unique single, white lilac cultivar. Its corolla is often composed of 5-12 petals. Our specimen does not bloom abundantly, perhaps because of partial shading from the trees. However, it started to bloom at an early stage.

S. v. 'Sensation' - as its name implies, it truly is a sensational single-flowered lilac cultivar. Its deep purple colour on the inside and white margins of the petal make this cultivar very likable and unique.

S.v. 'Slater's Elegance' - is the nicest single white that I have seen. Its corolla, up to 2½ cm across with wide petals curved upward, gives the appearance of a small cup or vase.

This cultivar has been patented and is to be made available via Sheridan Nurseries.

There are obviously other lilac cultivars in the collection worthy of special recognition, but they may have been with us too short a time, or the specimens may be too small, so that an opinion has not yet been formed. For others I may not yet have a good slide to show you.

A number of lilac cultivars in our collection are so similar to one another that it is impossible to say if they are mislabeled or products of overanxious and insufficiently informed introducers, etc.; but whichever is the case we will not be sure until a good descriptive checklist is produced. This, of course, may

be many years away.

In the meantime, your good cooperation in completing the "Lilac Performance Cards" and returning them to me for editing and printing is developing a list and pointing toward cultivars which might be misidentified in some collections. Such input of information would be useful in the preparation of a descriptive checklist at a later date. I feel that printing of the data from the "Lilac Performance Cards" would become meaningful if there were information available from 5 or more sources.

There are, however, lilac cultivars which are sufficiently unique, praised, admired, asked for, talked about and easily recognizable that they deserve special prominence. In my opinion, but incorporating into it the opinions of many others, from lilac enthusiasts to casual visitors, those cultivars are "the cream", and some or all should be on the list of any nursery selling lilacs.

Syringa vulgaris 'Sensation' - single purple with white border
- - 'Rochester' - single white
- - 'Slater's Elegance' - single white
- - 'Krasavitsa Moskvy' - double white
- - 'Edward J. Gardner' - double pink
- - 'Lucie Baltet' - single pink
- - 'Mme Lemoine' - double white
- - 'Nadezhda' - double blue
- - 'Paul Thirion' - double magenta
- - 'Charles Joly' - double purple
- - 'Frank Patterson' - single purple
- - 'Primrose' - single yellow
- - 'Mrs. Harry Bickle' - single reddish-pink
- - 'Bright Centennial' - single purple
- - 'Dwight D. Eisenhower' - single magenta-blue
- - 'Erzherzog Johan' - single lilac-violet
- x hyacinthiflora 'Esther Staley' - single reddish-magenta
- x - 'Sunset' - double magenta
- cv. 'Maiden's Blush' - single pink
- x prestoniae 'Miss Canada' - single reddish-pink

GRAFTING TECHNIQUE FOR THE LILAC GROWER

By: John H. Alexander III

Propagation by grafting yields new plants that are genetic duplicates of the parent plant. It is a time consuming operation, but with some genera, gives higher rates of success than other methods of asexual propagation. The propagation of lilacs by grafting is probably the most efficient method for the amateur and often for the professional, too! Lilacs can be grafted with little or no special equipment, and they are best grafted in the winter when there are fewer demands on the gardener's time. This is unlike cuttings of lilacs, which are most often propagated using an intermittent mist system and root best when taken in late May and early June.

The propagator's vocabulary includes such terms as understock, scion, callus, and cambium. The understock, also known as the rootstock, is a closely related plant that becomes the root of the new plant. The scion, or cion (pronounced sigh-on) is a stem piece from the plant to be reproduced. Callus is the undifferentiated tissue that forms over the wounded areas of the graft and knits together the union of scion and understock. The cambium is a cylinder-like layer of tissue, a single cell thick, that lies under the bark but outside of the wood. It is the cambium that adds girth to a tree by adding new xylem inside its cylinder, and new phloem outside, while at the same time increasing its own circumference. Xylem is the tree's wood and the plumbing that brings water up from the roots. Phloem, between bark and cambium, pipes the food materials, manufactured in the leaves, to the roots. The grafting process entails placing the scion on the understock so that the cambium of one is in line with the cambium of the other. Then callus forms over the cut areas of each and heals them together.

When grafting lilacs, any of several species of privet (*Ligustrum* sp.), are commonly used for understock. Ash (*Fraxinus* sp.) may also be used; all are members of the family *Oleaceae*. The stem of the understock should be about pencil size. Rooted cuttings of privet may be purchased, or you can propagate your own. Best results are obtained when you pot your understocks the spring before you plan to do your grafting. Plunge the pot to the rim in the garden for ease of care during the summer. In the fall mulch them heavily so that they do not freeze solid, and leave them in the garden, or place the potted plants where they will remain cool, dormant, and be available when you will be grafting. A cold frame, cellar bulkhead, or root cellar can be used to keep plants dormant through the winter. Ideal temperatures are 32^{o}-40^{o}F. No light is necessary for dormant plants, but they may need periodic watering.

Two to three weeks prior to the time you plan to graft, bring your potted understock into a warm room, or give them bottom heat at 65^{o}-75^{o}F. in a cooler room or greenhouse. The understocks are ready to graft when new growth from the roots has progressed. You can observe it by knocking a plant out of its pot. The newly grown roots will be white and should be about ½ inch long when they are ready to use. The buds on the understock will start to swell about this same time.

Scions should be cut when they are completely dormant. Choose pencil sized stems that are straight and of the previous summer's growth. Trying to use crooked scions or older wood makes the job of matching the cambium very difficult. I avoid using terminal buds and other plump buds that may be flower buds or shoot buds and would tax the union before it has a chance to be well formed. My preference is to use a scion with two sets of nodes containing four leaf buds. If your scion consists of three leaf buds and a flower bud, simply pinch out the flower bud. If scion wood is in short supply, a single pair of buds or even a single bud may be used. (The latter is called budding, and a slightly different technique would be followed).

Scions may be stored damp in a polyethylene bag and kept in a refrigerator for over a month. Do not let the scions dry out, but do not keep them too moist or they will become moldy. Most sandwich bags are of a very thin film of polyethylene and will allow the scions to dry unless you include a moist piece of paper towel (or something similar) to hold moisture. After several weeks of storage, the paper may begin to get moldy, but this works well for short-term storage. Freezer-type polyethylene bags are thicker, and I have had success storing scions in them by pouring water into the bag of scions and then pouring out all the water that could easily be shaken out. The bag is then bound securely at the top. The scions stay moist but not wet.

Scions keep so well that they can easily withstand the usual delays encountered in shipping. This attribute makes it possible to exchange scions with lilac fanciers almost anywhere.

The only equipment needed to graft lilacs is a sharp knife. A good-quality grafting knife is a joy to use, but unless you will be doing a great deal of grafting, it is probably a luxury. Choose a knife with a straight edge, it will make fatter cuts than a knife with a curved blade. Learn how to sharpen it (the best sharpening instructions that I have seen were in my Boy Scout Manual), and keep it sharp. Be careful! Many people put a piece of tape or a bandaid on their thumbs for protection.

There are many different styles of graft unions. The names of each, such as "side graft" or "cleft graft", usually describe the carpentry involved. Most can be used to graft lilacs. One particular easy one is called the "inverted cleft graft". It was taught to me by our first treasurer, Fred Van Orden, who often refers to it as "split and stick". To perform the inverted cleft graft make two cuts, one each on opposite sides of the understock, to form a 1-1½ inch wedge pointing upward. This should be done as close to the soil line as is possible, usually one or two inches above the pot's rim. Select a scion of a diameter similar to that of the understock. Cut the base of the scion of the scion straight across the grain with pruning shears. Then place the knife on the butt end of the scion and, by rocking it slightly, split the scion up 1-½ inches from the bottom. The split end of the scion should then be slipped down onto the wedge of the understock. Carefully match the cambium layers of rootstock and scion on one side of the graft union. Attempts to match both

sides often result in failure because the rootstock and scion are seldom exactly the same size. Matching one side is all that is necessary. The scion should next be fastened in place. This may be accomplished by tying the union with a budding band, raffia, or grafting tape. Rubber bands, string, and electrician's tape, although inferior to products made for the job, have been substituted and yielded satisfactory results.

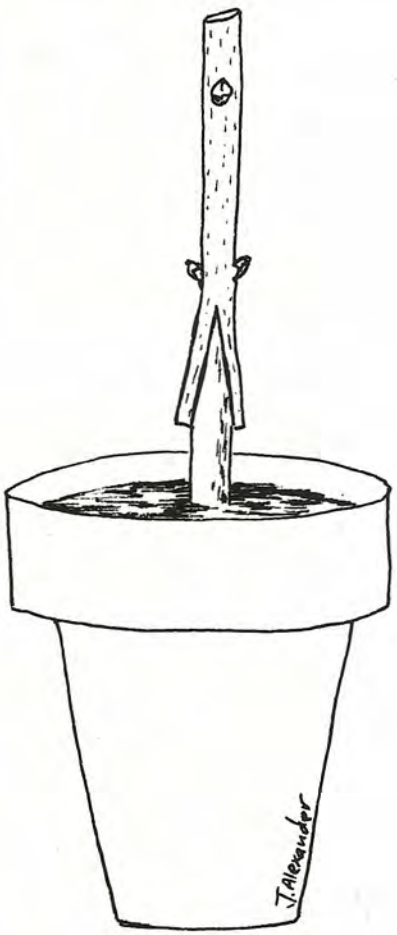
Learning to tie a budding band takes some practice. Start by holding the graft union with the thumb and first finger of your left hand (for those who are right-handed). Pick up the budding band with your right hand and place the opposite end so that it can be held against the union with the left thumb. Give a final visual check for cambium alignment and adjust if necessary. Stretch the band, wrap it once around the union and back over itself. This should secure the bottom end of the budding band. Continue to wind the band around the scion in a barber pole-type spiral. When the union is almost covered, wrap the band over the left thumb, and the next time around slip the band between the left thumb and the union. Securing the band with the left thumb, let go with the right hand, slide your left thumb down rolling the band that is under the thumb down, and the loop of the band that is over the thumb should snap off the thumb and secure the band in place. If it is done without pulling the upper end of the band through the loop, the end can be pulled free of the securing loop, and the band will unwind itself. It may be wise to practice this on a pencil before trying it on an actual graft union.

If you will be keeping your newly grafted plants in a greenhouse, where humidity is high, plunge them in moist peat, so that it covers the graft union. If you will be keeping them in a house, waxing is necessary. Paraffin works quite well to keep the scion from becoming desiccated. Heat the paraffin until it liquefies, and then, using a small paint brush, cover the scion and graft union. A thin coating is all that is necessary. Next place the plant on a windowsill and treat it as a house plant. Avoid using sunny, south windows and warm rooms where the scion might be forced into growth before the union is well formed.

A few weeks later buds will swell, break the paraffin and shoots will grow from the scion. Shoots may also grow from the understock, and, if at any time they do appear, they should be carefully removed. When your new plant is in the same stage of growth as lilacs outside, you may plant it out. It would be best to put it in a lightly shaded nursery area. The vegetable garden will do, but shade the plant until it becomes established. Plant it deeply so that the graft union and some of the scion is below ground, and roots will form above the union. Budding bands, if left exposed to the sun, will deteriorate over the summer, but if they are buried they will not. By leaving the budding band on, and planting deeply, the plant will grow and be constricted by the band. The passage through the phloem of food materials from the leaves is blocked by the constriction, and a bulge will appear where these accumulate just above the band. If this area is below ground, roots will

usually initiate from it. This begins the establishment of your lilac onto its own roots. Later, when you are transplanting it from the nursery, cut off any remaining understock. If the lilac roots do not seem to be enough to sustain the plant, prune back some of the top growth to arrive at a workable balance.

By following the steps outlined here, you can propagate lilacs. You can establish "own-root" plants by grafting and do it at home without a greenhouse.



INVERTED CLEFT GRAFT

LILACS IN ENGLAND

By: Dr. Owen M. Rogers

I went to England while working on the Tentative Check List to see and research their lilacs. England has a rich lilac history, sitting as it does astride the broad path of lilac progression from Constantinople to Europe to America. In England lilacs found a climate well suited to their needs, and John Parkinson in 1640 was able to report in his *Theatrum Botanicum* that, "Although I have shewed you these five sorts of Pipe trees in my former Booke (1629), yet I think it not unfit to present you with them againe here, and give you a full description of that sort that was defective there." This early acceptance has been continued, and today lilacs in England can be found in the full spectrum of possible places from the great estates and public buildings to churches and private gardens. Even in situations of very small streetside gardens where there is room for only one large plant, often it will be a lilac.

You might expect the great focus for lilacs in England to be the Royal Botanic Gardens at Kew. Everyone knows the admonition of Alfred Lord Noyes to "Go down to Kew in lilac-time..." Kew does have a long history as a botanic garden (established in 1759) but, for the greater part of that time, it held to the concept that botanic gardens should contain only species and species hybrids. Recently all that has changed under the aegis of Peter S. Green, Keeper of the Herbarium and Deputy Director, who has added a representative collection of the best lilac cultivars. Peter, in addition to being an honorary life member of ILS, is one of the world's authorities on the lilac family and author of the section on *Syringa* that will appear in Vol. IV of Bean's Trees and Shrubs Hardy in the British Isles. Perhaps one day the International Lilac Society can "Go down to Kew in lilac time...." and visit Peter, Kew, and the lilacs.

There are some magnificent old cultivars in the gardens of the houses associated with Kew including a very large 'Sensation' which, when I saw it in bloom on a bright May day, was showing a genetic mutation which split one flower so that one half was the expected purple with white margin and the other half was all white. These kinds of flower changes, while rare, are not unknown so I expect no one will separate this one out for perpetuation.

The largest public collection of lilac species and cultivars is managed by the Parks and Gardens Department in Brighton along England's south coast. The collection owes its modern plan to the efforts of Mr. J.R.B. Evison, now retired. His efforts have been continued and expanded by present Parks Director, Mr. M.J. Griffin. The collection is one of the most important in England, containing by far the largest assemblage of *S. vulgaris* cultivars. The planting is on the side of a hill in very chalky soil with a pH of 8.4. You can believe this value when you see the chunks of chalk on the soil surface. Because the area has very strong winds, the plants near the top of the hill require staking to keep them from being bloom over. The height of bloom of

the *S. vulgaris* cultivars is around the first of May. Any friends of the lilac planning to be in England should be sure to include the Brighton planting on their schedule. It is an interesting and important collection.

Not all of England has such stringent weather conditions as Brighton, but the climate does have a strong influence on lilac bloom. In the area around London the average annual rainfall is not much over 20 inches. It is, however, evenly distributed throughout the year so that there are many cool, cloudy days, especially in the spring during lilac bloom. This results in an extended flowering season and makes possible a classification of lilacs into early, mid-season and late-flowering cultivars. The classification holds for lilacs in America as well, but with our blooming season shortened because of rapidly rising temperatures, the distinctions are harder to see. The weather also affects color, and I saw the pinkest 'Lucie Baltet' and the yellowest 'Primrose' I have ever seen. Those climatic conditions do make possible many odd planting groupings not seen in eastern and midwestern North America. Bamboos and redwoods grow happily with lilacs, whose flowering overlaps that of *Laburnum*. The climate has its disadvantages, however. Peter Green pointed out that he had not really seen *Chionanthus* (another lilac relative) with good bloom until he came to Boston where the hot summers were necessary to promote bud formation.

A characteristic of many English botanic gardens is the rock garden. I saw spectacular ones at Kew and Edinburgh and at the garden of the Royal Horticultural Society at Wisley. In all of them the rock garden lilac was featured. This is the lilac that we once called *Syringa palibiniana* and now refer to as *Syringa meyeri* 'Palibin'. Palibin's lilac is a good plant for small places because it truly will maintain a small stature for many years. Combine that quality with neat foliage and many fragrant flower trusses over the entire bush and the result is a good candidate for the rock garden or any other place where a small flowering shrub can contribute to the garden design.

Palibin's lilac blooms later in May than the *S. vulgaris* cultivars. This means it coincides almost exactly with the Chelsea Flower Show. The Chelsea Show, sponsored by the Royal Horticultural Society, is an extraordinary flower show staged under a large tent area on the lawn of the Chelsea hospital along the Thames River. The exhibits range from individual blooms to whole gardens and feature an incredible array of plant types. It was especially gratifying to see how many lilacs were used in the displays both as exhibit plants (Palibin's is a natural) and as cut blooms.

One of the many commercial nurseries exhibiting at Chelsea was Notcutt's of Woodbridge in Suffolk. Having seen lilacs in botanic gardens, public and private gardens, and at a flower show, I accepted the invitation of Mr. John Dyter to visit Notcutt's to see lilacs being grown for commerce. Notcutt's produces over 1,000 plants of perhaps a dozen lilac cultivars for sale each year. They also maintain a large collection of cultivars from which they will custom-propagate on request. Their standard production procedure is to bud the cultivar on to lilac seedling understock in the field in August. The buds

are wrapped and the plants overwinter in the field. Next spring, each plant is examined and, wherever a bud failed, the plant is grafted with a scion of the cultivar being produced. This is a very labor intensive policy, but working the field twice does keep the number of successes very high. I am personally in favor of propagation of lilacs on their own roots to reduce the chance of problems after the plant is sold, but Notcutt's can point to a long list of satisfied customers, so their procedures work and will be continued.

