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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.

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Owen Rogers, Durham, New Hampshire, notes the form of Viburnum carlesii *'Compactum' during tour of Longenecker Horticultural Gardens, University of Wisconsin Arboretum.*

Editor's Note

Having missed this twelfth Annual Meeting I was obliged to rely upon several persons who were present and who graciously undertook the burden of providing me with reports, papers and pertinent paraphernalia in order that these Proceedings might be published. I wish to thank those wh did me these signal favors. I am especially indebted to Kenneth W. Wood, co-chairman of the Madison Convention, for furnishing me with tapes of several talks and with photographs of events and some of those who attended, also for his unfailing support throughout. To the several speakers I am grateful for copies of their remarks. To the Secretary and Treasurer for their reports. And to Charles Holetich for supplemental materials.

Whatever errors of commission, or omission, although readily apparent but which nevertheless do occur, I accept full and humble responsibility. The previous issue of Proceedings (vol. 11, No. 1) contained a synopsis of a booklet entitled "Lilac Species and Cultivars in Cultivation in U.S.S.R." This synopsis contained grave errors both of omission and orthography for which I apologize. Please refer to *Lilacs* vol. 11, No. 2 for the full and correct accounting.

The present number is respectfully dedicated to the memory of John C. Wister, Honorary member of the Board of Directors who died after Christmas of 1982 in his 96th year. His life was enriched both by a wide fellowship of gardeners and plantsfolk as well as an abiding love of plants. With the help of Gertrude S. Wister I have compiled a listing of his honors and awards bestowed upon him showing the broad range of interests and distinctions. The photograph is reproduced with kind permission of the Secretary of the Royal Horticultural Society.

This Twelfth Issue
is respectfully dedicated to the memory of

John Caspar Wister

1886 - 1983

1927	Sir Michael Foster Memorial plaque, Iris Society (of Great Britain)
	Schaffer Memorial Medal, Pennsylvania Horticultural Society
1929	Centennial Medal, Massachusetts Horticultural Society
1930	Gold Medal, American Iris Society
	Arthur Hoyt Scott Garden Award (first recipient), Scott Horticultural Foundation
1938	Gold Medal, Massachusetts Horticultural Society
1939	Centennial Medal, Pennsylvania Horticultural Society
1942	Doctor of Science, *honoris causa,* Swarthmore College
1945	Medal of Honor, Garden Clubs of America
1958	Liberty Hyde Bailey Medal (first recipient), American Horticultural Council
1961	George Robert White Medal of Honor, Massachusetts Horticultural Society
	Gold Medal, American Daffodil Society
1962	Gold Medal, American Rhododendron Society
	Horticultural Achievement Citation, Horticultural Society of New York
1963	Achievement Award, American Home Magazine
1965	Brooklyn Botanic Garden Medal
1968	A.P. Saunders Memorial Medal (first recipient), American Peony Society
1970	Award of Excellence, American Association of Botanical Gardens and Arboreta
1972	Honor and Achievement Award (first recipient), International Lilac Society

The University of Wisconsin Arboretum Lilac Collection

By Kenneth W. Wood

Let those who, having seen one lilac think they have seen them all, beware. Because of the many naturally occurring lilac species and the many years of careful research into the breeding of new lilacs by hybridizers, there are today many hundreds of different lilacs. Probably no one person has seen them all.

That the lilac is one of our most favored flowering shrubs seems self-evident. The many old clumps of common lilac found on abandoned farm sites testify not only to its long popularity, but to the durable nature of the plant itself.

This article will introduce visitors to the Arboretum's lilac collection, to the great diversity currently available in garden lilacs, and will acquaint interested persons with a facet of the Arboretum which has been little appreciated apart from its few weeks of spectacular bloom every spring.

Taxonomy

Lilacs are placed by botanists in the Olive Family. This large group of plants includes trees and shrubs of temperate regions in both the eastern and western hemispheres and the old-world tropics. Familiar members of the family are privets, ashes, jasmines, forsythias, lilacs and, as the name suggests, the true olive. The generic term given the lilacs more than two centuries ago by Linnaeus is *Syringa* (abbreviated here *S.*), derived from the Greek word meaning "pipe." It is thought that this term was originally used in connection with similar shrubs notable for their hollow, or pîpe-like, branches.

All of the approximately twenty-five species of lilacs occur naturally in temperate areas of the eastern hemisphere, from central and eastern Europe to Asia. None are native to America, though most thrive in the rigorous continental climate of the northern parts of our country. The common lilac *(S. vulgaris)*, from which the greatest number of cultivars have come, is native to a region of central Europe including Bulgaria, Hungary, and Rumania.

Several other species of lilacs are presently represented in our Arboretum collections. A few of these will be mentioned here briefly, with more detailed information given later. The early lilac *(S. oblata)* is very closely related to the common lilac. They look very similar, but the early lilac occurs naturally further east, in China. Other lilac species often grouped with the common lilac and which bloom at about the same time include: the little leaf lilac *(S. microphylla)*, native to northern China; the Manchurian lilac *(S. patula)*, native to northeastern China and Korea; Meyer's lilac *(S. meyeri)*, also native to northern China; and the cutleaf lilac *(S. laciniata)*, which occurs naturally in northwestern China. Two hybrid lilacs often mistakenly called spe-

cies are the Chinese lilac *(S. x chinensis)*, more appropriately called Rouen lilac, as it originated in a botanical garden in Rouen, France; and the Persian lilac *(S. x persica)*, its origin lost in antiquity.

Another group of lilac species is typified by the late lilac *(S. villosa)*, which has large leaves and coarser stems than the common lilac. The late lilac is native to China, as is Wolf's lilac *(S. wolfii)*. A third late-blooming species is the Hungarian lilac *(S. josikaea)* which, as its name suggests, comes from Hungary.

A final group within the genus *Syringa* includes two very similar species which differ markedly from other lilacs. These are the Peking lilac *(S. pekinensis)* and the Japanese tree lilac *(S. reticulata)*. Both are very large shrubs or small trees from the orient which bloom the latest of all our lilacs.

Common lilac flowers vary not only in color, but in shape of petals and florets: in being single or double: and in the overall shape of the trusses or clusters.

Flowers of late-blooming lilacs have larger, more pyramidal trusses, and individual florets are narrower. Few late lilacs have the familiar fragrance of the common lilac.

Development and Classification of Hybrids

Features used in distinguishing among the hundreds of cultivars of the common lilac, many (too many) of which look almost identical to the untrained eye, include such characteristics as overall form of the shrub, form of the clusters and their abundance, shape of petals, and the single (S) or double (D) flowers. Some cultivars are considered semidouble. And, of course, flower color is important.

Further comment is in order regarding the color of lilacs. The American Association of Botanical Gardens and Arboreta (AABGA) has attempted to standardize color ratings of lilacs in seven general color groupings. These are as follows:

I - White
II - Violet
III - Bluish
IV - Lilac
V - Pinkish
VI - Magenta
VII - Purple

It must be remembered that flower color varies considerably according to several environmental factors. Perhaps even more significantly, many lilac cultivars change color as the buds open and fade. With these limitations in mind, the interested reader can refer to the cultivar lists in the appendices to obtain a general description of a particular plant. For example: "Macrostachya" (S V) is single and pinkish, while "Jeanne D'Arc" (D I) is double and white.

Much can be said about the development of the large array of modern lilac cultivars. Basically, we can consider two main groups of lilacs-the approximately twenty-five naturally occurring species, and the very large assortment of horticulturally produced hybrid lilacs. More detailed information is available in many of the resources listed in the bibliography.

Hybrids occur when lilacs of different species or cultivars within a species are crossbred. The seed from these crosses is grown and selected for desirable new characteristics. Hybridization greatly increases the range of colors and forms which occur in many of our ornamental plants.

It is surprising to realize that of all the hundreds of lilac cultivars developed by horticulturists over the past two centuries, by far the majority have been developed at a single nursery-the Lemoine nursery, at Nancy, France. From the early 1870s until about 1950, Victor Lemoine and son Emile introduced many of the finest lilacs into commercial use. Three-quarters of the one hundred best lilacs, as recommended by the AABGA, were developed at this nursery. Over one hundred of the cultivars in the U.W. Arboretum collection are Lemoine lilacs. This predominance has led to the practice of calling hybrids of the common lilac "French Hybrids." This term is somewhat misleading as much lilac breeding has occurred elsewhere around the world. Most of these varieties have been developed directly from the common lilac.

The list of "French Hybrid" lilacs is so extensive, even in a relatively small collection such as ours, that each cannot be discussed separately. Interested persons are referred to the list of recommended lilacs in Appendix II. The Boener Botanical Garden at Hales Corners, Wisconsin, also has a publication "Lilacs," which lists these recommended varieties.

Though not commonly available from commercial sources, the lilacs of two Wisconsin breeders have been represented in the Arboretum's collection. Two hybrids introduced by the late Edward J. Gardner of Horicon, Wisconsin, 'Edward J. Gardner' (D Pinkish) and 'Jessie Gardner' (S Violet) are currently being replaced. Dr. A.H. Lemke, of Wausau, Wisconsin, introduced 'Silver King,' a single, bluish cultivar with distinctive, large gray-blue flowers. 'Silver King' can be seen in Beds 18, 31, and 32. These three cultivars all belong to the group of common lilac hybrids.

The Lemoines and other breeders have also used the common lilac in crosses with the early lilac *(S. oblata)*. These crosses have produced

several varieties, collectively known as the Early Hybrids, which provide a greater diversity of color among lilacs blooming about a week to ten days before the common lilac and its cultivars. Examples of Early Hybrids which can be found in our collection are: 'Lamartine' (Pink, Bed 10); 'Pocahontas' (Purple, Bed 17); 'Louvois' (Violet, Bed 17), and 'Montesquieu' (Magenta, Bed 14). These particular cultivars are all single-flowered.

A few lilac breeders have explored the possibilities of breeding later-blooming species lilacs, as for example: the late lilac *(S. villosa)* and the nodding lilac *(S. reflexa)*. Notable among the breeders of these "Late Hybrids" are Dr. F.L. Skinner of Dropmore, Manitoba, and Isabella Preston who worked at the Central Experimental Farm in Ottawa, Ontario. 'Hiawatha' (Bed 37) is an example of Dr. Skinner's work, and among Miss Preston's many introductions, 'Isabella' (Bed 37) and 'Jessica' (Bed 37) are considered quite distinctive. These varieties are particularly useful in lilac collections because they extend the season of bloom by about two weeks.