After the first year, the young plants are grown in the field to saleable size and then all are sold or destroyed. There are no holdovers to keep getting bigger and bigger, but there are new small plants coming on every year.

The English lilac has a long history and is alive and well today. It can be seen growing next to St. James Palace, the seat of the British Government, and it can be found in the smallest gardens. If settlers were to leave England today for a far country they would accord the lilac the same important berth as did settlers to America several centuries ago.

Erratum, *Lilacs* 7(1): 61. (Proceedings for 1978).

The word "typica" in *Syringa meyeri* (typica) is merely a typing error for the adjective "typical." It was *not* my intent to revive the obsolete and now incorrect practice of using the Latin adjective *"typica"* as the epithet for a subdivision of a species.

James S. Pringle

LILACS IN TEST TUBES: POTENTIAL FOR CLONING OF LILACS BY CELL AND TISSUE CULTURE

By: Subhash C. Minocha
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*Scientific Contribution Number 1021 from the New Hampshire Agricultural Experiment Station.

INTRODUCTION

With an ever-increasing demand on the availability of many horticulturally important woody shrubs, the selection of suitable species and varieties and the production of new varieties has become extremely important. Interspecific hybridization has played an important role in the production of new varieties of several ornamental shrubs such as rhododendrons, roses, and lilacs. Due to the relatively long life cycle of many woody plants the process of hybridization is generally quite slow. Furthermore, incompatibility barriers among different species and the reduced viability of F_1 progeny result in an extremely low yield of suitable hybrid plants. Each new hybrid thus produced has to be multiplied vegetatively in order to maintain its genetic constitution. Vegetative propagation is thus a sure means of utilizing and amplifying the genetic gains obtained through conventional sexual methods of propagation.

Interspecific hybridization as a tool to obtain novel hybrid combinations has been used extensively with lilacs (genus *Syringa*). During the past few years, several interspecific and intervarietal hybrids in *Syringa* have been produced by Dr. Owen Rogers at the University of New Hampshire. The aim of this breeding program is to produce better varieties with respect to the commercially important features such as small plant size, floriferous morphology, fragrant inflorescence, color range of flowers, late or early blooming, growth habit, and resistance to environmental stresses. Although many of the interspecific crossings have been successful, resulting in a high seed set, the attempts have been frustrated by the abundance of albino seedlings (seedlings lacking photosynthetic pigments) among the F_1 generation. With a few exceptions, all the albino seedlings die within a few days of germination. The very fact that some (less than 5%) of these seedlings do survive and gradually turn green under certain conditions indicates that many more might possess the potential to develop the necessary pigments, if they could be provided with optimal growth conditions. An additional problem faced by a lilac breeder is the present lack of some suitable means of large-scale vegetative propagation of the selected hybrids. Many of these hybrids end up being a single plant with limited potential for distribution and planting. The age-old conventional methods of vegetative propagation (e.g., grafting, layering, and rooting of stem cuttings) seem to be of limited use with lilacs.

With these two problems in mind, preliminary work was started in my lab to study the applicability of cell and tissue culture methods to lilac breeding and propagation. The aim of this paper is to provide an overview of where the cell and tissue culture techniques stand today in relation to vegetative propagation of horticulturally important plants and what potential advantage they offer in lilac

breeding and propagation.

From ancient times man has used methods such as grafting and rooting of stem cuttings for the vegetative propagation of selected plants. The techniques of cell and tissue culture are, however, of recent origin, and within a short period of less than half a century have proven their worth in the field of plant propagation. There are five general areas in which the applications of these techniques have been recognized: 1. Rapid clonal propagation of selected varieties and cultivars of many species 2. Recovery of pathogen-free clones from diseased plants; 3. Genetic improvement of plants through the production of haploids and homozygous diploids from anther culture, and by *in vitro* pollination and fertilization of incompatible genotypes; 4. Production of pharmaceutically important secondary plant products such as alkaloids, glycosides, essential oils, etc.; 5. The basic understanding of growth and development in plants. Some of the current developments in all these areas have been extensively discussed and reviewed (see Reinert and Bajaj, 1977; Street, 1977; Thorpe, 1978; Sharp et al., 1979). The list of plants from which it is now possible to obtain tissue cultures is indeed very long and ever-expanding. In a few commercially important plants such as chrysanthemums, orchids and geraniums, these methods have been highly successful and are being used currently on a large scale, while in a number of other species they are being perfected for commercial usage (Marston, 1967; Churchill, et al. 1971; Morel, 1971; Murashige, 1974; Holgate, 1977). Advances in the tissue culture of herbaceous plants indicate that these techniques have reached a stage where it is reasonable to expect that they will be directly applicable to woody ornamental shrubs and trees. Development of cell and tissue culture techniques for the propagation of several plant species including white pine (*Pinus strobus*), paper birch *Betula papyrifera*), yellow birch (*B. alleghaniensis*), some cacti, Venus' fly trap, geranium, and two rare and endangered species, namely, Furbish's lousewort (*Pedicularis furbishiae*) and Robbins' cinquefoil (*Potentilla robbinsiana*) have been underway in my laboratory for the past several years (Minocha and Mehra, 1974; Minocha, 1979; Minocha, 1980).

METHODS OF CELL AND TISSUE CULTURE

The basic principle underlying the methods of cell and tissue culture is the inherent capability of all the living cells of a mature plant to grow into a complete plants. This potentiality also called "totipotency" is expressed when cells are isolated and grown on a suitable growth medium. The basic steps in the use of cell and tissue culture for vegetative propagation are: 1. Isolating living cells; 2. Inducing them to divide and grow on the growth medium; and 3. Inducing them to regenerate whole plants that can be transplanted to the soil.

There are three common approaches to achieve the clonal propagation of a selected plant using tissue culture techniques. Most plant species are not amenable to propagation by all three methods and the method of choice for each species has to be worked out.

The first approach involves the regeneration of whole plants directly from the apical meristem or the axillary buds. This method is analogous to the rooting of cuttings except that very young plants can be cut into small segments, each containing one or more nodes. When incubated on an appropriate growth medium the axillary buds grow out into shoots and later produce roots. In many cases, in addition to the growth of the axillary bud, several adventitious shoots may also arise from the excised ends of the stem segment. Each of these shoots can be excised and transferred to a different medium to produce roots before transplantation into the soil. The repeated use of this method can produce a clone of several hundred plants within a few months. Culture of meristems from the shoot apex can also be used for obtaining pathogen-free and virus-free clones from infected plants.

The second method involves the establishment of true cell and tissue cultures and the regeneration of shoots or whole plants from these cell cultures. Excised plant parts are grown on suitable media on which they grow as an unorganized mass of cells. This unorganized cell mass is called a callus. Callus cultures can be started from any living cell(s) and organ of a plant can be induced to regenerate plants at will by appropriate modification of the medium. Roots and shoots generally differentiate separately. The shoots can be induced to produce roots after excision and transfer to a new medium. If successful, this method is much more rapid as compared to the former method of meristem culture.

The third approach, which has been the cherished goal of all tissue culturists, is called the method of embryogenesis. The best example of this method of cloning is the wild carrot (*Daucus carota*) citation tissue, where hundreds of thousands of genetically identical embryos can be regenerated in a short time. The callus cultures obtained from different plant tissues are grown in a liquid medium and placed on gyro-rotatory shakers. The suspension thus obtained contains single cells as well as small cell groups. On transfer to the appropriate medium these cells and cell groups differentiate into normal-looking embryos, each capable of growing into a whole plant. The process of plant regeneration is several times more rapid than the two methods described earlier, has relatively high yield, and provides whole plants which are similar to the embryos in the seeds. This method has not been successfully used so far in any of the woody plants.

Isolation of plant tissues One of the primary requirements of cell cultures is the maintenance of completely sterile conditions in the growth medium. Therefore, the plant tissues used to start cell cultures must be sterilized to remove all fungal and bacterial contaminants. These microbes, if not removed from the plant, would overgrow in the medium, ultimately resulting in the death of the plant tissue. Most of these micro-organisms are present on the surface of the plant and can be effectively removed by treating the tissue with a solution of commercial bleach. The tissue is then washed with sterilized water to remove excess bleach. In the case of stem and leaf segments of *Syringa*, 8-10 min treatment with 50% Clorox was quite effective for surface sterilization. The plant cells are generally much more resistant to Clorox and thus are not affected by the treatment. The surface-sterilized tissue is then cut into small

segments (less than 1 cm) and placed on the surface of solidified growth medium.

Culture medium Several growth media have been used for growing tissue cultures of many different species (MS medium--Murashige and Skoog, 1962; B5 medium -- Gamborg and Eveleigh, 1968; White's medium-White, 1943; Lin and Staba medium--Lin and Staba, 1961). Most of these media contain a suitable proportion of different inorganic salts, one or more vitamins, sucrose, and various plant hormones. The medium used in my lab for growing various lilac tissues was the MS medium. The various constituents of this medium are given in Table 1. A pre-mixed powder containing all the inorganic constituents is commercially available from Grand Island Biological Company (GIBCO). After mixing appropriate amounts of all the constituents of the medium, the distilled water the pH of the medium is adjusted to 5.5. Sucrose is generally used at a final concentration of 3 percent. One percent agar is added to the medium. After distributing the medium into Erlenmeyer flasks and test tubes, it is sterilized by autoclaving at 15 pounds per square inch (psi) steam pressure for 15-20 min. On cooling, the medium solidifies into a hard gel. Surface-sterilized tissue pieces are transferred to the medium, taking care to avoid the entry of airborne micro-organisms. This procedure is generally performed under a laminar flow hood. A laminar flow hood has a continuous outward flow of filter-sterilized air.

Growth conditions The flasks and test tubes containing the tissue pieces are incubated in growth chambers under controlled light and temperature conditions. Cultures are grown under fluorescent light (6 inches below two 20-watt fluorescent bulbs). Lights are kept on for 16 hrs per day. The day and night temperatures are maintained at 25 and 20° C, respectively. These light and temperature conditions are not absolutely critical for most cell cultures. A constant temperature of 25 ± 2° C with continuous light or 12 hr light periods should work equally well.

Role of Plant hormones Various natural and synthetic plant hormones play a significant role in plant cell and tissue culture. It is the concentration and the kind of plant hormones in the medium that determines the mode of growth of cells and tissues *in vitro*. Commonly used plant hormones in cell culture are the auxins (Cell enlargement or the rooting hormones, e.g. indoleacetic acid (IAA), naphthaleneacetic acid (NAA), indole-butyric acid (IBA), and 2,4-dichlorophenoxyacetic acid (2,4-D)) and the cytokinins (cell division hormones, e.g. zeatin, kinetin, and benzylamino purine (BAP)). Gibberellins and abscisic acid are also used in some cases. A combination of an auxin and a cytokinin is generally needed to obtain callus growth in many different tissues. A variation in the relative amounts of these two hormones or the absence of one of them from the medium may cause the callus to regenerate roots or shoots or both. In some cases, however, an alteration in the amounts of sugars or the relative amounts of nitrate and ammonium ions in the medium may control regeneration of plants from callus. Among the numerous possible combinations of several auxin and cytokinin concentrations, only a few are effective in inducing root or shoot

differentiation in a particular tissue. It is the determination of these optimal levels of hormonal combinations that involves laborious work and quite often a long time. It is also known that different tissues of the same plant may show a different response in cell culture. Therefore, cell cultures must be initiated from different tissues and organs of the plant.

Tissue and organ culture of lilacs The work with the tissue culture of lilacs was started in my lab with a rather limited aim of determining optimal conditions for the growth of the interspecific hybrid albino seedlings and for the vegetative propagation of some hybrids between selected species of the genus *Syringa.* The varieties and species tested so far include *S. patula* 'Miss Kim' X *S. meyeri* 'Palibin'; and *S. patula* 'Miss Kim' X (*S. patula* 'Miss Kim' X *S. meyeri*). All the parental types produce normal green seedlings while the interspecific crosses largely yield albino seedlings. The seeds were sterilized by placing them in 50% Clorox for 8-10 min followed by several washes with sterile distilled water. Seeds were germinated either on sterile wet filter discs or on the basal MS medium without sucrose. Germination of seeds was better on filter paper than on the medium. Two-to-three weeks after germination, the albino seedlings were transferred to the basal medium with 3% sucrose. Many of the albino seedlings survived for 3-4 months but did not show much growth beyond leaf stage. The green seedlings from the self-pollinated plants grew into normal plants.

When normal green plants grown *in vitro* were cut into small segments, each having a node and an axillary bud, many of these buds grew into normal shoots. Growth was generally promoted by a cytokinin (zeatin) at a concentration of 0.01 - 0.5 mg/1. One or two roots were produced from some shoots in the absence of cytokinin. Excised shoot species also produced normal plants. Thus the repeated subdivision of the green plants grown *in vitro* can be used to achieve limited vegetative propagation through this technique. Rooting of these plants does not seem to be a problem.

When excised stem and leaf segments from seedlings grown *in vitro* or from the plants grown in the field were grown on media containing an auxin (2,4-D at 0.1 - 0.5 mg/1), a healthy green callus was obtained in many cases. This callus, when grown in light, was very hard and compact in texture. If grown in complete darkness, the callus lost its green colour, grew at a much faster rate, and became soft and fragile. The presence of zeatin or BAP at a concentration of 0.1 - 5 mg/1 promoted the formation of callus as well as its growth. The callus was subdivided into smaller pieces and subcultured on a medium containing a combination of 2,4-D (0.2 mg/1) and zeatin (0.5 mg/1). Several other concentrations of these two hormones were tested (at levels of 0.1 - 10 mg/1) for their effect on callus growth and for the induction of organ regeneration. While most of the combinations of these two hormones could support good growth of callus, none was effective in inducing the differentiation of roots or shoots. The callus growth was severely inhibited if no auxin was supplied in the medium. Further research involving different auxins and cytokinins and some variations in the nutritional and environmental conditions should yield some interesting results.

POTENTIAL USES OF LILACS IN TEST TUBES

The techniques of cell and tissue culture are not only useful in the vegetative propagation of selected plants rapidly and economically, they also can be exploited in many different ways to achieve different objectives.

Meristem culture techniques can be used to obtain pathogen-free plants (free of fungal, bacterial or viral infections) from diseased plants.

Test tube pollination and fertilization can be used to overcome intervarietal and interspecific incompatibility in many species (Rangaswamy, 1977; deNettancourt and Devreux, 1977). This would aid in the production of new genotypic combinations which are not otherwise possible.

In many species it is possible to obtain haploid plants (plants with only one set of genes) from anther and pollen culture (Reinert and Bajaj, 1977). These haploids would be highly suitable for induction of mutations. Furthermore, these haploid plants can be treated with colchicine to obtain homozygous diploids (colchicine results in doubling of the chromosome number, yielding cells with two identical sets of genes). All the gametes produced from these plants would be genetically identical. Therefore, these plants would be of tremendous value in the breeding of new hybrids.

The role of cell and tissue cultures in growth and survival of normally inviable hybrid combinations (such as albinos) has been discussed earlier. These non-green seedlings do not survive in the field because they cannot photosynthesize. It would be possible to keep them alive under controlled conditions by providing them with an external carbon source. If grown to maturity, these hybrid plants could provide highly valuable gene combinations. It should also be possible to induce them to develop the photosynthetic apparatus by modification of the growth conditions.

Since all the plants produced and grown *in vitro* are completely free of bacteria, fungi, and nematodes, these plants can be conveniently transported across international boundaries without going through prolonged quarantine requirements. This mode of transportation of selected plant species is becoming increasingly popular.

Finally, cells grown in culture, especially those grown in suspension culture, can be frozen in liquid nitrogen and stored for several years. This way, germ plasm banks can be established to preserve valuable genotypes for future use.

All in all, the successful development of cell and tissue culture techniques for a particular species cannot only aid in the production and propagation of new varieties and cultivars, it can also help in the storage, transportation and selection of novel genotypes in a very convenient and economical way.

CONSTITUENTS OF MS MEDIUM

(Murashige and Skoog, 1962)

Constituents (inorganic)	mg/1
Ammonium nitrate	1650.0
Potassium nitrate	1900.0
Calcium chloride	440.0
Magnesium sulphate	370.0
Potassium dihydrogen phosphate	170.0
Iron - EDTA	36.7
Magnanese sulphate	22.3
Zinc sulphate	8.6
Potassium iodide	0.83
Boric acid	6.2
Sodium molybdate	0.25
Cobalt chloride	0.025
Copper sulphate	0.025

Constituents (organic)	mg/1
Meso-inositol	100.0
Glycine	2.0
Pyridoxine	0.5
Nicotinic acid	0.5
Thiamine HC1	0.1

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THE AWARDS OF THE INTERNATIONAL LILAC SOCIETY

By: Charles D. Holetich
(Chairman)

The International Lilac Society has given the following awards during 1978 and 1979 to honour those people who advance the Lilac.

HONOR AND ACHIEVEMENT AWARD

The highest award given by the Society. It is given only for outstanding work, dedication and service to promoting the Lilac or the Society. To be considered for the award the individual's contributions must be truly outstanding and of benefit to the whole Society. It is awarded only to individuals and not to institutions, given only once to any individual and need not be presented annually.

Recipient

1978 Mrs. Lourene Wishart

For promoting the growing and landscape use of the Lilac
For encouraging the public use and display of Lilacs in the mid-West
For educating public groups about the value of the Lilac .

DIRECTOR'S AWARD

Awarded by the Society only to those engaged in the improvement of the Lilac through hybridizing, scientific selection or selective research to improve the quality of the flower of the lilac plant. It is intended as an award for outstanding work with the Lilac. It is to be considered as the highest scientific horticultural award given by the Society.

Recipient

1979 Dr. Owen M. Rogers

For outstanding and dedicated service to the International Lilac in the researchers work on the "International Register of Cultivar names in the Genus Syringa".

For selective work in hybridizing and plant research of the lilac to obtain better cultivars.

For dedicated work as a member of the Board of Trustees and President of the International Lilac Society.

AWARD OF MERIT

Given to Individuals or Institutions, Public or Private Gardens, for outstanding contributions in promoting, growing, researching or working with the Lilac or the Society. It is intended as the Society's recognition for outstanding work or service. It is intended to be given regionally as an 'International Recognition for Work Over and Above the Average' - for outstanding promotion, for public education, for scientific-research work, or for horticultural excellence. A recipient may receive this award only once for the same work (but more than once for several contributions of equal merit).

Recipients

1978

Mr. Alvan Roger Grant

For a career of service in the Monroe County Parks and the emphasis given to Lilac therein.

Mr. Robert Forsythe

For service to the Society as a propagator of Lilacs and for his help in the dissemination of superior cultivars.

1979

Mr. Walter W. Oakes

For outstanding and dedicated work as a founding director and treasurer of the International Lilac Society.

For promoting the planting and exchange of rare and newer cultivars in private gardens and arboreta.

Mrs. Nancy Emerson

For dedicated work and service to the International Lilac Society as past treasurer and a member of the Board of Trustees in promoting the Lilac and the Society.

For promotion and planting of the Lilac especially in the formation of the Delhi Chapter of the International Lilac Society.

Mrs. Cora Lyden

For her work in hybridizing newer and better forms of Lilacs and promoting the planting and appreciation of the Lilac.

The Woodland Garden Club
and to the
Hulda Klager Lilac Society
of Woodlands, Washington

For their dedication in preserving the HULDA KLAGER LILAC GARDENS and the work of Hulda Klager in promoting the Lilac.

For their promotion and encouragement in planting Lilacs for home and arboreta landscaping.

For preserving an outstanding Lilac garden for public display and appreciation.

Historic Strawberry Banke Restoration
Portsmouth, New Hampshire

For its use of the Lilac in landscaping the early American restoration of a truly historic site, recognizing the Lilac as one of our country's earliest plantings of shrubs of beauty brought to the new world with the pilgrim fathers of our land.

The University of New Hampshire
Durham, New Hampshire

For its work in lilac research and the campus planting and landscaping with Lilacs and in appreciation for its outstanding promotion and hospitality to the International Lilac Society.

Historic Governor Wentworth Mansion
of Portsmouth, New Hampshire

For its outstanding planting of the Lilac in a truly outstanding display of an historical estate with some of the oldest Lilacs in North America. This special cultivar being designated as the 'Gov. Wentworth' Lilac.

The Governor and Legislature of the State of
New Hampshire

For being the unique state of our republic to designate the Lilac as the "State Flower" of New Hampshire thereby recognizing it as one of our earliest American pioneers of beauty brought over, cherished and planted by our pilgrim founders and earliest settlers of this nation.

For promoting and encouraging the planting of the Lilac in historical restorations, such as the Historic Gov. Wentworth Mansion, Strawberry Banke Restoration and State Universities and Colleges, thereby making New Hampshire truly the 'Lilac State'.

For listing of previous awards see Proceedings of the 1977 I.L.S. Convention - Amherst, Mass., page 9 - 12.

PROPAGATION OF LILAC (*SYRINGA VULGARIS* L.) CULTIVARS FROM GREEN CUTTINGS USING VARIOUS ROOT-STIMULATING FACTORS.

By: Dr. Krystyna Bojarczuk
Institute of Dendrology, Kornik Poland

1. Introduction

The propagation of lilacs from green cuttings so far is not employed in horticultural practice, in spite of the doubtless advantages of plants produced by this method. Such plants are easier to cultivate since all their shoots are of the noble variety and there is no need to cut off sprouts from the rootstock. In the Institute of Dendrology in Kornik, Poland, studies were undertaken aimed at developing a simple, fast and efficient method of propagating lilacs from green cuttings. Similar studies have been also conducted by Dr. G. Schmidt from Kerteseti Egyetem, Hungary (1978). A very interesting result of his studies was the observation that there is a relation between the rootability of a cutting and the processes of terminal bud differentiation. Here results will be presented of studies on the effect of various stimulating agents on the rooting and growth of lilac cuttings in relation to the work of G. Schmidt.

2. Materials and methods

Plants for the experiments have been obtained from 12 or 40 year old mother plants which three years before the experiment had been rejuvenated by a severe pruning of the shoots. The cuttings were taken from the current year's shoots. From one shoot from 2 to 3 bi-nodal cuttings were obtained. The lower cut was made at an angle to the shoot axis, 2-3 mm below a node and the lower leaves were removed leaving only short petioles for the protection of buds. The upper cut was made about 5 mm above a node, and the upper leaves were reduced by half in order to reduce transpiration. All the experiments were performed in a greenhouse on a propagating bench. The benches were well cleaned with formalin and white-washed before the medium was introduced.

First a layer of steamed compost soil was placed on the net, 15 cm deep, and then a 3-5 cm layer of perlite. sand and coarse gravel or a mixture of peat with sand (1:1). The cuttings were placed in a 5 x 5 cm spacing, about 3 cm deep in the medium. After planting the cuttings were prophylatically sprayed with fungicides Benlate 0.1%, Captan 0.3% and Topsin 0.1%. After 4-8 weeks, rooted cuttings were placed in a frame, protecting them for the winter with a thin layer of peat and spruce twigs.

The rooting reagents were prepared by the method of Mitchell et al. (1968). Auxins were dissolved in 20 ml of ethanol and poured into 50 g of talc, which was thoroughly mixed and dried at a temperature of 60^{o}C.

Mixtures composed of two or three components of various substances were prepared in such a manner that first the substances were mixed with talc and then ethanol with auxin was introduced.

All the experiments on the rooting of lilac cuttings were performed in three replicates, fully randomized with 8 or 16 cuttings per row replicate. The results obtained were subjected to analysis of variance.

3. Discussion of results

3.1 The effect of time of cutting and degree of lignification of the cuttings on their rootability.

In these experiments as well as in the studies of other authors (Sonnenfeld 1961, Boddy 1962, Schmidt 1978) a very high correlation was observed between rootability and the developmental stage of the mother plant. In our experiments best rooting was obtained on cuttings collected at the beginning and at full bloom and during the growth of shoots - about 85% of cuttings rooted (Table 1). Cuttings collected after the mother plants had passed the flowering time, which in most varieties was in mid-June, rooted much more poorly (about 25%). When material was collected even later, an increase in rootability was usually observed because of the use of concentrated rooting promoters (e.g. NAA 5000 mg/1 + pyrogallol 1000 mg/1) or from strongly growing shoots which sprouted as a result of heavy pruning in the spring. The strong drop in rootability upon termination of flowering of the mother plants is probably caused by advances in the process of stem lignification and a reduction in the levels of endogenous root-forming substances (Fadl et al. 1967, Tizio et al 1968, Bojarczuk 1978). In our studies we did not observe a second increase in rootability after withering of blossoms that was observed by G. Schmidt. Perhaps the differences are associated with the somewhat different climatic conditions and particularly with the later entering of the mother shrubs into the vegetative period.

The greatest rooting of cuttings was observed when they were collected from the apical part of the shoot (about 80%). More woody cuttings from the base of shoots rooted less (25%); thus when rooting basal cuttings they were slit for the lower 2 cm of their length and treated with higher concentrations of growth regulators. Similar results were also obtained by G. Schmidt (1978).

3.2 The effect of medium employed for the rooting of cuttings.

The highest percentage rootability was obtained in perlite and in coarse sand (80-100%), (Table 2). The cuttings in perlite also formed the strongest rooting systems. Perlite is a well-aerated medium, is permeable and above all is characterized by a high degree of sterility. Plants rooted in this medium were characterized by a high degree of health which

probably resulted in their greater ability to form adventitious roots.

3.3 Effect of auxin co-factors on the formation of adventitious roots.

The strongest effect on the rooting of lilac cuttings was observed from auxins, particularlly NAA in dust preparations at concentrations of 0.2 - 0.4% and in ethanol preparations at concentrations of 5000 mg/1 using the quick-dip method. Besides auxins in the experiments we have used various other substances such as vitamins, phenolic compounds and indol. Preparations that included pyrogallol at a concentration of 0.1% or indol at a concentration of 0.4%, together with auxin NAA 0.2% had an additive or synergistic effect on the growth of roots from the cuttings (Table 3). The role of these two compounds probably depends on their ability to protect endogenous auxin against oxidation by IAA oxidase (Gorter 1969).

A strong effect on the development of a root system was also observed for vitamins, particularily vitamin B_3 and C, at a concentration of 0.1 to 0.2%. They probably stimulate the growth of roots after initiating their development by plant hormones (Wareing and Philips 1976).

3.4 Treating rooted cuttings with gibberellic acid GA_3

Lilac cuttings treated with rooting promoters develop a very strong root system, which results in the exhaustion of plants and a weakening of the growth of their aerial parts. Therefore, methods were sought to bring the plant back to a balance between the root system and the aerial part. In the experiments conducted use was made of one-year-old rooted lilac plants which were given a foliar spray with gibberellin at a concentration of 50, 100 and 150 mg/1. Most intensive growth of the plant was obtained after the 100 mg/1 spray, performed during intensive plant growth, i.e. at the end of June (Table 4). On plants treated with GA_3 no frost injuries were observed over several consecutive winters; this appears to indicate that the gibberellin treatment did not lower their resistance to low temperatures.

Abstract

1. Cuttings of ornamental lilac (*Syringa vulgaris* L.) varieties have rooted well when obtained from current shoots of young mother trees (10-12 years old) or from old ones that were rejuvenated by a heavy pruning two years prior to propagation.

2. The highest percentage rooting and the strongest root system was obtained when the cuttings were taken at the beginning and in full bloom of the mother plants.

3. Cuttings taken from the terminal and subterminal parts of the shoots have rooted better than those obtained from the basal parts.

4. The best medium for the rooting of lilac cuttings proved to be a 3-5 cm layer of perlite placed over a compost soil.

5. A strong effect on the rooting of lilac cuttings was obtained following use of dust preparations which included auxin at a concentration of 0.2-0.4%, indol and pyrogallol at a concentration of 0.1-0.4%, and vitamins B_3 and C at concentrations 0.1-0.5%.

6. A foliar spray with gibberellic acid of one-year old rooted cuttings causes better growth relative to the controls, thereby equalizing the disproportions between the rooting system and the aerial part of the plant.

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Table 1. Effect of date on rooting of cuttings. Cv. 'Prof. Hoser', 4 and 8 weeks after cutting. NAA and Benlate used in dust preparations. No. of cuttings per replicate - 8. *Values designated with the same letter do not differ significantly from each other.

Cutting date	No. rooted		Roots/cutting		Total root length per cutting	
	Four weeks after cutting	Eight weeks after cutting	Four weeks after cutting	Eight weeks after cutting	Four weeks after cutting	Eight weeks after cutting
1. Before flowering	4,8 b*	6,1 cb	3,0 b	4,4 b	12,0 b	40,7 b
2. Onset of flowering	4,2 b	6,8 c	2,6 c	3,5 a	8,9 ab	29,8 a
3. Full bloom	2,8 a	5,2 ba	1,9 a	2,8 a	5,2 a	24,8 a
4. End of flowering	2,4 a	4,6 a	1,5 a	2,8 a	5,7 a	23,2 a
Treatments						
Control	1,6 a	4,5 a	1,4 a	2,2 a	4,2 a	16,5 a
NAA 0,2%	5,4 c	5,8 b	2,5 b	3,9 b	9,7 b	39,6 c
NAA 0,2% + Benlate 0,5%	3,5 b	5,9 b	2,2 b	3,6 b	10,1 b	30,0 b
NAA 0,4%	3,7 b	6,5 b	2,9 b	3,8 b	8,7 b	32,3 bc

Interaction 'dates' x 'treatments' not significant

Table 2. Effect of medium on rooting of cuttings cv. 'Mrs. Edward Harding', Date of cutting: 16.VI. 71 r. No. of cuttings per replicate - 8

Media	No. rooted	Roots/cutting	Total root length per cutting
Perlite	8,0 b	4,9 c	15,3 b
Sand	6,5 b	3,4 b	7,9 a
Sand + peat	2,5 a	1,7 a	3,2 a
Coarse gravel	2,7 a	2,5 ab	3,3 a

Table 3. Effect of indol, pyrogallol and auxin on the rooting of lilac cuttings.
Cv. 'Katherine Havemeyer', Date of cutting: 17.VI.73 r.
All substances in dust preparations. No. of cuttings per replicate - 8.

Treatment	No. rooted	Roots/cutting	Total root length per cutting
Control	3,6 a	2,5 a	19,8 a
Indol 0,2%	6,0 bc	4,1 b	31,6 a
Indol 0,4%	5,6 b	3,7 b	33,0 a
Indol 0,8%	5,6 b	3,1 ab	25,2 a
Pyrogallol 0,05%	6,3 bc	3,4 ab	26,6 a
" 0,1%	6,6 bc	3,4 ab	38,3 ab
" 0,4%	6,6 bc	2,4 a	25,1 a
Indol 0,4 + Pyrog. 0,1	6,3 bc	5,2 bc	52,4 abc
NAA 0,2	6,6 bc	5,8 c	58,1 abcd
" + Indol 0,2%	6,3 bc	10,1 de	85,6 cd
" + Indol 0,4%	7,0 bc	10,1 de	93,3 d
" + Indol 0,8%	7,0 bc	9,1 d	85,5 cd
" + Pyrog. 0,05%	7,3 c	10,4 e	79,3 bcd
" + Pyrog. 0,1%	6,3 bc	10,6 e	88,4 bcd
" + Pyrog. 0,4%	7,0 bc	9,9 de	73,9 bcd
" + Indol 0,4% + Pyrog.0.1%	7,0 bc	10,5 e	82,1 bcd

Table 4. Effect of gibberellic acid spray on the growth of rooted lilac cuttings. Dates of spraying: 29:06, 2:07, 6:07, 13:07, - 1974

Cultivars	Mean shoot increment in cm
'Andenken an Ludwig Späth'	20,0 b
'Edmond Boissier'	15,3 a
Treatment	
Control	5,4 a
GA_3 50 mg/1	15,2 b
GA_3 100 mg/1	28,1 d
GA_3 150 mg/1	20,7 c

Interaction of "Cultivar' x 'Treatment' not significant.

"PAPILLATE LEAVES IN LILACS?"

By: Peter S. Green*

Have any readers tried to use the key characters of papillate versus non-papillate lower leaf surfaces when trying to distinguish between the pair, *Syringa emodi* and *S. yunnanensis*. and other species? The great horticultural taxonomist, Alfred Rehder, employed these contrasting characters in his key to the species of *Syringa*, both in Mrs. McKelvey's classic "The Lilac" (1928) and in his well-known "Manual of Cultivated Trees & Shrubs" (1927 & 1940).

Papillae, in this context, are of course minute bumps on the surface of the leaf - invisible to the naked eye, but presumably discernible when looked for through a hand-lens, x10 or x20. Yet even with the higher of these magnifications I have completely failed to see these papillae in *S. emodi* and *S. yunnanensis.* I tried both fresh, living leaves and dried herbarium specimens and began to reject the character as not founded on fact and to wonder what it was that Rehder saw.

Recently, however, when a colleague was telling me of the studies he was making of the characters and anatomy of epidermal surfaces using a Scanning Electron Microscope, I thought that surely here was a way of really settling the question of whether or not there were papillae on the lower leaf surfaces of these two species and not on the others separated this way by Rehder. I have not learned to use a S.E.M. myself but my colleague, Mrs. Rowena Gale, is skilled in this new technique and kindly undertook to examine and photograph samples of leaf surfaces for me. Some of the results are shown in Plate 1 and I thought that readers would be interested to see that *S. emodi* and *S. yunnanensis* do indeed have papillae, while *S. wolfii,* one of the contrasted species, does not, nor do *S. julianae, S. oblata* var. *giraldii* and *S. tigerstedtii.* Also it does not matter whether the leaf material is living and fresh or dried and restored by boiling in water and fixing in Formol-Acetic-Alcohol.