The U.W. Arboretum's Lilac Collection

Little information is available regarding the original plantings in the lilac display area. The first plantings were made in 1935, under the direction of G. William Longenecker, Professor of Horticulture and then Executive Director of the U.W. Arboretum. Funds for purchasing the lilacs were donated by the former Madison Garden Club.

From its beginning, the Arboretum was envisaged as an outdoor laboratory for the study of plant communities native to Wisconisn or nearby regions. However, a certain area was set aside for testing the hardiness and desirability of exotic plant material for Wisconsin and Midwest conditions. The lilac display area is now a part of this test area, known since 1967 as the G. William Longenecker Horticultural Gardens. Plantings have continued, in the form of replacements and introduction of new varieties, to the present. The gardens are now under the supervision of Edward R. Hasselkus, a professor in the Department of Horticulture.

Soon after the original plantings were made, the lilac display area became one of the major spring attractions at the Arboretum. In 1973, bus tours of the area on "Lilac Day" were initiated. On this "Bike and Bus Day," more than 2,000 persons visited the lilac collection.

Lilac fruit clusters, often considered an unattractive nuisance should, in most cases, be removed to encourage formation of new flower buds. The tree lilac, however, has attractive, tan fruits retained throughout the winter. The seeds are particularly relished by pheasants.

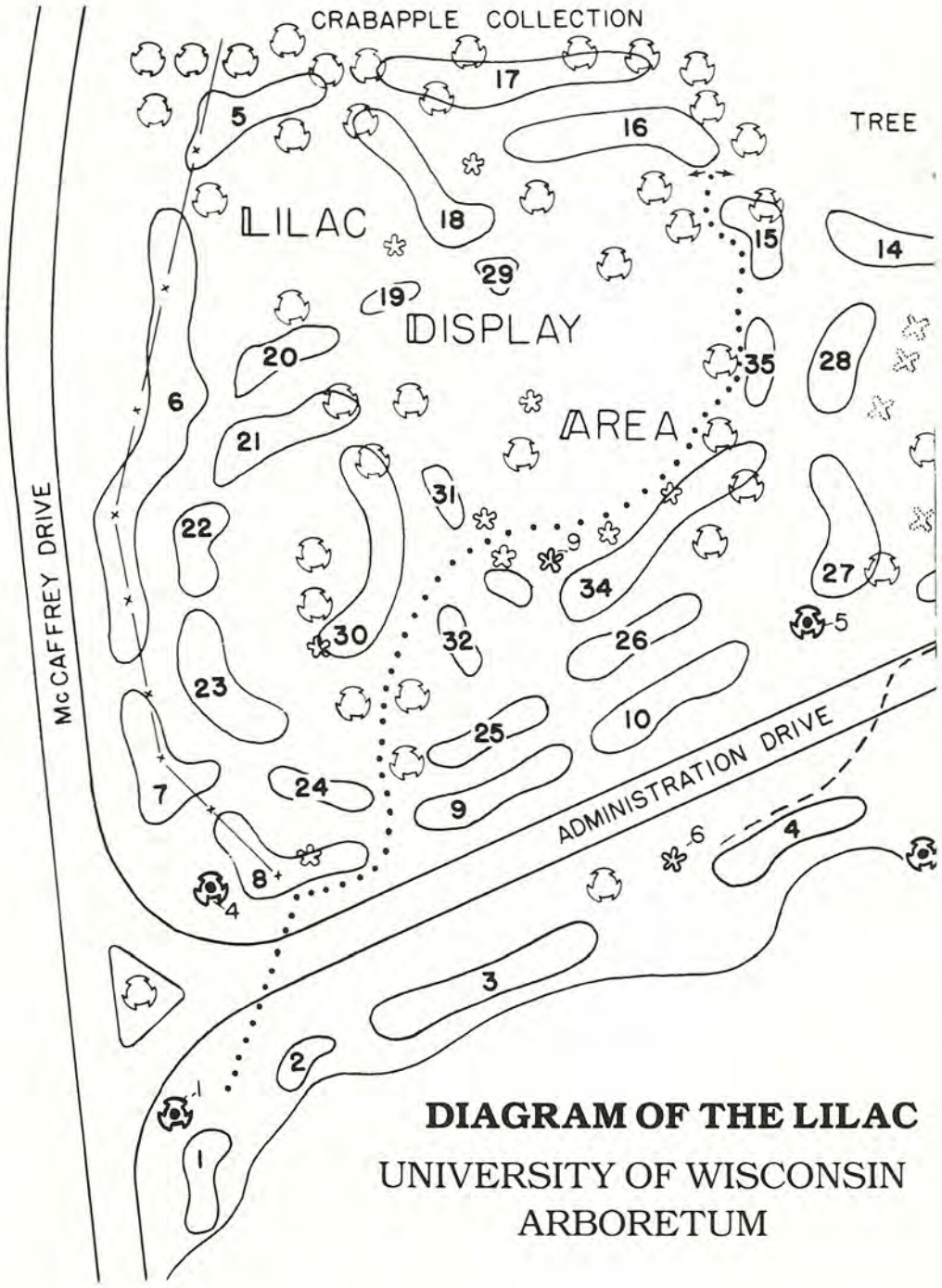
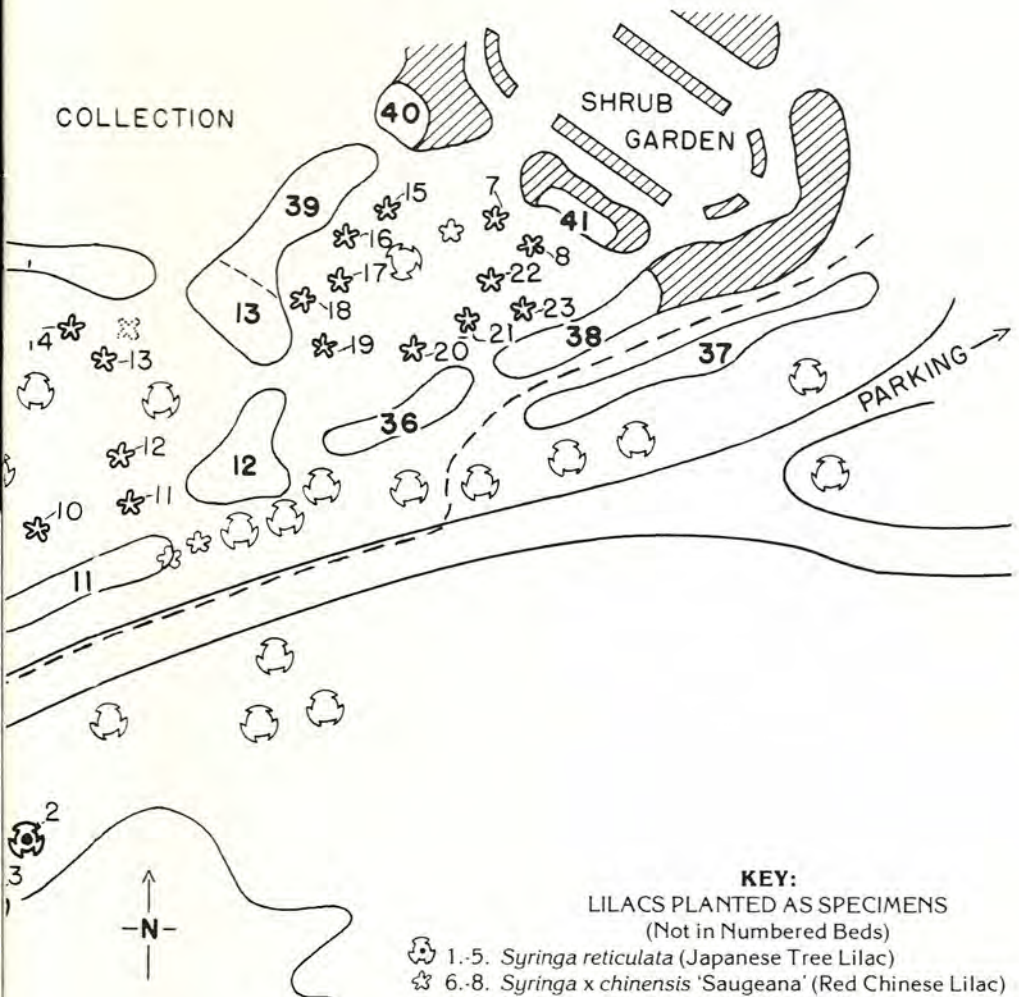


DIAGRAM OF THE LILAC

UNIVERSITY OF WISCONSIN
ARBORETUM



DISPLAY AREA

KEY:

LILACS PLANTED AS SPECIMENS
(Not in Numbered Beds)

1.-5. *Syringa reticulata* (Japanese Tree Lilac)
6.-8. *Syringa* x *chinensis* 'Saugeana' (Red Chinese Lilac)
9. *Syringa* x *chinensis* 'Alba' (White Chinese Lilac)
10. *S.* 'Ruhm Von Horstenstein'
11. *S.* 'City of Gresham'
12. *S.* 'A.M. Brand'
13. *S.* 'General Pershing'
14. *S.* 'Vivian Evans'
15. U.W. Arboretum Seedling #8
16. U.W. Arboretum Seedling #9
17. U.W. Arboretum Seedling #10
18. U.W. Arboretum Seedling #2
19. U.W. Arboretum Seedling #6
20. U.W. Arboretum Seedling #7
21. U.W. Arboretum Seedling #5
22. U.W. Arboretum Seedling #3
23. U.W. Arboretum Seedling #4

• • • • Tour 1, Midseason Lilac Species (see text)
— — — Tour 2, Late-Blooming Species
Other trees and shrubs in the lilac display area

Viewing the Collection

For a proper understanding of the variation to be found among lilacs, the collection should be visited several times during the spring. On a blustery early May day the visitor can see the first of the early species. The great mass of bloom of the common lilac cultivars occurs in about the second and third weeks of May. Most of the Preston hybrids and several other species of lilacs begin to bloom late in May and continue through the first week or two in June. Finally, the early summer visitor will find the white, cloudlike flowers of the Peking and Japanese tree lilacs. Thus various species of lilacs or their cultivars are in bloom at the Arboretum for almost two months.