Clearly Rehder was right: there are papillae in some species but I wonder how he saw them for they must be only 20 microns high. I wonder, too, if other people using his keys have failed like me to see them.

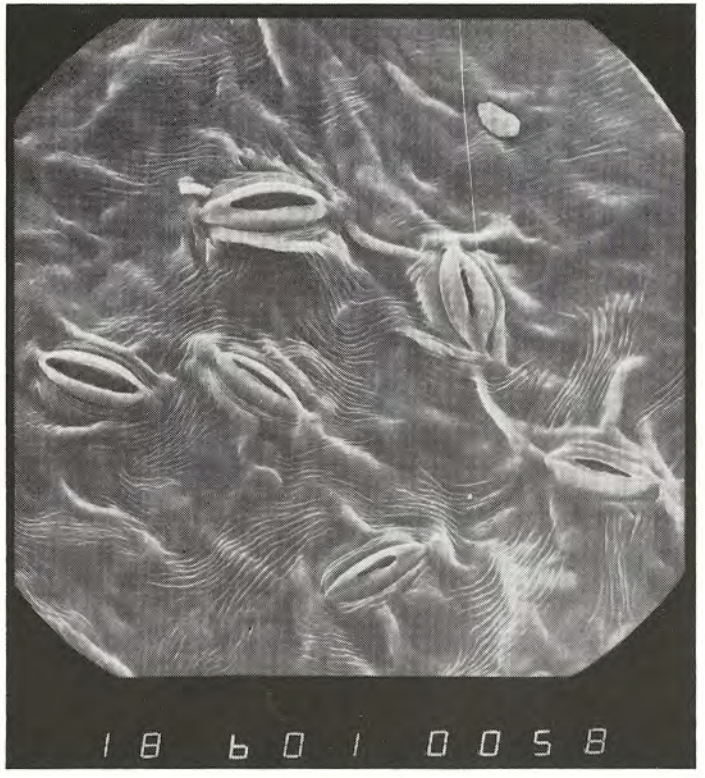
S.E.M. photomicrographs of lower leaf surfaces in *Syringa* species, X600. A, *S. emodi* (cult. Kew, 1978, No. 00.73.11126). B, *S. yunnanensis* (Yunnan, 1914, *Schneider* 2771, Herb. K). C, *S. wolfii* (cult. Kew, 1978, No. 000.73.14237). D, *S. julianae* (cult. Kew, 1978, No. 000.73.11120). E, *S. oblata* var. *giraldii* (cult. Kew 1978, No. 000.73.11124). F. *S. tigerstedtii* (cult. Stockholm, 1950, .T. Stearn s.n., Herb.K).

*Keeper of the Herbarium and Deputy Director of ROYAL BOTANIC GARDENS, Kew, Richmond, Surrey, TWi 3AE, England

A. *S. emodi*

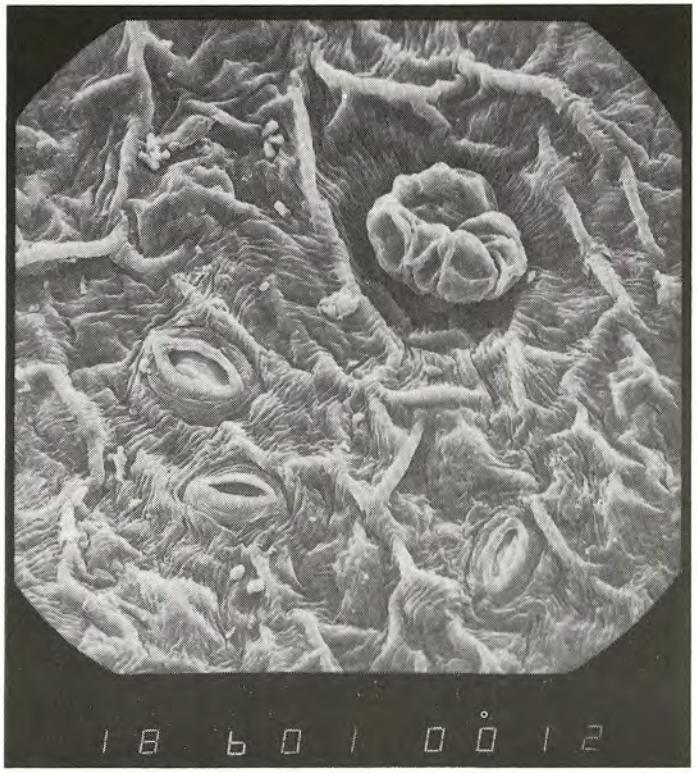
B. *S. yunnanensis*

C. *S. wolfii*



D. *S. julianae*

E. *S. oblata* var. *giraldii*



F. *S. tigerstedtii*

SYRINGA MEYERI cv. 'PALIBIN'*

Oleaceae

In this subject we have a case of widespread mistaken identity. For many years this plant has been known in cultivation as *Syringa palibiniana,* a name to which it has no claim at all. Being an attractive lilac, and dwarf, it has become a popular subject for rock gardens and the name *S. palibiniana,* which somehow became attached to it, was soon widely known and used, for, despite its length, it proves to be quite memorable and easily trips off the tongue.

Name changes in plants are usually blamed on botanists and the International Codes of Nomenclature but occasionally, as in this case the necessity for a change arises from a misidentification. Who first called our plant *S. palibiniana* is not clear but it is suspected that the mistake was first made in the Japanese nursery trade, for in the Descriptive Catalogue of the Yokohama Nursery Co. Ltd. for 1920 (and perhaps before this, but no earlier edition has been seen) we find offered on p. 34, *'Syringa palibiniana* . . . New Corean lilac . . . height: 2-3 ft', and in the 1937 Catalogue it is described as 1½-2 ft. high. Later after the war, K. Wada, also of Japan, continued to offer *'S. palibiniana* . . . new Corean lilac . . .' and I believe it was from that country that our plant was first introduced into Britain under this name.

Unfortunately, however, although the name *S. palibiniana* was validly published by Nakai (in Bot. Mag. Tokyo 27:32. 1913), it was originally applied to a quite different plant native to Korea which was later sunk into synonymy under *S. velutina* Komarov (see McKelvey, The Lilac: 125. 1928), now a synonym itself of *S. patula* (Palibin) Nakai. (I have seen the type specimen collected by Nakai and kindly sent on loan for examination by the University of Tokyo Herbarium and confirmed this synonymy for myself.)

What then is the identity of our desirable dwarf lilac? After careful investigation it appears to be *S. meyeri* Schneider, or at least a selected dwarf clone of this species. This was elucidated a number of years ago and the matter set out clearly by R.C. Elliott in 1961 (in Bull. Alpine Gard. Soc. 29(1): 124-127). Yet the name *S. palibiniana* continues to persist in use. My interest in lilacs, especially the species, has ranged over a number of years and I have been asked more than once to provide a name for our popular rock-garden plant. Believing it to be a clone, propagated vegetatively by cuttings, the opportunity is presented to select a name which helps to preserve in some form the name already well known and attached to our subject, while still complying with the two International Codes, that of Botanical Nomenclature and of Nomenclature for Cultivated Plants. The epithet *palibiniana* cannot be used, but a name at cultivar rank is selected instead: cv. 'Palibin'. I decided to use this name some time ago and told a number of correspondents with the result that it has already appeared twice in print (see references below), so I hope it will be taken into general use

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and prove an acceptable compromise between a complete name change on the one hand and the continued incorrect retention of an otherwise widely known but misapplied name on the other.

Because the true *S. palibiniana* is a synonym of *S. patula (S. velutina)* it is interesting to note that many people have applied one or other of these latter names to our dwarf lilac, thus illustrating the dangers of further compounding the confusion of misidentification through the automatic and uncritical application of synonymies taken from a reference work. Another unfounded name for our plant is listed by O.M. Rogers in his 'Tentative International Register of Cultivar Names in the Genus *Syringa* L.L (1976), that of 'Ingwersen's Dwarf'. It is there attributed to *S. patula* and was first listed, only as a name, by J.C. Wister in Arnoldia 23: 81 (1963), yet I doubt if it had really been proposed as a name, for reference to Ingwersen's catalogue shows entries which read *'Syringa palibiniana.* Dwarf shrub . . .' . I am sure that the plant I am now calling *Syringa* 'Palibin' is the one listed and that the use of the word dwarf in the catalogue was intended only as a description. Finally there appear to be two other names which have been applied to our plant, a made-up common name and Latin name: 'Dwarf Littleaf Lilac' or *Syringa microphylla minor,* used by Skinner's Nursery, Dropmore, Manitoba and listed by Rogers (1.c. pp. 20, 46) as having appeared in Skinner's 1966 Catalogue p. 12, which I have not seen.

Syringa meyeri is only known as a cultivated plant. How long it has been grown in Chinese gardens and how widely it is known there I do not know: I enquired about the plant when in Peking recently but without success. It was first introduced to the West, to the U.S.A., by F.N. Meyer in 1908 from Fengtai near Peking. Evidently two or more clones were involved (see McKelvey, 1.c. 170-172), although one of them may actually have been *S. pubescens.* I have seen a plant of *S. meyeri* growing at the Arnold Arboretum which originated from Meyer's introduction, and although it is dense and relatively low in stature, compared with most lilac species, I do not believe it is the same clone as the plant popular in British rock gardens. One may speculate, but I suspect that our plant was first taken from China to Japan and that it is from the latter country that it entered British gardens. From Britain it was introduced to North America after having been advertised in nurserymen's catalogues.

Syringa 'Palibin' is a most attractive plant. It produces an abundance of pinkish fragrant flowers in May but its main merit is its slow-growing, dwarf stature, making it an ideal shrub for the rock-garden. Under most circumstances it grows very slowly and for many years remains less than 1 m. high. The plant from which the specimen illustrated was taken has been growing in the rock garden at Kew for thirty years yet it is still only 1.5 m. high and 2 m. across. It is completely hardy and in fact appears to be hardy in much of North America, including New England, despite the severe winters of that part of the world (see an article by H.L. Flint and subsequent correspondence in The Pipeline 3(7): 1-5. 1977).

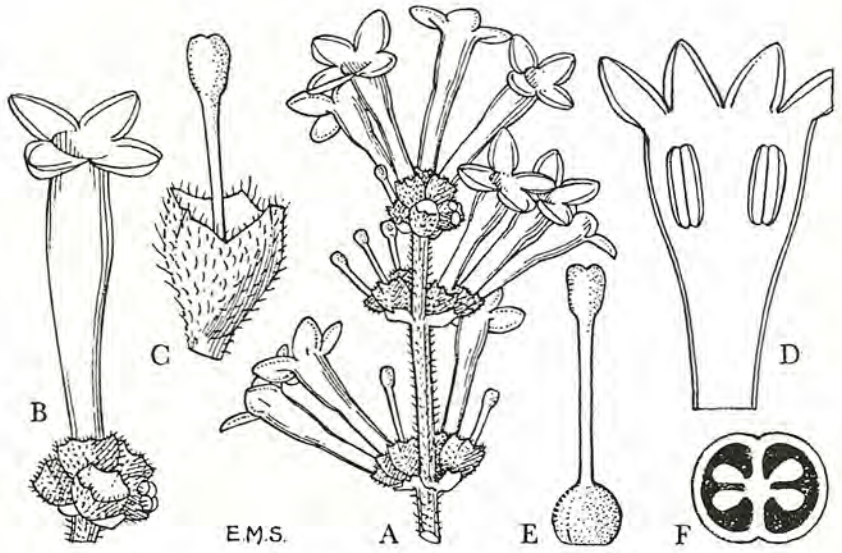
CULTIVATION. Like most lilacs, *Syringa* 'Palibin' is easy to cultivate. It is quite hardy and appreciates a sunny position. Slow-growing, it can flower when only 20 cm. high. Judicious pruning after flowering is beneficial. Propagation is by soft wood cuttings taken about June which root easily in a peat/sand mixture under mist or in a closed moist atmosphere such as under a polythene tent.

Syringa meyeri Schneider cv. **'Palibin'**. Krussmann, Handbuch der Laubgeholze ed. 2, 3:399 (1978); Alexander in Arnoldia 38(3): 70(1978).

S. palibiniana auct. mult., non Nakai (1913).

S. 'Ingwersen's Dwarf'. Wister in Arnoldia 23: 81 (1963); Rogers, Tentative Internat. Register Cultivar Names in *Syringa* L.: 31 (1976).

S. microphylla minor 'Dwarf Littleleaf Lilac'. Dropmore Cat. 12 (1966), not seen; cf. Rogers, l.c. 20, 46.



A, part of inflorescence, × 3; **B,** flower-cluster, × 6; **C,** calyx, style and stigma, × 12; **D,** corolla and stamens, × 6; **E,** gynoecium, × 12; **F,** transverse section of ovary, × 24.

DESCRIPTION. Dwarf deciduous *shrub,* 0.2-1 (-1.5) m. high; *stems* twiggy, pubescent. *Leaves* simple, opposite; *petiole* pubescent, 2-8 mm. long; *lamina* orbicular (or broadly ovate), (1-)1.5-2(-2.5) cm. long and broad, glabrous above, pubescent towards the base and on the nerves below, palmately 5-nerved, margin entire, ciliolate, base obtuse or truncate, shortly attenuate into the petiole, apex obtuse, occasionally broadly and shortly acuminate. *Inflorescence* terminal on side shoots, a many-flowered cymose dichasial panicle, pubescent. *Calyx* cupulate 1 mm. long, entire or with slight incipient teeth, pubescent, tinged dark purplish pink. *Corolla* tube slender, slightly broader towards the apex, 5-7 mm. long, pink or purplish pink, magenta-pink in the bud; *lobes* 4, valvate in bud, rounded, cucullate, 1.5-2 mm. long, borne at right angles to the tube, some eventually slight reflexed. *Stamens* 2, borne within the upper part of the corolla tube, *anthers* 1.75-2 mm. long, bluish purple. *Ovary* rounded, 0.5 mm. long, style slender, 2 mm. long, broadening towards the slightly bilobed stigma. *Fruit* usually abortive.

DISTRIBUTION. Known only in cultivation; originally from Japan or China.

- P.S. Green

Syringa meyeri cv. 'Palibin'

MARGARET STONES *del.*

NOMENCLATURAL NOTES ON SYRINGA SERIES VILLOSAE [OLEACEAE]

By: James S. Pringle*

Syringa subgenus *Syringa* Series *Villosae* Schneider is a group of ten species and their hybrids, collectively known as late lilacs. This paper deals with the nomenclature of three taxa in this series. Abbreviations for herbaria follow Holmgren & Keuken (1974).

AUTHORSHIP AND TYPIFICATION OF THE NAME *SYRINGA EMODI*

The first valid publication of the name *Syringa emodi,* for the Himalayan lilac, has commonly been attributed to G. Don, e.g. by McKelvey (1928), Rehder (1949), and Meyer (1952). As noted by McKelvey (1928), this binomial was first published by Wallich (1831), but only as a *nomen nudum.* Among the works in which the name *Syringa emodi* was published with a description, McKelvey and Rehder believed Don's *General History of the Dichlamydeous Plants* to have been the earliest, giving 1838 as its date of publication.

Subsequent bibliographic studies by several authors have indicated, however, that the publication of this name in Don's *General History* was antedated by its publication in Royle's *Illustrations of the Botany of the Himalayan Mountains.* According to Stearn (1943), Royle's work, although dated "1839" when completed, was published in numbers, from 1833 through 1840. Plate 65, featuring *S. emodi*, with an analysis adequate for valid publication under Article 44 of the *International Code of Botanical Nomenclature,* was published in No. 7 in August, 1835. The text description of *S. emodi* was published in No. 8 in December, 1835. Stafleu (1967) has determined that Volume 4 of Don's *General History,* in which *S. emodi* was described on page 51, was published in two parts, the first part in 1837, the second in March or early April, 1838. It appears, therefore, that the valid publication of the name *Syringa emodi* should be attributed to Royle rather than to Don, the complete citation being: *Syringa emodi* Wallich ex Royle, *Illustrations of the Botany ... of the Himalayan Mountains* ...1: 267 and 2: pl. 65, fig. 2. 1835. Although Royle attributed the origin of the name *S. emodi* to Wallich, his illustration and description of the species were based on his own collections; Royle's illustration of *S. emodi* is therefore here designated the lectotype.

Royle's illustration of *S. emodi* is reproduced as Fig. 1 in the present paper. This illustration depicts a flowering branch of a plant with elliptic to ovate-elliptic leaves, which are paler and conspicuously reticulate-veined beneath. The strongly ascending panicle branches, which are a distinctive characteristic of *S. emodi*, are clearly shown. The corollas, in the original colored plate, are

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depicted as being light bluish-purple, with widely spreading lobes. Yellow anthers protrude from the throat of the intact corollas; the illustration of a dissected corolla shows the short filaments just below the mouth of the tube, with about one-half the total length of the anthers exserted. This illustration corresponds closely to the appearance of *S. emodi* as this species is represented in cultivation (cf. photo in McKelvey, 1928).

The early history of *S. emodi* in cultivation has been reviewed by McKelvey (1928), who noted certain discrepancies among early illustrations and descriptions of the species. That the binomial *S. emodi* can be attributed to Royle, then, augurs well for nomenclatural stability. According to McKelvey's research, *S. emodi* was introduced to horticulture in Great Britain at the garden of the Horticultural Society (Later Royal Horticultural Society), where it was raised from seed collected by Royle. From the garden of the Horticultural Society it was distributed to botanical gardens and nurseries in France and evidently elsewhere. It appears likely, therefore, that most plants of *S. emodi* now in cultivation are derived from Royle's collection of seed of this species.

VALIDATION OF THE NAME *SYRINGA x JOSIFLEXA*

Hybrids between *Syringa josikea* Jacquin f. ex Reichenbach and *S. reflexa* Schneider have long been known as *S.* x *josiflexa*. This name, however, appears not to have been validly published under the provisions of the International Code of Botanical Nomenclature. It is notably absent from the *Index Kewensis*, as well as from such works as *Hortus Second* (Bailey & Bailey, 1941), Rehder's (1949) *Bibliography*, Krüssmann's (1960) *Handbuch der Laubgehölze*, and Meyer's (1952) *Flieder*. Because hybrids between *S. josikaea* and *S. reflexa* are widely cultivated, with several cultivars having been named, it appears desirable to have a binomial available for these hybrids. The name *S.* x *josiflexa* is therefore validly published in this paper.

Arguments against deriving the epithet of a hybrid from those of the presumed parental taxa have been presented by Yeo (1974). The binomials *S.* x *josiflexa* and *S.* x *swegiflexa*, however, are already in general use. The cause of nomenclatural stability therefore seems best served by the validation of these names.

Authorship of the name *S.* x *josiflexa* is often attributed to Isabella Preston. This practice, however, appears to have resulted from confusion of Preston's role as the originator of this cultigen with that of the author and publisher of its name. Bylov et al. (1974), for example, correctly cited "McKelvey 1928" as the author and date of publication of the name *S.* x *prestoniae*, but attributed the name *S.* x *josiflexa* to "Preston 1920." Since 1920, as noted below, was the year in which the initial cross between *S. josikaea* and *S. reflexa* was made, the progeny could not have been described then.

The library of the Royal Botanical Gardens at Hamilton has collected copies of all known works by Isabella Preston, Susan Delano McKelvey, and W.T. Macoun on lilac breeding, including those in popular periodicals and in the reports of the Canada Department of Agriculture Central Experimental Farm, Ottawa. A search of these and many other publications has disclosed no use of the name *S.* x *josiflexa* before 1935, when a Latin description would not have been required, nor any formal publication of this name in more recent years.

Syringa josikaea and *S. reflexa* were first crossed by Preston at the Central Experimental Farm in 1920 (Macoun, 1931; Cameron, 1950). The first mention of this cross in the reports of the Central Experimental Farm appeared in 1926, when Macoun wrote that *"Syringa reflexa* x *S. josikaea* is a handsome shrub with large panicles of lilac flowers." Preston annotated her copy (now in the library of the Royal Botanical Gardens) to indicate that *S. josikaea* was the seed parent and *S. reflexa* the pollen parent. She later published two articles in which this hybrid was briefly described (Preston, 1927, 1930), but no binomial was applied to it in any of these works.

The first use of the binomial *S.* x *josiflexa* in the reports of the Central Experimental Farm was in 1950, when Cameron reported that "A cross ... between *S. josikaea* and *S. reflexa* was named *S. josiflexa."* According to this report, only one F_1 seedling had been obtained, originally numbered S.20.06.01, and later named 'Guinevere'. A description of 'Guinevere' was published at this time. Some cultivars selected from seedlings of 'Guinevere' were also described.

Earlier, McKelvey (1928) had reported in her monograph, *The Lilac,* that when she visited the Central Experimental Farm in 1927, the hybrid between *S. josikaea* and *S. reflexa* mentioned by Macoun (1926) could not be located. Having seen no positively identified hybrid of this parentage, she published no binomial for such hybrids. Why McKelvey could not be shown seedling no. S.20.06.01 is not known. The history of 'Guinevere' is recorded in considerable detail in the Central Experimental Farm reports, and there is no indication, in these reports or in Preston's annotations, of any loss of records or confusion as to its origin. A specimen of 'Guinevere' (the holotype, cited below) was sent to McKelvey after *The Lilac* has been published, and appears to have been accepted as having been correctly identified as *S. josikaea* x *S. reflexa.*

McKelvey (1928) did note the presence of a lilac at Ottawa, seedling no. S.20.09, that appeared to be intermediate in certain respects between *S. josikaea* and *S. reflexa,* although the label on a specimen of this plant (*Fyles 200901,* AAH) indicates that it was originally grown as *S. villosa* x *S. vulgaris* 'Mlle. Fernande Viger'. McKelvey, however, annotated this specimen as being probably *S. josikaea* x *S. villosa.*

The earliest appearance of the binomial *Syringa josiflexa* in any publication appears to have been in a paper by Hillier (1936). He attributed this name to

Preston, but indicated that he had seen it only in personal correspondence. Also, there is in the Arnold Arboretum Herbarium (AAH) a specimen labeled *"Syringa josiflexa* Preston 'Guinevere', "collected by Preston (*s.n.,* 15 June 1939) and sent to McKelvey at the Arnold Arboretum. Because of these two indications that the name *S.* x *josiflexa* was coined, although not published, by Preston, its authorship is given as "Preston ex Pringle" below.

Although the name *S.* x *josiflexa* has not until now been validly published, the cultivar "Guinevere', being the first cultivar derived from *S. josikaea* x *S. reflexa,* has generally been considered to be the "type" of *S.* x *josiflexa*, and was so designated in the 1942 and 1953 editions of *Lilacs for America* (Committee on Horticultural Varieties, 1942; Lilac Survey Committee, 1953), and by Bylov et al. (1974). For the sake of stability, a specimen of 'Guinevere' has been designated the type of the name *S.* x *josiflexa* in this paper.

The Latin description of *S.* x *josiflexa*, and that of *S.* x *swegiflexa* later in this paper, have been prepared only for the purpose of validating these binomials, and have therefore been kept brief. Because these are cultivated taxa of hybrid origin, selections from later generations and backcrosses could and, in *S.* x *josiflexa*, already do exhibit so much diversity as to limit greatly the descriptive material that would be generally applicable to these hybrids.

SYRINGA x JOSIFLEXA Preston ex Pringle, hybrida nova.

Hybrida inter *Syringam josikaeam* et *S. reflexam.* Frutex habitu parentibus similis. Ramuli minute pilosi, olivacei. Folia elliptico-oblonga, in ramis florentibus 3-12 cm longa, in ramis vegetativis 7-15(- 25) cm longa, apice acuminata, basi cuneata, supra viridia, infra pallidiora, glabra. Inflorescentiae plerumque solitariae, erectae ramis distaliter cernuis, conicae, 12-25 cm longae, 10-18 cm latae, rachidi ramisque puberulentibus. Corollae 13-17 mm longae, 7-9 mm diametro, in cultivare typico violaceae (in sicco caerulescentes), in cultivaribus ceteris lilacinae, roseae, vel albescentes, tubo infundibuliformi et lobis ascendentibus uncatisque. Stamina inclusa. Fructus apicem versus rotundatus, mucronulatus, non verrucosus.

Holotype (cv. 'Guinevere'): Canada: Ontario: Regional Municipality of Ottawa-Carleton: Central Experimental Farm, Ottawa, *Preston s.n.,* 15 June 1939 (AAH).

Paratypes (cv. 'Guinevere'): Canada: Ontario: Regional Municipality of Hamilton-Wentworth: Katie Osborne Lilac Garden, Royal Botanical Gardens, Dundas, R.B.G. accession no. 54586, received from Kingsville Nurseries, Kingsville, Maryland, *Pringle 1587,* 29 May 1975 (BH, HAM, NHA).

Paratype (cv. not specified): U.S.A.: Massachusetts: Suffolk Co.: Arnold Arboretum, Jamaica Plain, Arnold Arboretum no. 792-35, received from the Central Experimental Farm, Ottawa, Canada, *Palmer s.n.,* 9 June 1938 (AAH).

The hybrid origin of *S. x josiflexa* 'Guinevere' is readily apparent in its morphology (Figs. 2-4). Its greater resemblance is to *S. josikaea,* because of the erect axis of its inflorescence and its relatively deeply colored corollas. The corolla color of young buds was recorded as 77B (R.H.S. Colour Chart, 1966); older buds were predominantly close to 77C, paler distally; in open flowers, the lower portion of the tube was 77C, the upper portion 77C, and the limb 76B-77D. The influence of *S. reflexa* appears in the widely divergent primary branches of the inflorescence, which are more cernuous distally than those of *S. josikaea,* and in the greater admixture of pink in its corolla color.

VALIDATION OF THE NAME *SYRINGA X SWEGIFLEXA*

Hybrids between *S. reflexa* and *S. sweginzowii* Koehne & Lingelsheim are widely cultivated under the name *S. x swegiflexa.* This name also appears not to have been validly published, and like *S. x josiflexa*, is absent from the *Index Kewensis.*

According to Rehder (1949), the binomial *S. swegiflexa* was first used in the 1935-1936 nursery catalogue of Herm. A. Hesse, published in 1935. It has since been used in many manuals and other horticultural publications, with its authorship being attributed to Hesse. However, since all use of this name has occurred subsequent to 1 January 1935, the absence of a Latin description prevents any publication of this binomial, to date, from being valid under the provisions of the International Code of Botanical Nomenclature.

SYRINGA X SWEGIFLEXA Hort. Hesse ex Pringle, hybrida nova.

Hybrida inter *Syringam sweginzowii* et *S. reflexam.* Frutex habitu inter parentes medius. Ramuli glabri, rubicund. Folia elliptico-oblonga vel obovata, in ramis florentibus 4-8 cm longa, in ramis vegetativis 5-12 cm longa, apice acuminata, basi cuneata vel rotundata, supra atroveneta, infra pallidiora, glabra; petioli rubinei. Inflorescentia suberectae vel cernuae, conicae, 15-27 cm longae, 6-22 cm latae, inflorescentiis lateralibus minoribus saepe concomitae, rachidi ramisque glabris vel puberulentibus. Corollae 12-13 cm longae, 8-9 mm diametro, tubo anguste infundibuliformi, dilute roseo (in sicco purpurascente), et lobis patentibus, albescentibus. Stamina inclusa. Fructus abrupte acuminatus, non verrucosus.

Holotype: U.S.A.: Massachusetts: Suffolk Co.: Arnold Arboretum, Jamaica Plain, Arnold Arboretum no. 701-36, received from the Herm. A. Hesse nursery, Weener (Ems), Germany, *E.J. P[almer] s.n.,* 12 June 1939 (AAH).

Paratypes: Canada: Ontario: Regional Municipality of Hamilton-Wentworth: Royal Botanical Gardens nursery, Dundas, raised from seed produced in R.B.G. breeding experiments, *Pringle 1354,* 13 June 1972 (HAM), *Pringle 1559,* 10 June 1974 (HAM), and *Pringle 1591,* 2 June 1975 (AAH, BH, HAM); Royal Botanical Gardens nursery, Dundas, R.B.G. accession no. 69590, received from

Agriculture Canada Research Station, Morden, Manitoba, *Pringle 1586,* 6 June 1975 (AAH, BH, DAO, HAM, NHA).

The type specimen of *S. x swegiflexa* was selected because of its direct connection with the Hesse nursery, where *S. x swegiflexa* was first produced, and from whose introduction of *S. x swegiflexa* most plants in cultivation are derived. The plant from which the paratype collection *Pringle 1586* was obtained represents *S. x swegiflexa* as it is found in a number of arboreta and nurseries, and may be clonal with the holotype. The other paratype collections, *Pringle 1354* and *1591,* represent plants obtained by crossing *S. sweginzowii* (seed parent) with *S. reflexa* at the Royal Botanical Gardens. Specimens of the parent plants as well as of the hybrids are in HAM (see Pringle, 1977).

Syringa x swegiflexa bears a stronger resemblance to *S. sweginzowii* than to *S. reflexa.* Its inflorescences, however, are less open than those of *S. sweginzowii,* and its corollas are deeper pink. The buds and the tubes of the open corollas were 69B-70D on the plant represented by *Pringle 1586,* and close to 62D on the plant represented by *Pringle 1591*; in both cases, the limbs of the open corollas were nearly white. The leaves are larger and more closely spaced than those of *S. sweginzowii,* but smaller than those of *S. reflexa.*

ACKNOWLEDGEMENTS

The author extends his sincere thanks to Dr. Garret E. Crow, Dr. Owen M. Rogers, and Mr. Freek Vrugtman for valuable information and helpful suggestions. The cooperation and assistance of library staff members at Agriculture Canada, the University of Guelph, McMaster University, and the Missouri Botanical Garden, as well as at the Royal Botanical Gardens; the hospitality of the staff of the herbaria of the Arnold Arboretum; and information on specimens at DAO graciously provided by Mr. William J. Cody are also gratefully acknowledged.