TOUR 1

For the visitor who comes in mid-May, the common lilac, its closely related secies and the many hybrid lilacs derived from them will be of particular interest. Walk along Administration Drive to McCaffrey Drive, the entrance of the lilac collection. Beds 1 and 2 are to the south, Beds 7 and 8 to the north (see map). Chinese lilacs *(S. x chinensis)* can be seen facing each other at both corners of these beds. These are shrubby lilacs, not suckering as freely as the common lilac. Flowers are small, but very profuse. The leaf is smaller and narrower than that of the common lilac. Note also the two Japanese tree lilacs planted as single specimens and trimmed into tree form at the corners of the drive. These bloom in late June.

Two common lilacs *(S. vulgaris)*, salvaged from old farm sites when the Arboretum was being developed, are now growing beside the star magnolia in Bed 8. Note the heart-shaped leaves, typical of the common lilac, and the vigorously suckering habit. Most of the hybrid lilacs inherit both these features from this species.

Proceed north between Beds 8 and 9 to the vicinity of Bed 33. The three plants here are Persian lilacs *(S. x persica)*. Often confused with the Chinese lilac, a close look will show that the leaves are even smaller and narrower. Occasional lobed leaves testify that the cutleaf lilac is a parent of this species. Flower clusters are similar to those of the Chinese lilac but of a paler color.

Chinese Lilac ***Common Lilac*** ***Persian Lilac*** ***Manchurian Lilac***

The white form of the Chinese lilac *(S. x chinensis* 'Alba') can be seen nearby in Bed 34 or the specimen plant beside Beds 33 and 34. Also in Bed 34 is the Manchurian lilac *(S. patula)* which has leaves somewhat larger than the Chinese lilac, though usually smaller than the common lilac leaves. This particular plant seldom blooms, perhaps due to competition from the walnut tree nearby. Look for it again in

Bed 29. Another Chinese lilac *(S. x chinensis* 'Metensis') is also in Bed 34. It has whitish flowers with a pale lilac center.

Continue to the end of Bed 34. From here through Bed 35 and into part of Bed 15 one will find the early lilac *(S. oblata)* and two of its varieties. Very closely related to the common lilac, it is distinctive because of its lower growth, early bloom, and very wide leaves which often taper to a long, narrow point. The early lilac is the first of our lilacs to bloom, sometimes two weeks ahead of the common lilac. It has been used extensively by lilac breeders and has given us a large group of "Early Hybrids" which bloom somewhat earlier than common lilac cultivars. The early lilac is the only lilac which can claim a respectable fall foliage color, in this case a rich maroon red.

Early Lilac

Cutleaf Lilac

Meyer's Lilac

Littleleaf Lilac

Other interesting lilac species in this area include the cutleaf lilac *(S. laciniata)* and Meyer's lilac *(S. meyeri)*, both in Bed 15. The cutleaf lilac is quicly recognized by its deeply lobed leaves. It is considered one of the parents of both the Chinese and Persian lilacs.

Meyer's lilac is a low-growing species, one of the few lilacs which can be used effectively in small gardens. It has distinctive, small, almost round, crisp leaves which are shiny and scalloped or fluted, This plant, in Bed 15, is trained as a standard, in tree form. Other Meyer's lilacs can be seen nearby in Bed 14.

Another interesting species can be seen in Bed 16. This is the littleleaf lilac *(S. microphylla)*. It has small oval leaves which are actually slightly larger than the leaves of Meyer's lilac. Littleleaf lilac flowers are lilac in color tone and among the most fragrant of lilac flowers. This species is unusual in that it regularly reblooms in late July or early August. The shrub is of medium size and somewhat less agressive than the common lilac.

The common lilac, its hybrids and relatives, such as the Chinese, Persina, early, cutleaf, littleleaf, and Meyer's lilacs all bloom from late April to mid or late May in Wisconsin.

From bed 16 one can proceed through the collection of "French Hybrids" (Beds 6, 18, 20, 21, etc.) in which case note more Manchurian lilacs in Bed 29 and additional Meyer's lilacs in Bed 30. Another alternative would be to proceed more directly to the parking lot through some of the "French Hybrids" in Beds 11, 12, 14, 28, etc.

TOUR 2

Later Blooming Lilacs

Another major group of lilac species and hybrids is the group which is related to the late lilac *(S. villosa)*. This group is easily recognized by its coarse stems and large leaves. Flowers in all late lilacs are narrower than those of the common lilac, but the trusses (clusters) are often very large. As the name suggests, these lilacs all bloom after the lilacs mentioned above. In Wisconsin, the late lilacs usually reach their peak bloom in the first week of June.

Felty Lilac

Wolf's Lilac

Late Lilac

The long bed near the parking lot, Bed 37, contains several of the late hybrids and a few of the late species lilacs. Preston hybrids ('Isabella' and 'Jessica') are represented in this bed. Also present here are two notable species of late-blooming lilacs. One, the felty lilac *(S. tomentella)*, has very large leaves which taper gradually to a long point. Its flowers are single and pinkish. The other, Wolf's lilac *(S. wolfii)*, has more deeply colored flowers of magenta or purple. Wolf's lilac has a particularly dense, well-rounded form, bearing leaves down to ground level. Its leaves are among the smallest of the late lilac group, ending in a blunt tip. Other late-blooming species of interest are located in Bed 4, near the middle of Administration Drive. In this bed is the late lilac *(S. villosa)*, one of the parent species used in developing the Preston hybrids. The late lilac has leaves very much like Wolf's lilac, though slightly larger. Flowers are pinkish. This is one of the hardiest of lilacs, enduring even the severe climate of central Manitoba. Also in this bed is the Hungarian lilac *(S. josikaea)*. Leaves of the Hungarian lilac are intermediate in size, short tipped, and fairly broad. Its flowers are placed in the lilac (IV) color class.

An additional late-blooming hybrid can be seen in Bed 16. This is *(S. x henryi* 'Lutece'). 'Lutece' is a very large shrub with thick, upright branches. Its flowers are violet in color and appear quite late, usually mid-June at the Arboretum.

Hungarian Lilac

Peking Lilac

Japanese Tree Lilac

Few of the later-blooming lilac species have the fragrance of the early-blooming lilacs. Many of them are very large, coarse shrubs which tend to become somewhat open at the base ("leggy") in maturity. Yet their graceful blossoms are much appreciated as they appear well after the early blooming species have faded. For these reasons, research will continue into the developemtn of improved "late hybrid" lilacs.

TREE LILACS FOR EARLY SUMMER

Late in June, long after the mass of "French Hybrids" have passed and the late hybrids have bloomed, the two tree lilac species come into their own. Unusual because of their cherrylike bark and treelike growth, these plants form quite a distinctive group among lilacs. Their flowers are tiny, creamy white and give off an odor which many people find objectionable. However, the individual flowers are borne in huge, pyramidal clusters which give the tree a very attractive, cloudlike appearance when in full bloom.

The two species in our collection the Peking lilac *(S. pekinensis)* (bed 16), and the Japanese tree lilac *(S. reticulata)* (Map No. 1-5), are very similar in overall appearance. The Peking lilac tends to be the shrubbier of the two and has a more delicate texture since its leaves are realtively small. The Japanese tree lilac, on the other hand, is more readily trained into tree form, and has very large, oval leaves. Four Japanese tree lilacs, three trimmed into tree form, can be seen along Administration Drive as one passes through the lilac collection.

Come look, smell, learn; and be glad that
others left things untouched for you to enjoy!

ACKNOWLEDGEMENTS

I have many people to thank for helping with this article. Thanks to Dr. John Thomson, Craig Tiedermann, Rosemary Fleming, Betty Hasselkus, and Dr. Katharine T. Bradley for proofreading and helpful thoughts; Norma Burt for typing and to Wayne Westphal for his attractive drawings. Finally, my thanks to Dr. Hasselkus, whose encouragement converted a lilac skeptic into something of an amateur lilac enthusiast. We also appreciate the efforts of Eugene Moran and the Arboretum Crew in maintaining the fine collection of lilacs at the Arboretum.

APPENDIX 1

University of Wisconsin Arboretum Lilac Collection

LILAC SPECIES

Scientific Name	*Location*	*Common Name*
Syringa reticulata (S,I)*	near Beds 1,4,8,10	Japanese Tree Lilac
Syringa x chinensis (S,IV)	Beds 1,2,7,8	Chinese Lilac
Syringa x chinensis 'Alba' (S,I)	Bed 34	White Chinese Lilac
Syringa emodi (S,IV)	Bed 3	Himalayan Lilac
Syringa josikaea (S,IV)	Bed 4	Hungarian Lilac
Syringa josikaea eximia (S,V)	Bed 3	Pink Hungarian Lilac
Syringa laciniata (S,IV)	Bed 15	Cutleaf Lilac
Syringa meyeri (S,IV)	Beds 14,15,30	Meyer's Lilac
Syringa microphylla (S,IV)	Bed 16	Littleleaf Lilac
Syringa microphylla 'Superba' (S,V)	Bed 16	Pink Littleleaf Lilac
Syringa oblata (S,V)	Bed 35	Early Lilac
Syringa oblata dilatata (S,V)	Beds 15,35	Korean Early Lilac
Syringa oblata giraldii (S,V)	Bed 34	Purple Early Lilac
Syringa pekinensis (S,I)	Bed 16	Peking Lilac
Syringa x persica (S,IV)	Bed 33	Persian Lilac
Syringa x persica 'Alba' (S,I)	Bed 31	White Persian Lilac
Syringa x swegiflexa (S,V)	Bed 36	Swegiflexa Lilac
Syringa x sweginzowi albida (S,I)	Bed 37	White Chengtu Lilac
Syringa tomentella (S,V)	Bed 37	Felty Lilac
Syringa patula (S,IV)	Beds 29,34	Manchurian Lilac
Syringa villosa (S,V)	Bed 4	Late Lilac
Syringa vulgaris (S,VI)	Bed 8	Common Lilac
Syringa wolfii (S,VI)	Bed 37	Wolf's Lilac

* (S, I) refers to color and whether a plant is single (S) or double (D). Color categories are (I White; II Violet; III Bluish; IV Lilac; V Pinkish; VI Magenta; VII Purple; Bed locations refer to MAP.

APPENDIX 2

THE BEST OF THE LILACS[1]

Good Common Lilac Cultivars (Midseason Bloom)

Color Group	*Single*	*Double*
I White	Vestale (Bed 28)[2]	Edith Cavell (Bed 21)
	Jan Van Tol (Bed 9)	Miss Ellen Wilmott (Bed 7)
	Mont Blanc (Bed 10)	Mme. Lemoine (Bed 23)
II Violet	De Miribel (Bed 14)	Violetta (Bed 14)
	Cavour	Marachel Lannes (Bed 9)
III Bluish	President Lincoln (Bed 14)	Ami Schott
	Firmament (Beds 14,38)	Olivier de Serres (Bed 30)
	Decaisne (Bed 16)	President Grevy (Bed 9)

[1]Adapted from 1968 survey by the American Association of Botanical Gardens and Arboreta; with additional late lilacs recommended by Donald Wyman in "The Preston Lilacs," *American Nurseryman,* 1 Dec., 1974.