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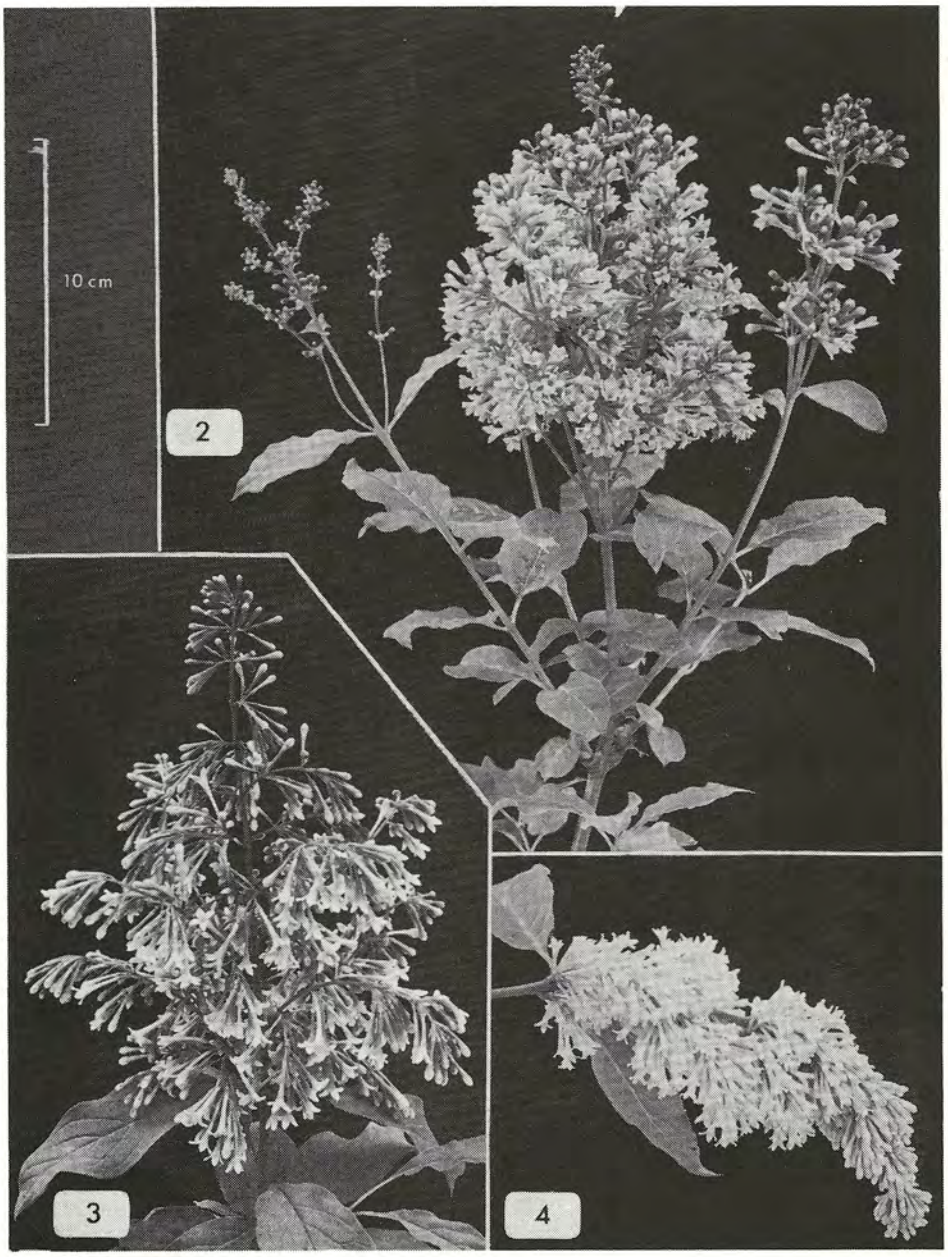
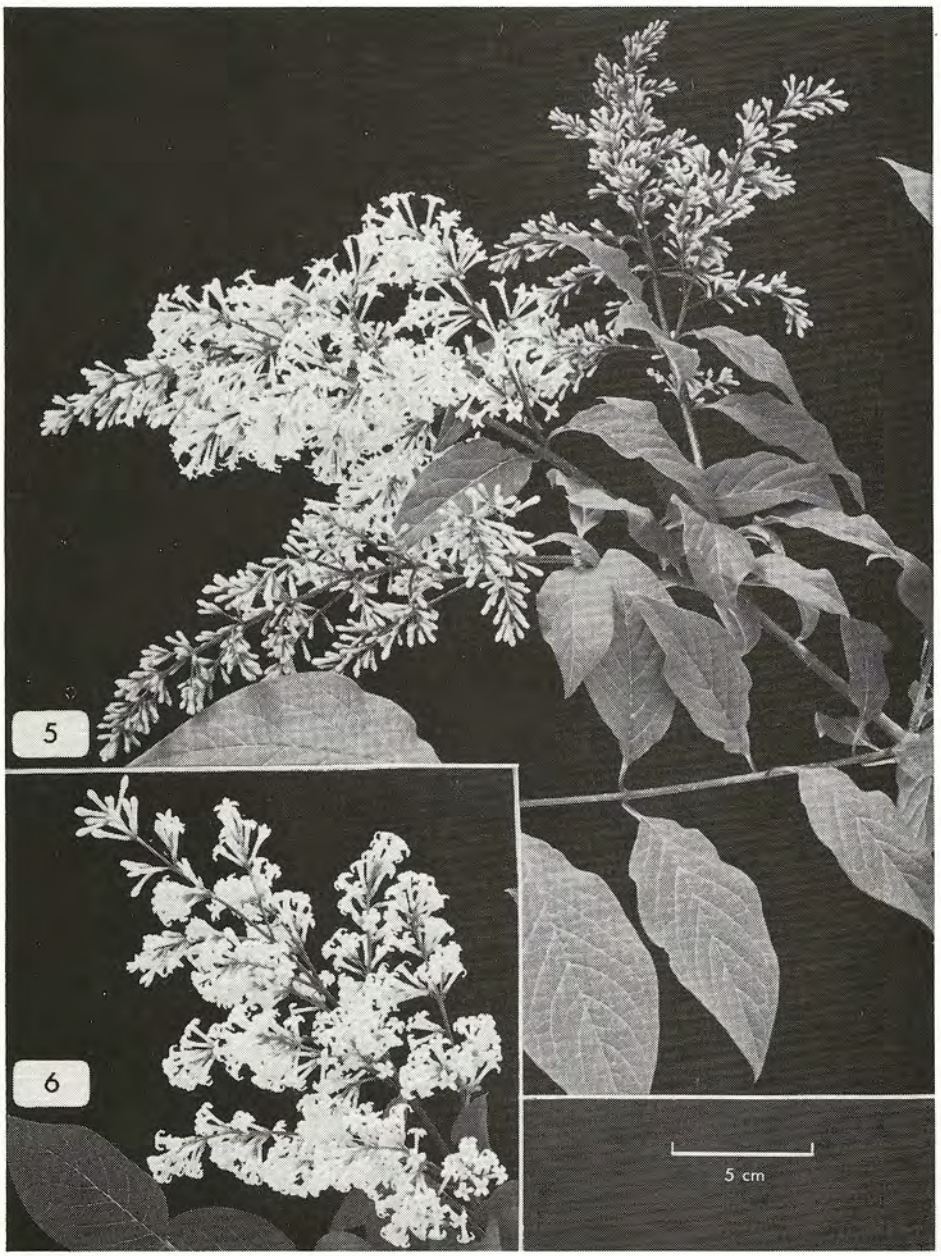
1. Illustration typifying the name *Syringa emodi* Wallich ex Royle, from Royle (1835).



2. *Syringa josikaea.* 3. *S.* x *josiflexa.* 4. *S. reflexa.*



5. *Syringa* x *swegiflexa.* 6. *S. sweginzowii.*

NOTES ON SYRINGA TIGERSTEDTII [OLEACEAE]

By: James S. Pringle*

Although described in 1948, *Syringa tigerstedtii* H. Smith has remained little known in horticulture. Its original description (Smith, 1948) was published in a journal having a limited circulation outside of Sweden, and even escaped the notice of the compilers of the *Index Kewensis* for about a decade. Most of the subsequent descriptions of *S. tigerstedtii,* which have been largely confined to technical publications of continental European origin, are essentially only abbreviated paraphrases of the original description, and contain virtually no additional information from direct observations. Except for a comparison of *S. tigerstedtii* with two related species in Smith's (1948) summary, the only descriptions in English are brief notes intended merely to convey the general aspects of this species (Frederick G. Meyer, 1963; Hillier et al., 1971; catalogues of R.H. Notcutt Ltd., Woodbridge, Sussex, U.K., 1954 et seq.).

The only illustrations of *S. tigerstedtii* published to date are those accompanying Smith's original description of this species -- line drawings of a leaf, two views of a fruit, and an unopened flower. These figures, unfortunately, were badly jumbled when they were republished by Krussmann (1962): Smith's figures of the flower bud of *S. tigerstedtii* and the leaf of *S. yunnanensis* were grouped, with figures from other sources, under the caption *"S. Sweginzowii"*; and his figures of the leaf and fruits of *S. tigerstedtii* were grouped with his figure of the flower bud of *S. sweginzowii* under *"S. tigerstedtii."*

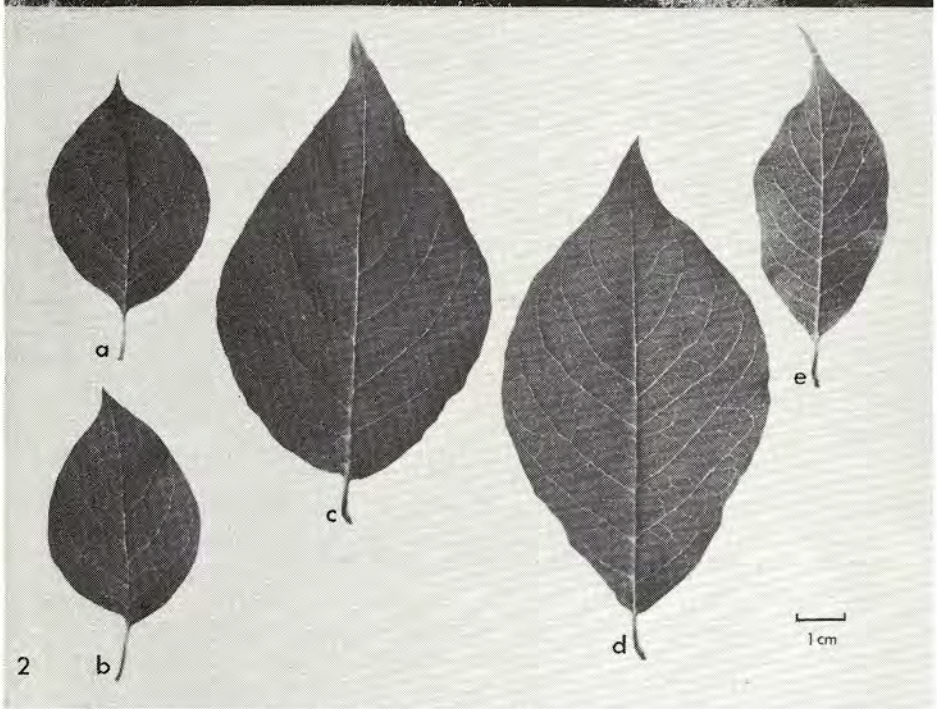
The present paper has been prepared so that a full description of *S. tigerstedtii* in English, with illustrations, may be conveniently available to North American plant scientists. To this descriptive material are added some new data from the author's own research on the breeding behavior and chromosomes of *S. tigerstedtii.*

The description of *S. tigerstedtii* in this paper is based on observations of plants at the Royal Botanical Gardens, Hamilton, supplemented by studies of the herbarium specimens cited. Color designations follow the R.H.S. Colour Chart (1966); abbreviations for herbaria are those of Holmgren & Keuken (1974).

TAXONOMY AND DESCRIPTION

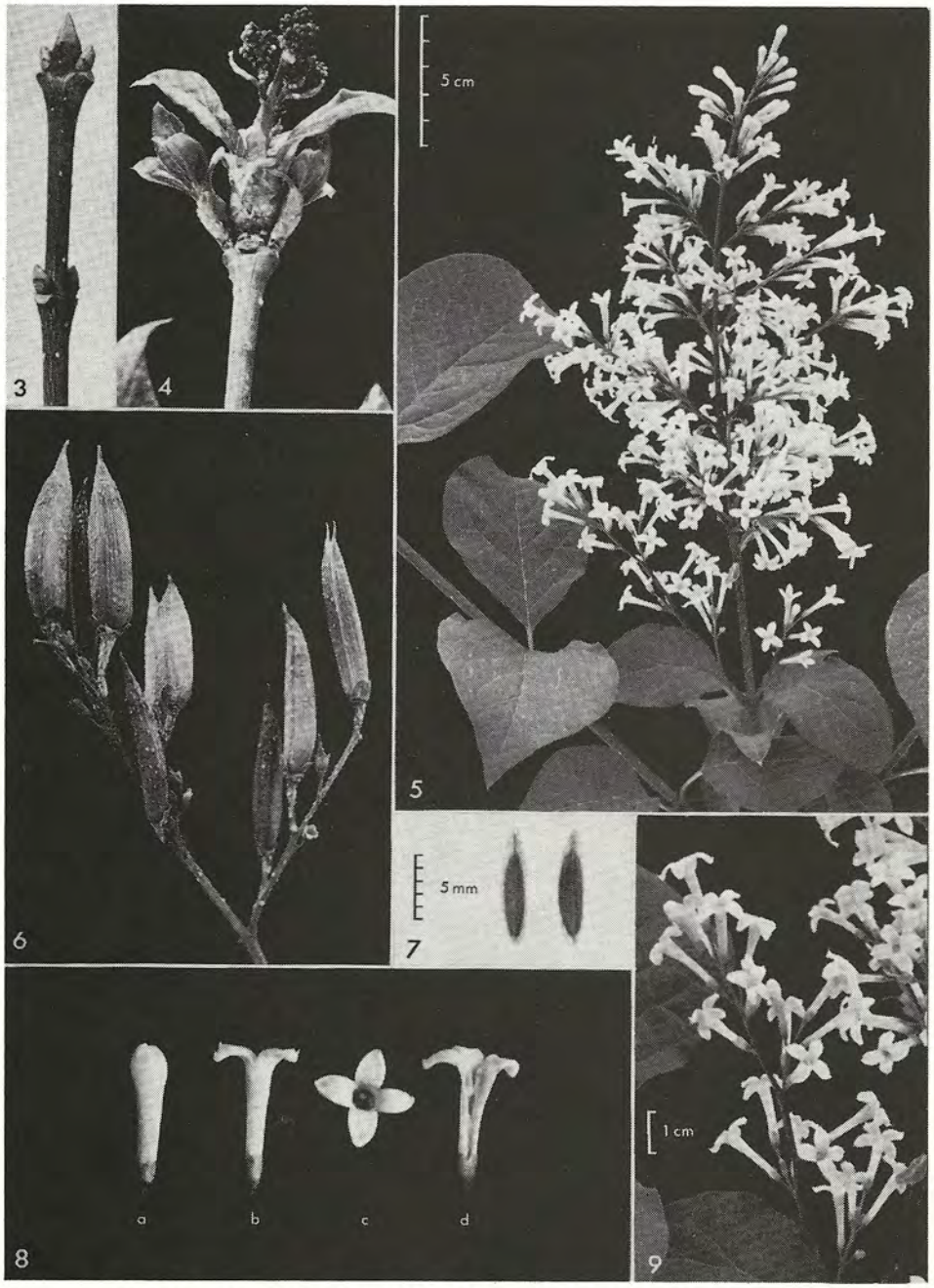
SYRINGA TIGERSTEDTII H. Smith, Lustgården 28-29: 107. 1948.
Type: China : Sikang [now Szechwan]: Tanpa (Romichango) Distr.: (Ndrome), ca. 3000 *m, H. Smith 12649,* 1 Oct 1934 (holotype S, isotype A!).**

*Royal Botanical Gardens, Box 399, Hamilton, Ontario, Canada L8N 3H8
**According to Article 73 of the International Code of Botanical Nomenclature (Regnum Vegetabile, Vol. 82. 1972), the terminal double i of the specific epithet, used by Smith (1948), should be retained.



2

Syringa tigerstedtii. 1. Four-year-old plant.
2. Leaves from vigorous vegetative shoot: a, b, from proximal part; c, d, from median part; e, from distal part.



Syringa tigerstedtii. 3. Winter twig, with terminal floral and lateral vegetative buds. 4. Expanding buds. 5. Inflorescence. 6. Mature fruits. 7. Seeds (Scale applies to 3, 4, 6, 7, 8). 8. Flowers: a, just before anthesis; b, Lateral view; c, top view; d, longitudinal section. 9. Part of inflorescence.

Syringa tigerstedtii is a member of subgenus *Syringa* series *Villosae* Schneider, and exhibits the traits characterizing this series, including terminal buds, inflorescences borne at the ends of leafy shoots, and yellow anthers (Rehder, 1928).

Plants of *S. tigerstedtii* have a graceful, open habit, with the older stems spreading and arching (Fig. 1). Thus the plants become proportionately broad, and increase in height more slowly than those of most taxa in series *Villosae.* In the Royal Botanical Gardens nursery, plants received as cuttings in 1970 were about 2 m tall and 3-4 m wide at the end of the 1975 growing season. Smith (1948) described a 12-year-old plant in the Botanical Garden of the University of Uppsala, Sweden, as being "upwards of 2 m in height," and also described the plants he had seen in their natural habitat in China as being about 2 m tall. In the 1954 catalogue of R.H. Notcutt Ltd., however, *S. tigerstedtii* is said to reach dimensions of 8 ft x 8 ft, and Frederick G. Meyer (1963) indicated that he had seen plants up to 10 ft. (about 3 m) tall in Germany.

The twigs of *S. tigerstedtii* (Fig. 3) are terete and glabrous. Those of the previous growing season are reddish-brown, 177A-200D. On older branches the bark is grayer, that of branches about 1 cm in diameter being close to 201A. The vegetative buds are obtuse to subacute and average about 3 mm long, with the scales glabrous and brownish-yellow, close to 163B near the center, paler above, and redder below. The floral buds are similar but larger and more acute.

Observations of *S. tigerstedtii* at the Royal Botanical Gardens have disclosed that leaf shape is more variable in this species than published descriptions have indicated. Leaves on short twigs and on the proximal parts of longer twigs commonly have blades ranging from broadly ovate, as they were described by Smith (1948), to nearly orbicular, mostly 4-8 cm long, 1.2-1.4 times as long as broad (Fig. 2a, b). The blades of median leaves on long shoots are larger, usually broadly elliptic to obovate, 8-13 cm long, 1.4-2 times as long as broad (Fig. 2c, d). The blades of distal leaves on long shoots tend to be shorter and considerably narrower, usually more than twice as long as broad (Fig. 2e). Nearly all leaf blades are rather abruptly short-acuminate, although the bases range from broadly cuneate to rounded. The lower leaf surfaces are persistently short-pilose along the midrib and the proximal parts of the main lateral veins. When fully expanded, the leaves are medium green, 137C-138A, above, and paler, close to 138C, below, with the petioles suffused with reddish-purple. No notable autumn color develops.

The inflorescences of *S. tigerstedtii* are borne at the ends of spreading or slightly cernuous branches, usually singly, but occasionally in groups if the terminal meristem aborts or is destroyed prior to floral-bud differentiation. The larger inflorescences are 15-25 cm long and 1.0-1.7 times as long as broad. The wide spacing of the inflorescence branches and the small, widely spaced clusters of flowers result in relatively open inflorescences (Figs. 5, 9). The rachis and branches of the inflorescence are glabrous, prominently lenticellate, and strongly suffused with reddish-purple, the branches being close to 138A-

Table 1. *Syringa tigerstedtii* contrasted with three closely related species*

	S. tigerstedtii	*S. sweginzowii*	*S. tomentella*	*S. yunnanensis*
Leaves -- Lower surface	Pilose along midrib and proximal parts of main secondary veins	Pilose along midrib and proximal parts of main secondary veins	Densely pubescent along primary to quaternary veins	Glabrous
Inflorescence -- Branches and pedicels	Glabrous	Glabrous	Usually puberu - lent, occasionally nearly glabrous	Puberulent
Corolla -- Apex in bud	Rounded	Subacute	Subacute	Intermediate
Limb, diameter	7-9.5 mm	8-11.5 mm	6.5-8 mm	9.5-11 mm
Tube, length	8-10.5 mm	11-13 mm	10-15 mm	8-11 mm
Anthers, apex	At or up to 0.5 mm below throat	1.5-2 mm below throat	At or slightly above throat	At throat
Capsule	Gradually long-acuminate	Gradually long-acuminate	Gradually long-acuminate	Abruptly short-acuminate

*Based on Krüssmann (1962), McKelvey (1928), Smith (1948), and observations at the Royal Botanical Gardens.

187A on the upper sides, the rachis browner, close to 200C.

The calyces are 2-3 mm long, with most of the lobes acute, some rounded. The corollas are relatively small, with nearly cylindrical tubes generally 8-10.5 mm long and limbs (7-) 8-9.5 mm in diameter. The lobes become wide-spreading and ultimately somewhat reflexed, with the apices minutely mucronate and hooked (Fig. 8). Shortly before anthesis, the corolla tubes are light purplish-pink, close to 73D; they fade nearly to 69D as the flowers open. The lobes are white. The anthers are light yellow, 10C, before dehiscence and are borne near the summit of the tube, their tips reaching to with 0.5 mm of the throat of the corolla.

The capsules of *S. tigerstedtii* are 14-20 mm long, sparsely and minutely verrucose, with the valves gradually tapering into relatively long, sharp tips (Fig. 6).

S. tigerstedtii, S. sweginzowii Koehne & Lingelsheim, *S. tomentella* Bureau & Franchet, and *S. yunnanensis* Franchet, all of which are native to the same general region of China (see map by Friedrich Meyer, 1952, p. 31), are very similar and obviously closely related. All have relatively small leaves and open inflorescences borne on spreading or arching branches. Traits useful in distinguishing among these four species are presented in Table 1.

At the Royal Botanical Gardens, 43° 17' N, 79° 55' W, *S. tigerstedtii* generally flowers at the same time as most of the other species and hybrids in series *Villosae*, e.g., *S. sweginzowii, S. x prestoniae* McKelvey, and *S. villosa* Vahl. In 1974, it reached its peak of bloom about 12 June; in 1976, when many lilacs flowered earlier than usual, its peak of bloom was about 10 June, somewhat later than that of most representatives of this series. Fruits ripened in early November in 1974.

The name *S. tigerstedtii* honors C. G. Tigerstedt, a Finnish arboriculturist, who was a member of Smith's expedition to China in 1934 (Smith, 1948).

CHROMOSOMES AND BREEDING BEHAVIOR

From previous studies (Pringle, 1977, and papers cited there), it appears that all the species in series *Villosae,* despite their diverse aspects, are genetically compatible, producing some viable, highly fertile hybrids when crossed in any combination. Until the present study, however, this had not been experimentally confirmed for *S. tigerstedtii.* In this study, *S. tigerstedtii* was crossed with *S.* 'Miss Canada', a trihybrid cultivar derived from *S. josikaea* Jacquin f. ex Reichenbach, *S. reflexa* Schneider, and *S. villosa* Vahl (Canada Dept. of Agriculture, 1967). From both of the reciprocal crosses, viable seeds were obtained, indicating that *S. tigerstedtii* is indeed part of the interfertile complex which includes 'Miss Canada' and its ancestral species.

Somatic chromosome counts were obtained from root tips of germinating seeds of open-pollinated *S. tigerstedtii*. The plant from which the seeds were collected is represented by *Pringle 1689* (BH, DAO, HAM). The count of 2n = 46 (Fig. 10) thus obtained is the first for this species. Previously, Sax (1930) reported definite or approximate counts of 2n = 46 for all of the species in series *Villosae* that he studied, except for *S. yunnanensis,* and Taylor (1945) reported the same number for those species in series *Villosae* that were represented in his research.

HISTORY OF S. TIGERSTEDTII IN NORTH AMERICAN HORTICULTURE*

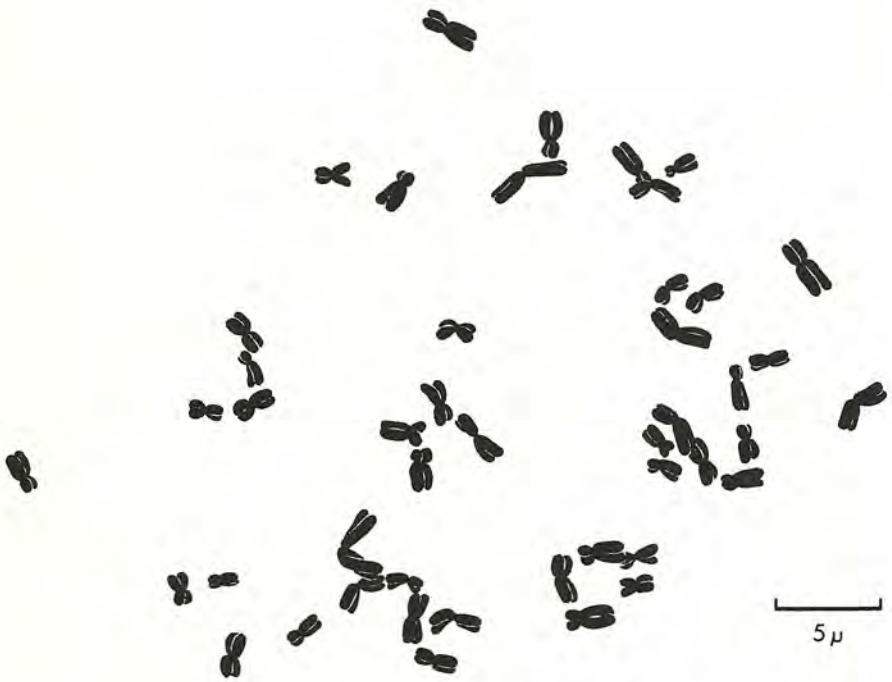
Smith discovered *S. tigerstedtii* at the type locality, about 31°N, 102°E, when it was in fruit. In addition to herbarium specimens, he collected seeds, from which plants of this species were grown at the Botanical Garden of the University of Uppsala, Sweden, and at other botanical gardens in Europe. This appears to have been the only introduction of *S. tigerstedtii* into cultivation from the wild. From this introduction, however, the original recipients of the seed distributed propagating materials to other botanical gardens and nurseries.

Syringa tigerstedtii appears to have been brought to North America on at least ten occasions. Other North American arboreta have received propagating material from those that imported this species. The first institution on this continent to acquire *S. tigerstedtii* was evidently the University of Washington Arboretum, Seattle, which received seeds of this species from the Hortus Botanicus Bergianus, Stockholm, Sweden, in 1948. The Arnold Arboretum of Harvard University received seeds from the Hortus Botanicus Bergianus in 1949, according to Wyman (1960), and also in 1952, as indicated by herbarium records in AAH. Plants from the latter introduction, grown under the number 1254-52-A, are represented in the herbarium by *Kreps s.n.,* 29 May 1964 (AAH). *Syringa tigerstedtii* was first introduced into Canada at Agriculture Canada's Arboretum and Botanic Garden, Ottawa, which obtained seeds from the Gotenborgs Botaniska Tradgard, Goteborg, Sweden, in 1951.

Highland Park, Rochester, New York, acquired seeds of *S. tigerstedtii* from the Botanical Garden of the Agricultural University, Wageningen, Netherlands, in 1956 (James W. Kelly, in litt., 1967). Plants raised from these seeds were the source of cuttings brought to the Royal Botanical Gardens in 1970 (R.B.G. accession no. 70363; represented in herbaria by *Pringle 1687* [BH, DAO, HAM]). The plants illustrated in this paper were derived from these cuttings, as were plants sent to the Niagara Parks Commission, Niagara Falls, Ontario (R.B.G. plant records, 1976).

Frederick G. Meyer (1963) reported acquiring plants of *S. tigerstedtii* from the nursery of Rudolph Schmidt, Relligen, Holstein, West Germany, in 1959, in a plant-introduction program sponsored by Longwood Gardens, Kennett Square, Penn-

*Unless other wise indicated, information in this section is from the American Horticultural Society (1976).



10. Somatic chromosomes of *Syringa tigerstedtii* (2n = 46).

sylvania, and the New Crops Research Branch, Agricultural Research Service, United States Department of Agriculture. This acquisition, assigned Plant Introduction No. 262326, was the source of plants now at Longwood Gardens and the United States National Arboretum, Washington, D.C.

Other North American arboreta growing *S. tigerstedtii* include Winterthur Gardens, Winterthur, Delaware, which acquired this species from the nursery of R.H. Notcutt, Ltd., in 1960; the University of Minnesota Landscape Arboretum, St. Paul, which obtained this species from the Belmonte Arboretum, Wageningen, Netherlands, in 1962 and 1964; and the garden of the Bailey Hortorium, Cornell University, Ithaca, New York, where seed was received from Uppsala in 1969. (W.J. Dress, in litt., 1976).

At least one American nursery, Kingsville Nurseries, Kingsville, Maryland, has listed *S. tigerstedtii.*

HORTICULTURAL EVALUATION

Among those horticulturists who have become acquainted with *S. tigerstedtii*, there have been sharply contrasting opinions as to its ornamental value. Smith (1948) considered it to be "en av de elegantaste av alla syrener"; Krüssmann (1960), although probably only translating Smith's paper, called it "eine der schonsten Arten." Wyman (1960), however, described the flowers of *S. tigerstedtii* as being "not the least ornamental," and assessed the species as having "no ornamental value, whatsoever." In the opinion of the present author, *S. tigerstedtii,* although attractive, appears to have relatively little value as an ornamental. Because of its open habit, relatively small and open inflorescences, and pale corollas, it is less impressive, from a horticultural viewpoint, than such related taxa as *S. yunnanensis* or *S.* x *nanceiana* McKelvey. *S. tigerstedtii* does appear, however, to be of potentially great value in plant breeding. In previously reported experiments with taxa in series *Villosae* (Pringle, 1977), it was found that hybrids having one parent from the group of species with large leaves and dense inflorescences, e.g., *S. villosa*, and the other parent from those species with smaller leaves and more open panicles, such as *S. sweginzowii* and *S. yunnanensis*, were often especially attractive. Such hybrids often retained the graceful habit of the small-leaved species, while their denser branching and larger, more densely flowered panicles had considerably more visual impact. Their foliage tended to be less sparse than that of the small-leaved species, and less coarse than that of the large-leaved species. *Syringa tigerstedtii* may contribute not only the graceful habit associated with the small-leaved group generally, but also a tendency toward a lower, more spreading growth habit than would otherwise be available in series *Villosae.*

Syringa tigerstedtii may also be valuable in breeding because of its fragrance. McKelvey (1928) described, or cited descriptions of, the flowers of all species in series *Villosae* as being virtually odorless or rather ill-scented, with the exception of *S. sweginzowii,* said to have a "pleasing and delicate" fragrance, and *S. yunnanensis,* described in a quotation from Adrien Franchet as having very fragrant flowers. In *S. tigerstedtii* the fragrance is well developed and is considered pleasant; Smith (1948) described it as being similar to that of carnations, but spicier.

Also, *S. tigerstedtii* appears to be one of the hardiest lilacs. Smith (1948) reported that it was fully hardy at Uppsala, having survived even the "terribly severe" winters of 1939-1942.

ACKNOWLEDGEMENTS

The author expresses his sincere thanks to Mr. Freek Vrugtman, for valuable information and suggestions, and to Mr. James W. Kelly and Dr. William J. Dress, for data on the introduction of *S. tigerstedtii* at Rochester and Ithaca, New York, respectively.

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HOW SYRINGA VULGARIS 'MOUNT DOMOGLED' GOT ITS NAME[1]

By: Peter A. Hyypio[2]

I first saw the dwarf lilac on May 9, 1968, when Robert B. Clark, who was then plant taxonomist for the County of Monroe Department of Parks, took me on a walking tour of the lilac collection in Highland Park, Rochester, New York. The plant was in full bloom and it impressed me so that I made some notes which I later included in a letter (1) to Dr. Walter Koelz, a retired U.S.D.A. plant explorer and lilac fancier:

> Finally, something labelled only as Anderson nana. Found by Edgar Anderson in the Balkan countries, undescribed? Dwarf plant, about waist high, very floriferous, single, good rich lilac color, thyrses scaled down to good proportion with the plant. I don't know where Rochester got it but they should have a record.

That was over ten years ago but I still remember that the plant bore a label with the name "Anderson nana" and the fact that the name was not included in the list of lilacs grown at Highland Park because I added the name in pencil to my copy of the checklist (2) on the bottom of page 262. However, I can't recall the source of the information that it was "Found by Edgar Anderson in the Balkan countries," and that it might have been undescribed.

I also remember the deep impression the little lilac made on me on account of its compact size and attractive appearance. It seemed like an ideal specimen shrub for today's small home gardens and a likely candidate for carefree informal hedging. For these reasons I suggested to Clark that he should name it as a cultivar and propagate it for distribution, to which Clark heartily agreed.

The problem in naming it began when, to the best of my recollections, Clark could find no record of its origin or source in the files at Highland Park. This set in motion a search which led to the discovery of two herbarium specimens in the Bailey Hortorium which in turn helped me piece together the history of the origin of the Rochester plant. The documented facts are the following.

1. In March 1935, Edgar Anderson published a short account (3), entitled "A Visit to the Home of the Lilac", in which he recorded some impressions on the "striking variation in form and habit" of the *Syringa vulgaris* that he encountered in the vicinity of Băile Herculane on the southern face of Mount Domogled at the Cazan Pass on the Romanian side of the Danube River. At the time of his visit in September 1934 the lilac fruits were still immature but Anderson reported that seeds were later collected for the Arnold Arboretum by the Romanian Forest Service and that many seedlings had already germinated while he was preparing his report. It was on the basis of this

[1]Received for publication January 29, 1979

[2]Extension Botanist, L.H. Bailey Hortorium, Cornell University, Ithaca, NY 14853.

report that I began to associate the name Mount Domogled with the Rochester lilac, and suggested it to Clark as a possible cultivar name.

2. A letter (4) from Richard A. Howard, dated July 2, 1976, reports that there are two plants 949-34-A and 949-34-B in the living collection at the Arnold Arboretum recorded as grown from seed collected by E. Anderson in 1934 from Herculane, Romania, from the locality of Mount Domoglev [sic]. Records further show that the seeds were sown December 28, 1934, and germinated January 13, 1935.

3. Inventory No. 122, Division of Plant Exploration and Introduction, U.S.D.A. (5), shows that on January 26, 1935, they received two collections of seeds of *Syringa vulgaris* among a group of "seeds collected by Dr. Edgar Anderson, of the Arnold Arboretum Balkan Expedition". One of the collections (P.I. 108773) was labelled "No. 114. From Mount Domogled, Rumania. A dwarf form." The other (P.I. 108774) was labelled "No. 106. From the Cazan Pass, Rumania."

4. In a letter (6), dated July 13, 1976, Alma C. Delpey wrote that according to old inventories she located at the Plant Introduction Station, Glen Dale, 50 plants of P.I. 108773 were growing in the test nursery at Glenn Dale in 1940 and a herbarium specimen was collected on May 8, 1940, by W.H. Cowgill (No. 1858). No record of them was found in later inventories and the plants were recorded as being "DEAD" in 1944. According to Delpey, there is no record of P.I. 108773 having ever been distributed by the U.S.D.A.

5. There is a flowering specimen of P.I. 108773 (7), collected by W.H. Cowgill, No. 1858, in the herbarium of the Bailey Hortorium as well as one of P.I. 108774 (8), also collected by Cowgill on the same date. Their labels bear essentially the same information as was recorded in Inventory 122 except for an added note for P.I. 108773, "Flowers: blue lilac."

6. In 1971, R.B. Clark submitted the name 'Mount Domogled' as having been registered during 1970 (which it was not), without description or any other explanation, for a lilac being grown at Rochester (9). More recently, O.M. Rogers included 'Mount Domogled' in the *Tentative International Register of Cultivar Names in the Genus Syringa* (10) and gave as a synonym *Vulgaris nana.*

7. There is a flowering specimen in the Bailey Hortorium herbarium labelled *Syringa vulgaris* 'Mount Domogled', collected by R.B. Clark on 27 May 1970 with no other information than the locality, "Highland Park 1167A" (11).

I don't know when the name *Syringa vulgaris nana* became attached to Anderson's plants. the name is a "natural" but it is not available because it was already used for a dark reddish purple flowered lilac by Ellwanger and Barry as early as 1875 in their Cat. 2, 23rd, ed., 72 (12), which we have in the Hortorium catalog collection. This date is several years earlier than those cited by McKelvey

in her monograph (13). Nevertheless, according to John Wister in *Lilacs for America,* 1953, the name *nana* was used at many places for a "dwarf form, Discovered and intr. by Edgar Anderson" (14).

The supporting documents are listed as an Appendix; copies of these documents have been deposited with the International Registration Authority for cultivar names in the genus *Syringa*. the Royal Botanical Gardens, Hamilton, Canada.

Although we could not be sure of the origin of the Rochester plant, Clark and I were convinced that circumstantial evidence supported our belief that it was, indeed, an offspring of the lilacs Anderson wrote about and we deemed the name 'Mount Domogled' to be appropriate for commemorating its native origin.