[2]Bed numbers refer to map showing bed locations in the Lilac Display Area. Cultivars without bed numbers are not presently in the collection.

IV Lilac	Christophe Colomb (Bed 14)	Victor Lemoine (Bed 36)
	Jacque Callot (Bed 3)	Henri Martin (Bed 11)
		Leon Gambetts (Bed 8)
		Alphonse Lavalle (Bed 6)
V Pinkish	Lucie Baltet (Bed 12)	Mme. Antoine Buchner (Beds 12,13)
	Macrostachya (Bed 3)	Katherine Havemeyer (Bed 6)
		Montaigne (Beds 22, 24)
		Belle de Nancy (Bed 24)
VI Magenta	Capitaine Baltet (Bed 11)	Paul Thirion (Bed 26)
	Mme. F. Morel (Bed 13)	Charles Joly (Bed 10)
	Congo (Bed 21)	President Poincare (Bed 5)
VII Purple	Andenken an Ludwig Spaeth (Beds 3,20)	Adelaide Dunbar (Bed 14)
		Paul Hariot (Bed 18)
	Mrs. W.E. Marshall (Bed 39)	
	Night (Bed 36)	
	Monge (Bed 14)	

Color Group	*Good Early Hybrids*	*Good Late Hybrids*
I White	Gertrude Leslie (D[3], Bed 12)	Anna Amhoff* (S, Bed 10)
	Sister Justena (S)	Hecla (S, Bed 39)
	Mount Baker* (S)	
II Violet	(None reported)	Jessica (S, Bed 37)
		Lutece (S, Bed 16)
III Bluish	Clarke's Giant (S, Bed 17)	Nocturne* (S, Bed 36)
	Blue Hyacinth (S, Beds 6,41)	Miss Kim* (S, Bed 14)
	Charles Nordine* (S, Bed9)	
	Laurentian* (S)	
IV Lilac	Assessippi (S, Beds 6,41)	Isabella (S, Bed37)
	Nokomis (S, Bed 17)	Elinor (S)
	Excel (S, Bed 10)	Celia (S)
	Annabel* (D, Bed 39)	
V Pinkish	Esther Staley (S, Bed 38)	James MacFarlane (S, Bed 38)
	Necker (s)	Ethel M. Webster (S, Bed 37)
	Buffon (S, Bed 13)	Coral (S, Bed 37)
	Turgot* (S, Bed 9)	Romeo* (S, Bed 37)
	Fenelon* (S)	Alexander's Pink* (S, Bed 38)
		Dawn (S)
		Prairial (S)
		Ursula (S, Bed 39)
		Enid (S)
		Floreal (S, Bed 25)
VI Magenta	Evangeline (D)	Hiawatha (S, Bed 37)
	Montesquieu (S, Bed 14)	Lucetta (S)
	Missimo* (S)	Redwine (S, Bed 21)
	Alice Eastwood (D, Bed 17)	Guinevere (S)
		Nerissa (S, Bed 37)
VII Purple	Tom Taylor* (D)	Royalty (S, Bed 37)
	Purple Heart (S)	Donald Wyman (S)
		Rutilant (S, Bed 37)
		Lynnette (S)

[3]S = single, D = double * = tentative, meager reporting

LILAC CULTIVARS

Adelaide Dunbar (D, VII) Bed 14
Aladdin (S, V) Bed 37
Alexander's Pink (S, V) Bed 38
Alice Eastwood (D, VI) Bed 17
Alphonse Lavallee (D, IV) Bed 6
Ambassadeur (S, III) Bed 17
A.M. Brand (S, VI) near Bed 12
Andenken an Ludwig Spaeth (S, VII) Beds 3,20
Annabel (D, IV) Bed 39
Anna Amhoff (S, I) Bed 10
Assessippi (S, IV) Beds 6, 41
Belle de Nancy (D,V) Bed 24
Berryer (D, V) Bed 11
Bleuatre (S, III) Bed 21
Blue Hyacinth (S, III) Beds 6, 41
Buffon (S, V) Bed 13
Capitaine Baltet (S, VI) Bed 11
Catinat (S, V) Beds 5,38
Charles Joly (D, VI) Bed 10
Charles Nordine (S, III) Bed 9
Charles Sargent (D, III) Bed 32
Charles X (S, VI) Bed 10
Cheyenne (S, III) Bed 12
Christophe Colomb (S, IV) Bed 14
Churchill (S, V) Bed 13
City of Gresham (S, VII) near Bed 12
Clarke's Giant (S, III) Bed 17
Claude Bernard (D, V) Beds 6,22
Comtesse Horace de Choiseul (D, V) Bed 27
Congo (S, VI) Bed 21
Coral (S, V) Bed 37
Decaisne (S, III) Bed 16
De Croncels (S, VII) Beds 18,23
De Miribel (S, II) Bed 14
De Saussure (D, VII) Bed 18
Desfontaines (D, VI) Bed 8
Deuil d'Emile Galle (D, V) Bed 6
Diderot (S, VII) Bed 10
Diplomate (S, III) Beds 17,38
Dr. Charles Jacobs (S, VII) Bed 30
Dr. Lemke Bed 34
Duc de Massa (D, III) Bed 7
Edith Cavell (D, I) Bed 21
Edmond About (D, VI) Bed 6
Edmond Boissier (S, VII) Bed 27
Edouard Andre (D, V) Bed 24
Emile Gentil (D, III) Bed 27
Emile Lemoine (D, IV) Bed 9
Esther Staley (S, V) Bed 38
Ethel M. Webster (S, V) Bed 37
Etna (D, VII) Bed 14
Excel (S, IV) Bed 10
Firmament (S, III) Beds 14,38
Floreal (S, V) Bed 25
Frank Klager (S, VII) Bed 17
Frau Bertha Dammann (S, I) Bed 24
Frau Wilhelm Pfitzer (S, V) Bed 7
French Giant (S, III) Beds 2,22
Fuerst Lichtenstein (S, V) Bed 30
General Pershing (D, V) near Bed 14
General Sheridan (D, I) Bed 30
Gertrude Leslie (D, I) Bed 12
Glorie de Lorraine (S, VI) Beds 5,6
Glorie de Moulins (S, V) Beds 7,25
Glory (S, Vi) Beds 6,20
Grand Duc Constantin (D, III) Bed 5
Guizot (D, IV) Bed 3
Hecla (S, I) Bed 39
Henri Martin (D, IV) Bed 11
Henri Robert (D, II) Bed 38
Herman Eilers (S, V) Bed 3
Hiawatha (S, VI) Bed 37
Hippolyte Maringer (D, IV) Bed 14
Hugo Koster (S, IV) Bed 26
Hyacinthiflora (D, III) Bed 3
Isabella (S, IV) Bed 37
Jacques Callot (S, IV) Bed 3
James MacFarlane (S, V) Bed 38
Jan Van Tol (S, I) Bed 9
Jean Mace (D, V) Bed8
Jeanne D'Arc (D, I) Bed 8
Jessica (S, II) Bed 37
Jules Ferry (D, V) Beds 5,30
Jules Simon)D, III) Bed 14
Kate Harlin)S, I) Bed 11
Kate Sessions (S, V) Bed 17
Katherine Havemeyer (D, V) Bed 6
Lamartine (S, V) Bed 10
La Mauve (D, V) Bed 26
Laplace (D, VII) Bed 14
La Tour d'Auvergne (D, VI) Bed 23
Le Notre (D, II) Bed 14
Leon Gambetta (D,IV) Bed 8
Louvois (S, II) Bed 17
Lucie Baltet (S, V) Bed 12
Lutece (S, II) Bed 17
Macrostachya (S, V) Bed 3
Marc Mitchell (D, V) Bed 11
Marechal Lannes (D, II) Bed 9
Marengo (S, IV) Bed 12
Marie Finon (S, I) Bed 36
Marie Legraye (S, I) Beds 6,22,26
Mathieu De Dombasle (D,IV) Bed 9
Maud Notcutt (S, I) Bed 11
Metensis (S, I) Bed 34
Mirabeau (S, IV) Bed 11
Mireille (D, I) Bed 27
Miss Ellen Wilmott (S, I) Bed 7
Miss Kim (S, III) Bed 14
Mme. Abel Chatenay (D, I) Bed 11
Mme. Antoine Buchner (D, V) Beds 12,13
Mme. Casimir Perier (D, I) Beds 6,34
Mme. Catherine Bruchet (D, I) Bed 3
Mme. Charles Souchet (S, III) Bed 12
Mme. de Miller (D, I) Bed 3
Mme. Florent Stepman (S, I) Bed 5
Mme. F. Morel (S, VI) Bed 13
Mme. Lemoine (D, I) Bed 23

Mme. Leon Simon (D, IV) Bed 25
Monge (S, VII) Bed 14
Monique Lemoine (D, I) Bed 39
Montaigne (D, V) Beds 22,24
Mont Blanc (S, I) Bed 10
Montesquieu (S, VI) Bed 14
Moonglow (S, III) Bed 39
Mrs. Edward Harding (D, VI) Bed 6
Mrs. McKelvey (D, IV) Bed 4
Mrs. W.E. Marshall (S, VII) Bed 39
Nerissa (S, VI) Bed 37
Night (S, VII) Bed 36
Nocturne (S, III) Bed 36
Nokomis (S, IV) Bed 17
Olivier de Serres (D, III) Bed 30
Pascal (S, IV) Bed 6
Paul Deschanel (D, VI) Bed 20
Paul Hariot (D, VII) Bed 18
Paul Thirion (D, VI) Bed 26
Perle Von Stuttgart (D, IV) Bed 27
Pocahontas (S, VII) Bed 17
President Carnot (D, IV) Bed 8
President Fallieres (D, IV) Bed 1
President Grevy (D, III) Bed 9
President Lincoln (S, III) Bed 14
President Poincare (D, VI) Bed 5
President Roosevelt (S, VII) Bed 16
President Viger (D, III) Bed 39
Primrose (S, I) Bed 40
Princess Alexandra (S, I) Bed 25
Princess Clementine (D, I) Bed 18
Priscilla (S, VI) Bed 36
Prodige (S, VII) Bed 14
Professor E. Stoekhardt (S, IV) Bed 26
Reaumur (S, VI) Bed 6
Redwine (S, VI) Bed 21
Reine Elisabeth (S, I) Bed 27
Rene Jarry-Desloges (D, III) Bed 3
Roi Albert (S, VI) Bed 28
Romeo (S, V) Bed 37
Royalty (S, VII) Bed 37
Ruhm Von Horstenstein (S, VI) near Bed 11
Rutilant (S, VII) Bed 37
Sarah Sands (S, VII) Bed 39
Saugeana (S, VI) Beds 1,2,8 & near 4,41
Senateur Volland (D, VI) Bed 19
Siebold (D, I) Bed 28
Silver King (S, III) Beds 18,31,32
Souv. de Henri Simon (S, III) Bed 27
Thunberg (D, IV) Beds 28,38
Toussaint l'Ouverture (S, VII) Bed 14
Turgot (S, V(Bed 9
Ursula (S, V) Bed 39
Vauban (D, V Bed 1
Vestale (S, I) Bed 28
Victor Bed 36
Victor Lemoine (D, IV) Beds 28,39
Ville de Limoges (S, V) Bed 6
Violetta (D, II) Bed 14
Virginite (D, V) Bed 30
Vivian Evans (S, IV) near Bed 14
Viviand Morel (D, IV) Bed 28
Volcan (S, VII(Bed 14
Waldeck-Rousseau (D, V(Bed 22
White Swan (S, I) Bed 40
Arboretum Seedling #1 Bed 39
Arboretum Seedling #2 near Bed 13
Arboretum Seedling #3 near Bed 36
Arboretum Seedling #4 near Bed 38
Arboretum Seedling #5 near Bed 39
Arboretum Seedling #6 near Bed 13
Arboretum Seedling #7 near Bed 38
Arboretum Seedling #8 near Bed 38
Arboretum Seedling #9 near Bed 39
Arboretum Seedling #10 near Bed 39

Ed Hasselkus points out Spiraea *x* cinerea *'Grefsheim' during tour of the Longenecker Horticultural Gardens, University of Wisconsin Arboretum.*

August Henry Lemke, 1868-1946*

By Freek Vrugtman, Hamilton, Ontario

About 150 miles north of Madison, Wisconsin, in Marathon County and bisected by the Wisconsin River, lies the City of Wausau with a population of about 32,000. Originally a sawmill settlement, Wausau has grown into an industrial center. In 1913 the 'History of Marathon County' was published; the author was Judge Louis Marchetti. One of the topics Marchetti covered was the profession of dentistry. August Lemke was a dentist at Wausau, Judge Marchetti wrote:

> AUGUST H. LEMKE, D.D.S., who has well equipped offices at No. 312 South First Avenue, Wausau, enjoys a large and substantial practice which he has built up since the fall of 1907 and is the only practicing dental surgeon engaged on the west side. He was born in Germany, September 2, 1868, and is a son of John A. and Marie (Scherbert) Lemke.
>
> John A. Lemke brought his family to America in 1871, coming directly to Wisconsin. He was a cigarmaker by trade but immediately invested in land in the town of Wausau, Marathon County, and acquired three farms, aggregating 110 acres, all valuable land. He continued to maintain his home in the city of Wausau but daily visited his farm and for a number of years overlooked their development. He and his wife now live in comfortable retirement at Wausau where they are held in exceeding esteem. They have eleven children.
>
> August H. Lemke was reared at Wausau and attended the public schools and also a business college and was graduated with the degree of B.S. from the university at Valparaiso, Indiana. For fourteen years afterward he followed teaching, both in the rural and the city schools and prior to turning his attention seriously to the study of dentistry, visited Europe, in 1901, and once more saw the old family home place in Germany. Prior to this, however, he had spent about one and one-half years in travel in the United States and during this period covered no less than 11,000 miles. In 1907 he was graduated from the Chicago Dental College and in September of the same year opened his office at Wausau.
>
> Dr. Lemke was married in 1902 to Miss Emma Hennig, of Dodge County, Wisconsin, and they have three children. He is secretary and treasurer of the Marathon County Dental Society and belongs to the Wausau Commercial Club.

It is quite conceivable that Judge Marchetti's "History of Marathon County" inspired Dr. Lemke a few years later to start taking his own

*Contribution No. 53 from the Royal Botanical Gardens, Hamilton, Canada.

notes on the "Earlier History of Dentistry in Marathon County". A few years after her husband's death, Mrs. Lemke was persuaded to deposit Dr. Lemke's notebook bearing that title with the Manuscript Collection of the State Historical Society of Wisconsin at Madison. Among the biographic notes on the various dentists who practiced in Marathon County is also an autobiographic one written in 1928:

Dr. A.H. Lemke

Up to date the Doctor seems to be the only foreign born one of German descent. The very day of his third birthday his parents left their mother country to become American citizens, coming directly to the village of Wausau, in 1871, making the "briny deep" in a sailboat in about fifty days. Nearly a week by rail to Berlin, Wisconsin, the end of the railroad. There changing to stage-coach travel, arriving here in the woods November 2nd. There was nothing but hard work, even for a kid in those days. Today it is all fun. When but ten years of age he was taken from the public school to enter the parochial which was attended for three seasons, and during vacations and spare-hours after school and Saturdays the time was spent in a cigar-shop sapping the life out of the youth. With the best of opportunities he never learned the use of tobacco. At thirteen he entered the shop of Curtis Bros. and remained there for seven and one-half years, when he became of age, and his own dictator. Having attended public evening school when they came into being, he gleaned enough to be able to enter the Wausau Business College, such as it was, and in the fall of 1890 was prepared to teach a rural school. In the spring of 1891 he had an European trip on the brain. Through the negligence of the father in taking out his Second Papers, the would-be traveler was obliged to see to his own naturalization. But not to postpone the trip now, and not to be embarrassed abroad, it was necessary to take out his First Papers to swear allegiance to his adopted country. And well that he did. The reason was a Wanderlust and to see his birthplace as well as to see other points of interests in the larger cities.

Through the nineties he taught eight terms in the rural schools, and was variously employed during vacations, carpentering two seasons, scaling lumber at Kelly's one mill, "Commercial" course at the Stoughton Academy, besides brushing up for the following school year's work. In 1897 he entered the Valparaiso University taking the scientific course, finishing in one and one-half years; followed by another rural school term. Then came the best period of his whole life; for 18 months knocking about the country, almost continuously on the move except to replenish his purse. Visiting all points of interest from Duluth, Minnesota, to New Orleans, Louisiana, and all West except for Utah and Nevada. From

Los Angeles to Victoria, British Columbia. Spending the winter along the Gulf of Mexico (incidentally dodging the coldest winter on record in the North) totalling a distancee of 11,500 miles includng the Yellowstone Park.

Arriving home in the fall of 1900 he went back to teach school four years more, three of which were in the city on less than fity dollars per month. Married in 1901. On what?

Dr. August Henry Lemke in 1907 (age 39) when he graduated from Chicago Dental College.

Dr. August Henry Lemke in his garden in 1933 (age 65) in Wausau, Wisconsin.

He entered the Chicago College of Dental Surgery in 1904, finishing in 1907, was Prosector two years in the Disecting Department, receiving a special diploma on Oral Surgery besides the regular degree. He opened his practice the same year at 313½ First Avenue South and on August 1, 1918, moved into the Dunbar Building on Third Street.

As a hobby he enjoys standard poultry, gold fish, and gardening, principally peonies Without the automobile, he has 26,000 miles to his credit. Why should he not have enjoyed life and be happy? He has Brazil on the brain yet. Three children heip to make up the family; and at this date, 1928, all three are married. The doctor signed the dental society's constitution in 1908 and did not miss over three meetings in these twenty-one years. He held offices, mostly secretaryship, and also was a number of years in the Central Society.

Dr. Lemke had a greenhouse in the back of his home; he also was a keen photographer. When and where he began growing lilacs is not known, but, by May 1941, Lemke had selected two lilacs which he sent to the University of Wisconsin Arboretum where they were planted early that month.

One selection he named 'Silver King'; it is a single blue *Syringa vulgaris* that is grown in a number of collections and is offered by one or two commercial nurseries. The other selection, un-named, was accessioned at the University of Wisconsin Arboretum as Dr. Lemke's No. 71. It is also a *S. vulgaris* selection, but the flowers are double and bluish-lilac. It is still growing in a few collections under several designations, some misspelled. No other Lemke lilac selections have come to light.

August Henry Lemke died on June 30, 1946, at the age of 77.

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Edward James Gardner
1891 - 1952

by Walter E. Eickhorst, Naperville, IL

Edward Gardner was born in Appleton, WI and grew up in an atmosphere of "truck farming" which was apparently the family endeavor at the turn of the century in the vicinity of West De Pere, WI. It was during these early years of his life that he formed the guidelines of his avocation that would later become a "stock-in-trade", the nursery business. While still located in the De Pere area he issued a woody plant catalog (not dated) which depicts two of his later to be qualities that relate to the improvement of lilacs in the trade. While this early list was diversified, it was only slightly so, the major portion, thirty-two of the entries were lilacs and perhaps the more important factor noted here is the emphasis placed in the value that all plants were on their *OWN ROOTS*. The commonly associated understock problem apparently was an obsession with Gardner in that he constantly searched for a method of simple and positive lilac production that would not be plagued with the long-standing problem of understock suckering.

During the late 1930s Gardner continued his vigorous search for a better way to grow lilacs and in the May 1, 1941 issue of the American Nurseryman Magazine there appeared his report in this effort, "Propagation Under Mist". The editor noted, "While operating his nursery at West De Pere, Wis., Edward J. Gardner has had his inventive genius stimulated by contact with his brother's metal works. The method of propagation he describes here has produced experimental results that warrant further trial to discover its practical application.

So it was mist propagation, as it has been known for more than thirty years, had its founding in lilac propagation. The inventive stimulation of this man is now undergoing an even more far reaching and greater in-depth scientific search for better methods of woody plant production. Today the more sophisticated search goes on in the sterile environs of "tissue culture".

While some of the lists of plant offerings that Gardner or those of his brother, Robert L. Gardner, who took over the Garden Nursery business in 1952 and continued with its operations until his death, carried no identification of dates, several that are available have stamped dates of receipt placed thereon by the recipients. While

much of the nursery operation is known to have been moved to the Horicon, WI area by the late 1940s, the 1947 list which included forty-three lilacs still showed the location of the business as West De Pere and a number of peonies are included in the offering, a number of which bear evidence of Gardner hybridization efforts since the name influence is present. However, the in-depth peony interest it is believed was that of Robert L. Gardner.