It is unfortunate that Clark did not follow standard registration procedure before he submitted the name or that the registration authorities did not require him to do so. But, be that as it may, I suggest that to correct the situation we use my original description of the lilac and Anderson's account of its origin for its registration. The name 'Mount Domogled' still seems appropriate although I have since learned that it is Muntele Domugled in Romanian.

Finally, I would emphasize that the name 'Mount Domogled' applies only to the individual plant so designated by Clark and me at Highland Park or to plants propagated vegetatively from it. There are at least two plants at the Arnold Arboretum and perhaps a few others elsewhere whose origin might be traced to Anderson and Baile Herculane, Mount Domogled and Cazan but since they originated as seedlings from a highly variable wild population it would not be consistent with the cultivar concept to label them 'Mount Domogled'. If, however, any of them might seem worthy of perpetuating on its own merits, the other Romanian place names mentioned by Anderson are available as well as is the name of Edgar Anderson himself.

APPENDIX

1. Hyypio, Peter A. 1968. Letter to Walter Koelz. May 29. (Copies of letters cited are deposited in the lilac-registration files at the Royal Botanical Gardens.)

2. Harkness, Bernard. 1964. A checklist of the cultivated woody plants of the Rochester parks. Part II. Phytologia 10:241-270.

3. Anderson, Edgar. 1935. A visit to the home of the lilac.

4. Howard, Richard A. 1976. Letter to Freek Vrugtman. July 2.

5. Anonymous. 1939. Plant material introduced by the Division of Plant Exploration and Introduction, Bureau of Plant Industry, January 1 to March 31, 1935 (Nos. 107748-110197). U.S.D.A. Invent. No. 122.

6. Delpy, Alma C. 1976. Letter to Freek Vrugtman. July 13.

7. Herbarium specimen: *W.H. Cowgill 1858,* BH.

8. Herbarium specimen: *W.H. Cowgill 1857,* BH.

9. Wister, John C., & Joseph Oppe. 1971. 1970 lilac registrations. Arnoldia 31:121-126.

10. Rogers, Owen M. 1976. Tentative international register of cultivar names in the genus *Syringa*. New Hampshire Agric. Exp. Sta. Res. Report No. 49.

11. Herbarium specimen: *R.B. Clark s.n.,* 27 May 1970, BH (*ex* HPH).

12. Ellwanger & Barry, Mount Hope Nurseries. 1875. No. 2. Descriptive Catalogue of Ornamental Trees, Shrubs, Roses, Flowering Plants, &c. 23rd ed. Rochester, New York.

13. McKelvey, Susan Delano. 1928. The Lilac: A Monograph. New York: The Macmillan Company.

14. Lilac Survey Committee. 1953. Lilacs for America: Report of the 1953 Lilac Survey Committee of the American Association of Botanical Gardens and Arboretums. Swarthmore, Pennsylvania: The Arthur Hoyt Scott Horticultural Foundation.

1. THE NE-95 LILAC PHENOLOGY NETWORK*

By: M.T. Vittum and R.J. Hopp[1]

ABSTRACT

A lilac phenology network started in 1961 now covers 26 states and six Canadian provinces. Of 756 sites established, 521 were active in 1977. Plants from the same clone are planted at each location. Long-time records are necessary before the data can be used effectively. The New York State Agricultural Experiment Station at Geneva, NY, serves as coordinator of this project, which involves interstate, interregional, and international cooperation.

The lilac phenology network established under several regional research projects continues to be a focal point of phenological activities in the north-central and eastern states as well as in several Canadian provinces (see Preface).

The first lilac network began in Montana in the mid-1950's. It expanded until common purple lilacs, *Syringa vulgaris* L., were observed by about 1,000 cooperators throughout the western United States (Caprio 1966). This project provided the impetus for establishing similar networks in other parts of the country. North-Central Regional Research Project NC-26, "Weather Information for Agriculture," initiated in 1961, included a phenology objective; so did Northeast Regional Research Project NE-35, "Climate of the Northeast - Analysis and Relationship to Plant Response," when it was revised in 1965.

In both NC-26 and NE-35, a single clone, known as 'Red Rothomagensis', was used as a living integrator of environmental factors. Plants in the NC-26 and NE-35 projects were vegetatively propagated from the same parent stock or clone to avoid differences in their response to environmental factors that might occur if the plants were not genetically alike. Standardized instructions were developed to ensure uniformity in recording dates of first leaf, first flowers, full bloom, and end of bloom. Hopp *et al.* (1969) describes these phases as follows:

> *First leaf* is the date when the widest part of the newly emerging leaf has grown beyond the ends of its opening winter bud scales. The leaf is distinguished by its prominent midribs and veins.
>
> *First flowers* is the date when the majority (at least 50%) of the flower clusters have at least one open flower. The lilac flower cluster is a grouping of many small individual flowers. Thus, the date to record is the date when one of these small flowers is open on most of the clusters.

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Full bloom is the date when all the small flowers on the majority of the flower clusters are open or in other words when most of the flower clusters no longer have any unopened flowers.

End of bloom is the date when nearly all (at least 95%) of the flowers have withered or dried up. The floral display has ended except possibly for several clusters on the bush.

Most observation sites are located near weather stations to allow comparisons between phenological data and meteorological observations. In July 1970, the phenological efforts conducted under NC-26 and NE-35 were combined as one of the objectives of a new regional project, NE-69: "Atmospheric Influences on Ecosystems and Satellite Sensing."

In 1971 the province of Quebec, through Laval University, joined the NE-69 project, and in 1972 a group of research stations in the Canadian Atlantic Provinces, under the leadership of the Nappan, Nova Scotia, Experimental Farm, Agriculture Canada, Research Branch, became part of the project. Several locations were established in the Province of Ontario, and in 1977, the Royal Botanical Gardens at Hamilton agreed to assume leadership in developing a network in that province. At the end of 1977, a total of 756 sites had been established (Table 1), covering an area ranging from Newfoundland to North Carolina in the east and from North Dakota to Oklahoma in the west-central states.

Hopp and Blair (1973) described development of the network and presented some preliminary results. Lilac phenological observations from the various locations in this NE-69 network through 1973 were assembled by Hopp *et al.* (1973). Since then composition of the network has fluctuated to some degree from year to year. While additional sites have been added, others have been discontinued. But, the general pattern or the density of the sites in various segments of the network has not changed materially. A map showing distribution of most of the observation sites is reproduced in Fig. 1.

In addition to the genetically identical 'Red Rothomagensis' lilacs, two honeysuckle cultivars, *Lonicera tatarica* 'Arnold Red' and *L. korolkowii* var. *Zabelii*, are observed at some locations in the North-Central states, and in New York, North Carolina, Tennessee, Quebec, and the Atlantic Provinces. Noggle (Article No. 2) found 'Red Rothomagensis' lilac not to be a suitable indicator plant in North Carolina. The poor performance was apparently caused by the lack of adequate winter chilling of the lilac plants. The honeysuckle cultivars were better adapted for phenological studies in that state.

Table 1. Frequency distribution of years of lilac phenology data for locations active in 1977.

State or province	Number of sites: Established	Number of sites: Active in 1977	Number of years data have been recorded: 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Northeast																			
CT	11	9					1	2	1			1	1	1	2				
DE	3	2												2					
ME	14	10		1	5	2		1	1										
MD	5	4						1	1	1	1								
MA	9	7						1	1	1	4								
NH	7	6			1		1				1	2		1					
NJ	35	21			1	1		2	1	3	5	6	1	1					
NY	84	53		5		2	2		4	4	7	3	25		1				
PA	28	18	1			4	4	8				1							
VT	66	51	2	2		6	1	2	3	3	5	4	5	11	7				
WV	53	22	2	1	1	3	5	7					3						
Canada																			
NB	6	4		1	2		1												
NFLD	3	2		1			1												
NS	5	4		1			3												
PEI	1	1					1												
ONT	3	2	1		1														
QUEB	298	268	44	31	45	56	86	6											
Other states																			
IL	7	7					1							1					1
IN	10	4				1		1						1					1
IA	7	0																	
KS	4	2														1	1		
MI	9	2			1		1												
MN	6	3				1							1					1	
MO	5	2																1	1
NE	7	2					2												
NC	23	0																	
ND	4	2																2	
OH	4	2															1	1	
OK	5	2	1			1													
SD	5	0																	
TN	7	4									1		1	1	1				
WI	22	11			1	2	4	1							1	1	1		
Total	756	521	51	43	58	79	114	32	12	12	24	17	37	18	12	2	3	6	1

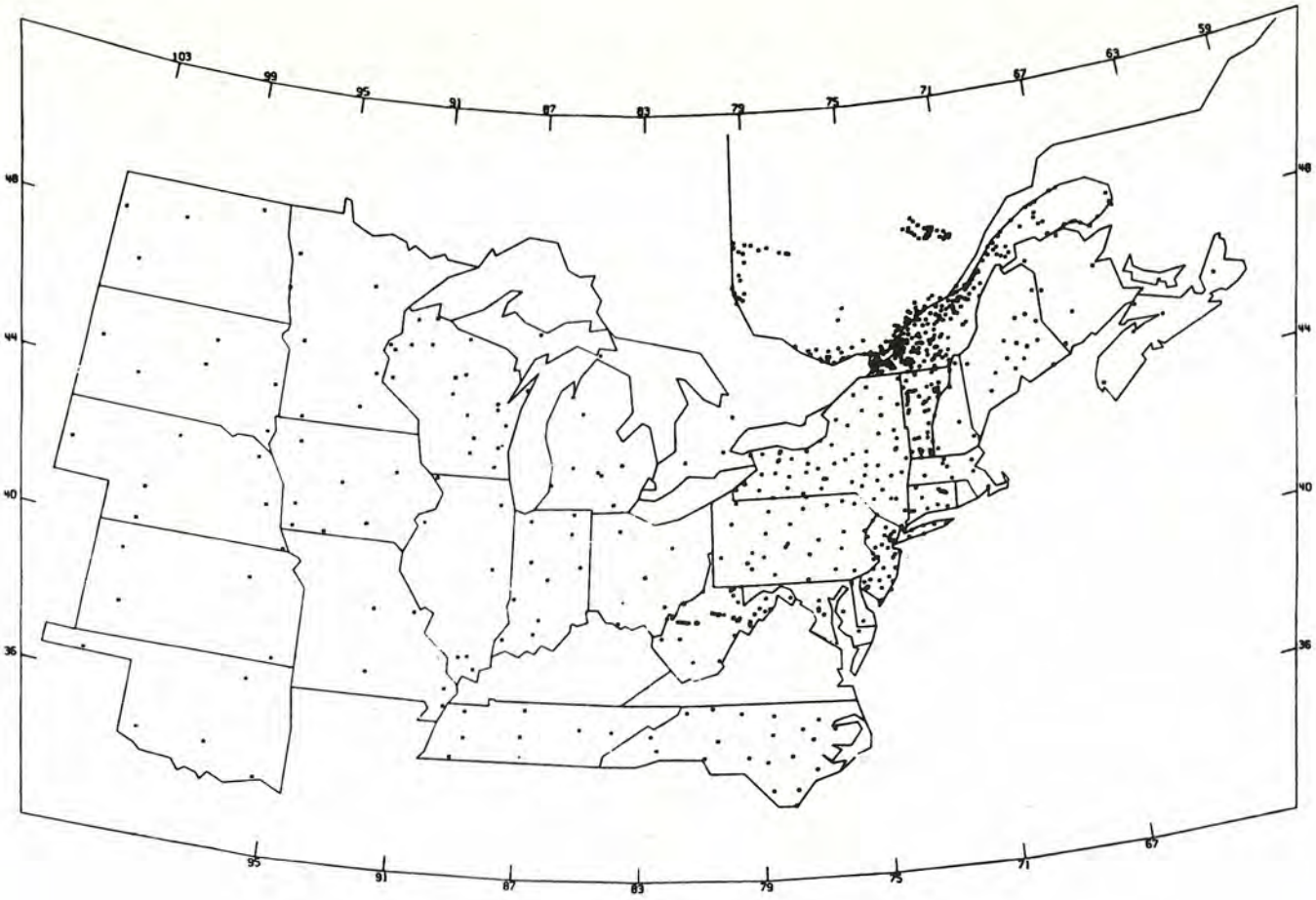

Figure 1. Network of NE-95 phenological sites (Newfoundland not shown).

Table 2. Lilac phenophase dates in 1977 compared to average.

State or Province	Phenophase: First leaf No. sites	First leaf Departure from average* (days)	First flower No. sites	First flower Departure from average* (days)	Full bloom No. sites	Full bloom Departure from average* (days)	End of bloom No. sites	End of bloom Departure from average* (days)
Northeast								
CT	9	- 2	8	- 7	7	- 8	7	- 8
DE	2	9	2	-14	2	-14	2	-14
ME	10	- 1	8	0	8	- 1	7	- 2
MD	3	- 4	3	-11	3	-13	3	-16
MA	7	- 4	7	- 5	7	- 3	7	- 4
NH	6	- 4	6	- 6	6	- 7	6	- 9
NJ	20	- 8	20	- 8	18	- 8	17	- 6
NY	51	- 5	42	- 7	42	- 7	42	- 7
PA	17	- 6	16	- 4	16	- 6	16	- 7
VT	48	- 6	34	- 6	34	- 8	35	- 7
WV	22	- 1	14	- 8	10	- 8	9	-11
Canada								
NB	4	+ 4	2	- 1	2	0	2	- 2
NFLD	2	- 1	2	- 1	2	- 2	2	- 1
NS	4	- 4	4	- 2	4	- 1	3	0
PEI	1	+ 1	1	- 2	1	- 1	1	+ 2
ONT	2	- 4	1	0	1	0	1	- 4
QUEB	167	+ 5	118	+ 6	119	+ 6	116	+ 6
Other states								
IL	1	0	1	-14	1	-15	1	-12
IN	3	- 3	4	-14	4	-12	4	- 6
KS	2	- 7	2	- 1	2	- 4	2	- 4
MI	1	- 4	2	- 6	1	- 5	1	- 3
MN	4	- 4	3	-13	3	-14	3	- 9
MO	2	- 9	2	- 8	2	-12	2	- 6
NE	2	+ 6	2	- 6	2	- 6	2	- 7
ND	2	-16	2	-19	2	-22	2	-18
OH	2	-10	2	-16	2	-16	2	-12
OK	2	0	2	0	2	- 1	2	- 4
TN	3	0	4	- 5	4	- 8	4	- 9
WI	11	- 8	9	-13	8	-14	8	-13
Total	410		323		315		309	
Average		-3.6		-6.6		-7.2		-6.7

*Negative = days earlier than average; positive = days later than average.

In 1977, volunteer observers in 23 states and six Canadian provinces reported lilac phenological observations (Table 2). Because of the addition and discontinuation of sites and the fact that not all volunteer cooperators make their observations each year, it is difficult to obtain long-term records for all sites. Of the 756 sites originally established (Table 1), only 410, or 54 percent, reported first leaf in 1977, 323 or 43 percent reported first flowers, 315 or 42 percent reported full bloom, and 309 or 41 percent reported end of bloom (Table 2). It is generally agreed that a minimum of 10 years of observations is needed to establish a "normal" date, and 15 or 20 years would be better. At the end of 1977, we had 10 years (not necessarily consecutive) of data from 113 sites and 15 years of data from only 12 sites. We had no sites with 20 years of data.

The master file of the lilac phenology data was originally kept at the Vermont Agricultural Experiment Station. It is now being maintained at the New York State Agricultural Experiment Station, Geneva, NY.

The method of data transmittal to Geneva for inclusion in the computerized master file varies. In states and provinces with an official representative on the NE-95 Technical Committee, the representative usually acts as coordinator for assembling and transmitting the phenological observations for his area to the Geneva station. All data from the North-Central states pass through the Indiana Agricultural Experiment Station at Purdue University, while the Geneva, NY, station collects data directly from observers in Pennsylvania, Maryland, and Delaware. The Massachusetts and New Hampshire data are collected at Vermont before being transmitted to Geneva. Similarly, Nova Scotia handles the observations from all sites in the Atlantic Provinces. The large Quebec network, with 298 observation sites, is coordinated by Laval University (Article No. 11). Tennessee cooperates informally with the NE-95 project.

As an example of data available, Table 2 summarizes observations made in 1977. Actual dates of all phenophases were several days earlier than "normal" in practically all states or provinces. The exceptions were New Brunswick, Prince Edward Island, Quebec, and Nebraska for first leaf, Quebec for first flowers and full bloom, and Prince Edward Island and Quebec for end of bloom.

The data in the Geneva file are available to researchers for localized, regional, or network-wide studies and analyses. They have already been used for studies by graduate students at New Jersey, New York (Hickin and Vittum 1976), and at Guelph, Ontario[3]. Additional usage may be expected in the future as more information goes into the data bank.

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[3]Gary Richards is presently completing a thesis entitled "Relationship between temperature and the chilling (breaking of dormancy) requirement in lilac."

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