By 1949 it would appear that the nursery business was now solidly located in Horicon with the growing field being located some 2½ miles east of the community on Hwy. 33 (remnants of the nursery rows still stand in this site although it has been unattended for more than twenty years). The list dated 1950 now embraces more than two-hundred-fifty selections and claims ninety-nine of the then published list of one-hundred best forms. Herein for the first time appears Gardner's 443 (pat. App. for) with the following brief description:

> This is the beautiful, double, pink lilac, visitors so much admired during our Lilac displays of the past two years. We did not intend starting sale of this variety for at least another year in order to build up a good stock, but there was so much demand for the plant that we finally applied for a patent on it and are offering a few plants for Fall delivery. The buds are of a lilac purple shade but the color lightens as the flowers open, the blooms eventually becoming a beautiful light pink that glows in the sunlight, making a striking effect, attracting everyone's attention. The individual florets resemble hyacinth florets in form and measure 7/8" across and are double. Two to three rows of petals appear to come from a single corolla. The inner petals are narrow and deeply channeled, outer petals broad and recurved. The bloom panicles are large and loosely branching often showing five to eight separate spikes to the cluster. As a cut flower the keeping qualities are very good and the blooms are quite fragrant.

This became the 'Edward J Gardner' lilac (Plant Patent No. 1086). The 1954 list of plant materials would indicate the interest in peony growing since twenty Gardner named selections were listed.

The lilac offerings of 1956 are still in excess of two-hundred. Not only is the 'Edward J. Gardner' (Plant Patent 1086) selection among them, here for the first time is listed 'Mrs. R.L. Gardner' (Plant Patent1443) and is briefly described:

> This lilac, just patented, is a deep blue, almost violet color, with large single florets and very large panicles. It retains its deep color for many days. It blooms heavily and the bush is a sturdy grower and well shaped when given space. This is the first season we are offering this new lilac to our customers.

Also appearing for the first time is the selection 'Jessie Gardner' (Plant Patent 1444) and is likewise briefly described here:

This lilac also is being offered to our customers this year for the first time, The coloring is similar to the 'Mrs. R.L. Gardner', excepting that it is a more reddish purple with the younger flowers deep violet. The flowers are double, and arranged very tightly in the panicles. The petals are numerous and extremely twisted.

Two additional selections also appear in this 1956 list, but without the cover of patent rights. These are 'Leone Gardner' and a form thought to be an *S. dilatata* hybrid 'Mary Gardner' and carry brief descriptions:

'Leone Gardner' - This is another new lilac we are introducing to the trade this year. When the blooms first open, they are a very deep purplish red. After they have been open for a couple of days, the lower portion of the panicles turn to a beautiful shade of purplish red which glows exceedingly red in the afternoon sun and the upper part of the panicles appear to be a cobalt blue.

'Mary Gardner' - A 1956 introduction to our trade. This lilac is classed among the early lilacs which bloom 10 days to two weeks before the French lilacs. The flowers are clear blue, single, and the bush is a prolific bloomer. In season the bush appears to be completely covered with blooms. If the bush is given sufficient room it will attain a globular shape. Like the dilatata and the Canadian lilacs, the foliage is bright green and appears to be fresh all through the summer into the late fall.

Of particular note concerning the selection 'Leone Gardner' is the fact that the description lacks the critical value as to whether the flowers are single or double.

"Blue and Pink Lilacs" by R.L. Gardner of Edward J. Gardner Nursery, Horicon, WI was published in *Wisconsin Gardens,* Vol. 6, Nos. 2 and 3, March-April and May-June 1955, a publication of The Wisconsin Garden Club Federation affiliated with The National Council of State Garden Clubs, Inc. This article was reprinted by permission in The Pipeline, Vol. III, No. 10, Oct. 1977. Because of its current value, it is further reprinted below.

Ed Gardner worked for many years in the Gardner Manufacturing Co. and for a time served that firm as superintendent and was owner of the Gardner Nursery, portions of which still stand, but unattended since the mid-1960s.

It is of particular interest to note that all of the Gardner lilac introductions bore no record of hybridization, all being designated as seedlings of unknown origin, yet, after more than 30 years, there is an acknowledged quality of selections recognized by horticulturists. that in the person of Edward J. Gardner there was indeed an outstanding ability to select and judge quality lilacs.

While many struggle to accomplish a lasting mark only a few of us ever succeed, but Ed Gardner did make a lasting contribution through his inventive curiosity in the field of woody plant propagation, and more particularly in the genus *Syringa*, the lilac. It would appear from the evidence at hand that this man was born into a humble family, appreciated the beauty of life, sought to improve that which was around him and was called from this earty at the age of sixty, leaving his world a bit better and more meaningful than he found it.

Blue and Pink Lilacs

by R.L. Gardner, Edward J. Gardner Nursery, Horicon, WI

There are many varieties of lilacs for which the colors blue or pink are claimed. While acknowledging the beauty of many of these varieties, and the fact that the colors do approach blue or pink, I must, in this same breath, insist that most of them are not blue or pink and only a few of them can honestly be classified as such. We can have bright hopes, however, because lilac breeders are expanding the scope of their activities very rapidly. They are speeding up the tempo of their cross breeding which, until comparatively recently, was a wide open, almost untouched field. Results have been astounding and even better results in the future are inevitable.

See Stock in Bloom

Subscribers to Wisconsin Gardens might feel that to be cautioned about purchasing lilacs advertised as blue and pink casts doubtful reflections on their intelligence and such advice is therefore out of order, or unnecessary, or superfluous. But, the fact remains that each year I receive more than a few orders for lilacs which the buyers "understand" are good blues or pinks. Of course, they have never seen them! Consequently, after they have seen them blooming a year or two later, I sometimes receive letters which are not too complimentary. So - caution No. 1, - see the bloom of the lilac you want, if at all possible, before you buy. Caution No. 2 - If, because of the newness or scarcity of a variety you cannot see it in bloom, do not hesitate to ask the grower point blank, "Is this really blue?". A grower of any repute at all will be only too pleased to answer your question quite frankly. Naturally, after you've seen the bloom you might not fully agree with the information given to you, but then, all of us have our own opinions. Maybe your idea of "blue" or "pink" is entirely different from that of the grower.

Recommended Lilacs

In recommending blue and pink lilacs listed herein, I have used as a basis for my selections the reactions of visitors to the nursery to these varieties. I have also considered to a lesser degree my own observations. If you do not find your favorite in this list, please do not allow yourself to become disturbed. Rather, I would suggest that you see the listed varieties at your favorite nursery, arboretum, or public park during the blooming season.

After the variety name, the name of the breeder is inserted within parentheses. The description is more or less my own and I am open to correction. These are also listed in their order of best, next best, etc. Let us start with the blue lilacs.

Favorite Blues Listed

No. 1. *Mme. Charles Souchet (Lemoine).* This variety was imported by us in 1950. Is is actually blue and might be described as "for-

get-me-not" blue. The flowers open up blue and stay blue for many days. After a week to ten days, the blooms were still a vivid blue with only slight indications of fading. A prolific bloomer producing very large panicles. It is a sturdy grower.

No. 2. *Ami Schott (Lemoine).* A double lilac, with large panicles and florets. The lower petals are a deep, almost violet, while the upper and inner petals fade to an almost bluish white, with the result that the overall cast is blue. Another generous bloomer, with medium growing habits. Truly this is the best double blue to my knowledge.

No. 3. *Firmament (Lemoine).* This blue lilac on our list was No. 1 (with apologies to President Lincoln) until we acquired Mme. Charles Souchet. It opens light blue which is near sky blue and in suitable weather maintains that color for several days. Afterwards the color gradually turns to a pinkish blue, which is also most attractive. A prolific bloomer, sturdy, but with dwarf-like tendencies in growth. Panicles are medium to large.

No. 4. *Decaisne (Lemoine).* This is a very good, long lasting, prolific bloomer. The growth habits are toward the dwarf side. The panicles are long and narrow. The flowers open to a deep blue and after some days, a hint of pink appears with the blue to produce a purplish effect which to most people enhances rather than detracts from the beauty of the flower. This is an old standby and the demand remains constant from year to year.

No. 5. *Mary Gardner (Gardner).* A light blue early lilac, which is perhaps a hybrid of *S. vulgaris* and *Giraldii.* A generous bloomer, blooming about one to two weeks before the regular French varieties. Growth habits of the bush tend toward the dwarf and the stocks are slender. Excellent for cutting.

No. 6. *Olivier de Serres (Lemoine).* A good double, clear blue, somewhat sky blue. A good bloomer with large panicles. A rugged grower, medium tall.

No. 7. *President Lincoln (Dunbar).* An excellent sky blue lilac. Not quite as blue as Mme. Charles Souchet, but more blue than Firmament. Would be an excellent No. 2 were it not for the fact that the blooms fade very rapidly once they are open. Also, panicles are not large and the bush is an upright grower which is not as desirable as the growth of the six preceding varieties mentioned.

Pink Varieties Listed

No. 1. *Edward J. Gardner (Gardner).* Plant Patent No. 1086. The mere fact that this double pink lilac was originated by the late Edward J. Gardner does not put this lilac in the first place on this list of pink lilacs. For the past several years, the visitors to the nursery have been attracted to this lilac more than to any other variety, bar none.

The buds are of a mauve pink shade that lightens as the flowers open. The blooms become a beautiful light pink that glows in the

sunlight, making a striking effect and attracting everyone's attention. The florets resemble a hyacinth floret in form, and measure as much as one inch in diameter. Two or three rows of petals appear to come from a single corolla. The inner petals are narrow and deeply channeled, while the outer petals are broad and recurved. The panicles are very large and loosely branching, often showing five to eight separate spikes to the cluster. Excellent for cutting and the blooms are quite fragrant. The plant is a strong grower. To my knowledge, there is no finer pink lilac.

No. 2. *Lucie Baltet (Baltet).* This very good, single pink lilac was considered for many years to be the best. It is still considered the best pink lilac by many of those who have not seen the Edward J. Gardner. Although the florets are small and panicles medium, it is a prolific bloomer. Shortly after opening, the flowers fade. In hot weather, the fading is very rapid and after a couple of days, in extreme conditions, they may turn to a questionable pinkish white. Under ideal conditions, however, the blooms are very beautiful for several days and they make an excellent cut flower. Growing habits of the plant tend towards the dwarf side.

Hue Range is Wide

No. 3. *Mme. Antoine Buchner (Lemoine).* A delicate pink, double flowered lilac. Panicles are medium but there are many of them. Truly a pure light pink.

No. 4. *Marechal Foch (Lemoine).* A striking deep pink or perhaps, more suitably, rose colored single lilac. Enormous panicles, and a free bloomer. Growth habits of the plant are upright and medium tall. A desirable lilac for any garden.

No. 5. *General Pershing (Lemoine).* A good showy double pink, which has slight lilac tint. Panicles are loose, which produces a graceful effect. Florets are large, resembling somewhat a double flowering almond. Even though this variety tends toward the lilac shade of pink, it is another very desirable variety. Panicles are large and blooms in late season. Growing habits, medium tall and spreading.

Of course, we could go on and on listing good varieties of pinks and blues. But, in doing so, we get away from the original thought of those which are the closest to true pink and true blue. And that's just the way it goes when my customers ask me for my opinion as to what lilac is the best blue, pink, purple, etc. The best leads to the next, and that to another which may not be quite the color we started to talk about, and on, and on, until we are talking about an entirely different color than that with which we started, about a double instead of a single, a rugged grower instead of a graceful grower - guess we just like them all when you come right down to it. But those I have listed I believer are close to the true colors of blue and pink.

A.M. Brand and his Peony Farm

by Donald Wedge, Albert Lea, MN

The Brand Peony Farm was the first nursery of any consequence in Minnesota. It gained national prominence for both peony and lilac propagation. The story begins with Brand's father, Oliver Franklin Brand, who was born in St.Lawrence County, New York, in 1844. After serving in the Civil War, he migrated to Fond du Lac, Wisconsin, where he was an agent for the Ellwanger and Barry nursery of Rochester, New York.

In 1867 Mr. Brand senior moved to Faribault, Minnesota, where he established a general nursery. There son Archie Mack Brand was born in 1871. Archie studied law at the University of Minnesota, graduating in 1895, and entered the practice of law at Graceville, Minnesota, a small crossroads town near the Dakota border. Every spring and fall he would return to Faribault to help his father during the planting and digging seasons. In 1899 Archie decided to join his father as partner. In 1911, owing to failing health, his father retired and moved to Pomona, California.

In 1918 Miss Myrtle Gentry, who for fifteen years had been a teacher and assistant principal of Faribault High School, decided she would like to try a new line of work. Archie hired her to run the office. She must have done a good job because one year later she became Brand's partner. When, in 1953, Mr. Brand died, Miss Gentry became sole owner and continued to operate the business for three more years. In 1956 she sold the nursery to A.P. and Robert W. Tischler.

In 1958 Robert Tischler bought out his brother's interest and operated Faribault Seed and Nursery Company. Two years later the nursery was liquidated, and the name and mailing lists were sold to a St.Cloud businessman.

Lilacs were a specialty of the Brand Peony Farm for thirty years, from 1920 to 1950, when Mr. Brand maintained an impressive scion block of some 180 cultivars, all *Syringa vulgaris* except for the Rouen or Varin's lilac. His right-hand man, during the period of lilac propagation and growing techniques was Edgar "Dick" Lehman of whom more later. Two occasions stand out in which I met Mr. Brand. The first was in the late 1920s when he was a dinner guest in my parent's home before speaking to the Albert Lea Garden Club. The other was in 1946 in his nursery office at which time I also met Myrtle Gentry. During this latter visit he made two statements which impressed me deeply: 'Marechal Foch' is one of the greatest lilacs along with 'Leon Gambetta', and 'Charles X' and 'Marie Legraye' are two of the best varieties for cut flowers.

Returning to "Dick" Lehman, for much of what I report will be Dick's reminiscences garnered last March at his home in Faribault.

Dick established Lehman Gardens in 1939, specializaing in outdoor or hardy chrysanthemums. He had just met Dr. L.E. Longley of the University of Minnesota who needed a grower to put his hybrid seedling "mums" onto the market. Sometime later he was to meet another chrysanthemum hybridist, a Dr. Crawford of the University of Chicago, who, in Dick's opinion was the "Luther Burbank" of chrysanthemums. Dr. Crawford just threw his seedlings into Lehman's lap since he was not interested in varieties nor making money. He just wanted amateur gardeners to enjoy his chrysanthemums!

Dick Lehman went to Iowa State on a football scholarship. He earned his board and room by waiting on table at a co-ed's dining hall. In the spring of 1923 he went to Brand's nursery to buy a plum tree for his mother's garden. Myrtle Gentry remembered him from high school and offered him a summer job. That fall Archie Brand offered him $2,000 per year to stay on at the nursery. Dick thought, "Why should I go to college, when I can make this much money?" He stayed on for sixteen years.

When Dick Lehman began working at Brand's Peony Farm, Brand listed only three lilacs: 'Charles X', 'Andenken an Ludwig Spaeth' and *S. chinensis*. The newer varieties were secured between 1923 and 1930. At one time Brand's had over 150 varieties, almost all *S. vulgaris*. The nursery never did get into the Preston and Skinner Canadian hybrids.

Bertram Farr, a general nurseryman of Weiser Park, Pennsylvania, received many named lilacs from the Arnold Arboretum. Both Farr and Brand were directors of the American Peony Society. Through this friendship Brand became interested in lilacs, securing a start of many varieties from Farr's nursery.

Theodore Wirth, Superintendent of Parks at Minneapolis, brought in some 200 varieties of lilacs from the collection at Highland Park, Rochester, New York. Mr. Brand secured permission to dig suckers from this splendid collection.

Brand also received shipment in large wooden boxes directly from the Lemoine nursery in France.

Farr budded all his lilacs on California privet. Brand bought a lot of liners from Farr. The winter of 1936 was particularly severe. Thousands of lilac liners all of which had been budded on privet were killed. Meanwhile Charles Nordine of the Jewell Nursery, Lake City, Minnesota, was budding lilacs onto green ash with success. This now is the standard method for propagating lilacs in the field.

To return to Lehman's story: At first we lined grafted lilacs directly into the field without irrigation and without too much success. The Brands would spend the winter months at Santa Ana, California. They had no children. One winter they took Dick along as driving companion and got him a temporary job in a California nursery. Dick noticed that this nursery propagated 'Concord' grapes by cuttings which were stuck one inch apart in beds under irrigation. Con-

sequently Brand's technique was modified to growing the grafted lilacs first in beds under irrigation for two years, then lining them out for two more years.

Another observation that Brand and Lehman made was that lilac scions started to bud out early while green ash was slow to break dormancy. A solution was found by holding the grafts in cold storage to keep the scionwood dormant until the ash wood was ready to bud before lining them out into beds. At the peak of their operations Brand's Peony Farm propagated up to fifty thousands of lilacs per year all of which were sold retail through the catalogue.

In 1913 Brand exhibited six of his peony seedlings in a local flower show for the first time. These created a sensation, especially the 'Martha Bullock' peony. That fall he began to advertise for retail sales, but sales did not pay for the advertising costs. In 1916 he did more extensive advertising by putting out a small catalogue. Business picked up. The 1920s were the heydays for Brand's Peony Farm. One year Brand introduced twelve new peony varieties, offering them at $50 a piece. Lehman was left in charge of the stand when a customer stepped up and ordered all twelve varieties writing out a check for $600. Altogether Brand introduced 76 peony varieties, nineteen of which rated 9.0 or better in the American Peony Society symposium ratings. Some of these are still considered as fine as any in the peony lists even today.

Things were going "real good" until the Depression came along. Brand was hit pretty bad. Mr. Brand called his crew together and said, "The bank wants assignment of my personal life insurance as collateral to secure a note to keep things going. If you fellows want to keep on working and are willing to take less pay (35¢ per hour), we'll keep operating." Conditions began to improve after 1934.

About 1935 Brand had his men pick about five bushels of seed from the best lilac varieties. Next spring they sowed the seed in a ¼ to ½ acre plot. When they bloomed he selected five lilacs: 'Ethiopia' a single purple, 'Grace Orthwaite' a single pink, 'Margaret Rice Gold' a single purple, 'Col. Wm. R. Plum' a single purple, and 'A.M. Brand' a single purple. This last seems to be the only variety to have caught on. Secretary Oakes rates it as the best single red. Charles Holetich describes it as a good annual bloomer with heavy clusters of single purple florets, the side branches often tipped toward the ground from the weight of the clusters.

I called Robert Tischler a few days ago. He was the last owner of Brand Peony Farm and reports that he selected and named two varieties: 'Addie Tischler' a double pink, and 'Robert Tischler' a semi-double purple.

The Brand Nursery was located just across the river from downtown Faribault. Adjoining the nursery was the school for the deaf and dumb and the feeble-minded institute. Actually many of the field workers came from the school for the deaf. Every year the big

events at Faribault were the fields of lilacs and peonies in bloom. Mr. Brand tells this story on himself. He was working in the fields with a crew, and of course he was in his work clothes. A carfull of women stopped and got out to view the blooming fields. He overheard the remark, "Look at those poor souls from the institute, especially that pathetic old man." They were quite taken back when Mr. Brand spoke up identifying himself.

One final thought about Archie Brand the man as described by Dick Lehman: he was a second Calvin Coolidge, an orthodox Republican - conservative as the day is long - a kind of loner. I don't think he had a green thumb, he did have a good color perception and he had the knack or ability to pick a winner.

"Col." Hanssen Schenker calls for bids during the annual lilac auction. Helpers are, from the left: Walter Eickhorst, Naperville, Illinois; Max Peterson, Ogallala, Nebraska; John Carvill, Latham, New York; and Bill Emerson, Delhi, New York. (Note Col. Schenker's "Mad About Lilacs" T-shirt. These sold for $14 each at the auction!)

Propagation of Lilacs at McKay Nursery

By Bernard Fourrier, Waterloo, WI

When we talk about propagating lilacs we have to group them according to their degree of difficulty in rooting. At McKay Nursery we propagate lilacs in two ways: from seeds and from softwood cuttings. I should add a third way, by division, which we use to supplement our production specifically with *Syringa vulgaris* and its white varieties. These divisions are made in the fall, when plants are dug from saleable lilacs.

Propagation by Seed

Generally the late flowering species are propagated by seed: *SS. villosa* and *reticulata*. Lilac species seeds do not germinate very well. *S. villosa* seeds require cold stratification, if sown in the spring. If sown in the fall in this part of the country, they will germinate in the spring. *S. reticulata* requires a warm period for germination. After sporadic and subsequent germination in the field, we now sow them in flats in the greenhouse in January. After five or six weeks at 70-78°F temperatures, we get 95% germination. Once the seedlings have put on a set of two leaves, they are potted.

Propagation by Softwood Cuttings

Softwood cuttings are divided into two groups. Firstly, the easy to root lilacs: *SS. meyeri, Julianae* 'Miss Kim', *josiflexa* 'James Macfarlane' and 'Royalty'. Eight to ten inch long cuttings are taken in the early part of June. The leaves are stripped from the bottom two to three inches after which the cuttings are wounded and dipped into a a .025% solution of indolbutyric acid (IBA). The cuttings are then stuck outdoors in a bed filled with two inches of sand and mist applied for six to seven seconds at three minute intervals. We usually get 90-95% rooting. The cuttings are lifted in November and stored overwinter in a refrigerated chamber. With respect to this group I would like to add that we are experimenting with hardwood cuttings. We started a couple of years ago. None of them rooted, but they did not die either. So we are trying again this year with a different hormone combination and a lot of "goodies" are added to them. Hopefully we will strike it rich.

The second group, the harder to root lilacs, include the so-called French hybrids plus *S. chinensis* 'Saugeana' which do all right in a closed environment, that is, in a greenhouse, but do not do so well under open mist propagation. The greenhouse is first whitewashed and the benches cleaned up and filled with a rooting medium consisting of three parts perlite to two parts peat. This is then drenched with Terachlor. At the end of May the cuttings are taken when the lilac shoots are five to six inches long. We prefer to take them in the evening when the air is cool and the sun is going down. If we have to take them during the day, we take small amounts, spray them with

water and put them in the shade. All cuttings are then put in the refrigerated chamber until ready to be processed by dipping them in a Captan solution. After removing the lower leaves, the cuttings are wounded and dipped in a solution of .025% IBA and .125% NAA, with the dark shades receiving the stronger solution, and the pinks the weaker. The cuttings are stuck in the bench avoiding any contact of the leaves with the medium or to overcrowd them. The cuttings are watered and hoops are placed above the benches securing them on the sides. A 2-mil polyester sheet is placed above the benches, forming a tent under which the temperature and humidity is kept high. The temperature is never allowed to rise above 90-95%F at which point we either ventilate or shade the cuttings. The cuttings are checked daily for moisture, twice if necessary. After the cuttings are rooted, they are given some ventilation, so they are hardened up before being potted. The percentage varies between 60% for whites to 90% for pinks with a range of 75% total.

Questions and Answers

Holetich: *Do you use the same growing medium under open mist as in the greenhouse?*

Fourrier: No, under open mist we stick the cuttings in sand.

Hasselkus: I would like to add that Bernie uses two inches of sand in his out door beds. He sticks his cuttings deep into the sand, so that roots develop in the soil below the sand.

Fourrier: We take ten inch cuttings so that the liners have big enough tops to be handled by machine. If we take a ten inch cutting and we stick two inches of it into the two inch layer of sand, that leaves a top of eight inches. The first thing the cutting is going to do is to make roots in the sand which is warmer and better for rooting. But, if the cutting was lifted at that time, most likely it would not survive especially if it has gone through the summer and part of the fall with roots only in the sand. The cutting will die under refrigeration. Cuttings which have made new roots in the sand usually develop much stronger secondary roots that go into the soil. These are the cuttings which become hardier and more mature. I should add that after they are rooted and have some small roots going into the soil, we add fertilizer. I am not concerned about the tops, because we are going to cut them back to eight inches anyway.

The idea is that if you make a small cutting of three or four inches (which will root perhaps more readily than bigger ones), they will not make subsequent new growth nor become mature enough to go through the winter. With big cuttings it is just like a second year for them. The big cutting is not only going to root, but its top half is also going to harden up.

Holetich: *When do you start your fertilizing schedule?*

Fourrier: As soon as the cuttings are off the mist and onto their own roots I start fertilizing with 15-30-15 in order to develop a

much stronger root system. Again I am not concerned about the tops.

Holetich: *How many days does it take from the time you put them in until they are rooted and you apply fertilizer?*

Fourrier: It depends upon weather conditions, but usually six weeks.

Question: *How do you prepare your lilac cuttings? What is the technique?*

Fourrier: We remove a very thin slice of bark on the surface We try not to go into the cambium zone. Wounding is done about 1-1½ inches from the bottom end. We dip them so that we get better penetration of the hormone solution. Many times the rooting is going to occur right at the wound. Much later on, other roots will come out of the other side of the cutting, but there is going to be more action right there at the wound. If you do not wound the cutting, it will also root, but the roots will come at the end where the surface is much more restricted. Also another reason why we are wounding is that we want to speed up the rooting, because around here our growing season is very short and we have to remember that cuttings have to be hardeded up by the time we dig them in November. So we do everything we can to speed up the rooting even if it means wounding the cutting, fertilizing them and get them to harden up.

Question: *Is this process done for cuttings in the mist chamber or only in the sand?*

Fourrier: Either in the mist chamber or in the sand, we wound them, and more so for the French hybrids.

Question: *When roots go down into the soil, if it's in a mist chamber, the soil is extremely wet!*

Fourrier: Yes, in the mist chamber we have four to five inches of peat and perlite mixture, so as soon as the cuttings are rooted we have to pot them because they are in the bench. After they are potted, they will put on some top growth, which is necessary for them to really harden up.

Question: *Is there any value in the extract of willow to stimulate roots?*

Fourrier: One of the extract ingredients is indoleacetic acid (IAA) which is similar to IBA. It has a very short life.

Question: *Is vermiculite as good as sand for a rooting medium?*

Fourrier: I do not like to work with vermiculite because it holds too much water, which makes it really hard to control. The medium gets too soggy.

Question: *Do you use bottom heat?*

Fourrier: When you make cutting in the greenhouse under a tent at the end of May, you have to fight the heat. So you do not add any heat.

Question: *How do you apply rooting hormones, liquid or powder?*

Fourrier: We dip into a solution which we mix ourselves. This is a

very good question, because for hardwood cutting we prefer a powder. If you use a liquid hormone with hardwood cuttings, sometimes you get much quicker reaction at the bottom, but if you have too much water in the soil they will become very active and start rotting. And if there is not action in the top at that time, you get into trouble. Another point which should be mentioned is that NAA is different from IBA in the sense that it really gets cells to be very active, and if the medium is really too wet, your cuttings at best are really going to start swelling and the more water you use in your medium the more swelling you get. Eventually you will get rotting. So you have to be careful when using NAA.

Question: *What is the latest date you can take cuttings?*

Fourrier: We have taken semihardwood cuttings of certain lilacs with very good success.

Rogers: *What is the relationship of lilac bloom and taking cuttings? Have lilac blooms gone by when you take cuttings?*

Fourrier: No, just at beginning of bloom.

Rogers: *You're talking essentially at beginning of full bloom?*

Fourrier: Yes, but we have made cuttings after blooming in June. With some varieties we use stonger hormones. In fact we are experimenting with a kind of humidifier which works with some plants but not with all plants. With lilacs we found that if we take them when they are a little bit more mature (when the bark is darker green, but before turning brown) we get pretty good results.

Question: *Do you cut the leaves at all?*

Fourrier: No, the cuttings are from five to six inches long for the humidity chamber and ten inches long for open mist propagation. We remove the lowermost leaves from 2½-3 inches. We do not touch the upper leaves. If you take cuttings at the end of May the leaves are not really all that large. Also I think I should mention that the less damage you do to the leaves, the better you are with lilacs. If you only squash the leaves but you do not see any damage, there may be a slight crease or the surface is broken, this is an opening for mold or secondary organism to invade the tissue. We try very carefully not to injure any cuttings, trying to keep them loose all the time. And if there should be the least rupture to the leaf, water is going to invade the tissue and the leaves become water soaked.

Question: *Could you cut the lower leaves in half and just leave the upper pair of leaves?*

Fourrier: Well, everyone has his way of propagating lilacs. In the International Propagators' Society I have heard numerous talks on lilac propagation, and everyone has different recommendations. One will claim that he gets 100% rooting all the time. I do not claim that! In fact, I had a hard time to get what I am

getting now. With some people a certain method works well, but if I should try it, it might not work for me. It depends upon the way we handle the cuttings.

Heard: *If an application of a bound fertilizer is made just a couple of weeks before the cuttings were taken, would that stimulate rooting? Also were your open beds covered in any way?*

Fourrier: No, I do not think so. If you got just a couple of weeks of fertilization prior to taking cuttings, there is nitrogen which is not going to be processed. My experience is that if nitrogen has not been transformed into carbohydrate sugar, it might have a negative effect on rooting. As far as cuttings in open mist is concerned, open means open.

Bernie Fourrier, propagator of McKay Nursery, discusses his technique.

Micropropagation of Ornamental Plants

by Brent McCown, University of Wisconsin Department of Horticulture

I would like to go over the methodology that encompasses the subject of micropropagation. I will cover a large number of crops concentrating principally on ornamentals. Midway I will give a little bit more on lilacs, although I have not done much work on lilacs, but I believe I can make some pretty good guesses as to how lilacs will respond to tissue culture. Finally I will talk about some of the far-off things which are coming.

Growing Plants in Test Tubes

Basically what we want to do is utilize laboratory procedures where we have fine control of plant growth to accomplish certain purposes, in many cases multiplication, in other cases we have other objectives. As far as terminology, the general term which many people use is "tissue culture", that is, cultivating tissues in some kind of sterile environment. I use the term "microculture" which I think is a lot more appropriate when we are culturing plants is a micro sterile environment, a sub-heading of this is "micropropagation". The reason why we are doing this is for the clonal multiplication.

One of the things which you may not realize unless you have been active in the horticultural industry is how important microculture has become. Microculture is rapidly invading our horticultural industry. Most of us realize that it began with orchids about twenty years ago. A majority of prominent orchids already have spent a portion of their life cycle in test tubes. The major crop around the world which is produced by tissue culture is the foliage plant including flowering pot plants, for example, *Gerbera*, the Transvaal daisy, which you buy retail now. It has come out of tissue culture somewhere. There are many herbaceous perennials which have such slow multiplication rates of clonal reproduction that a large industry of micropropagation is rapidly developing.

Micropropagation is fast moving into the fruit business, both tropical and temperate fruit production. I would say that in a few years, you will not be able to buy a blueberrybush which has not come out of a test tube somewhere along the line. Similar activity is going on with peaches, apples, pears, *et cetera*.

We are beginning to get strong interest in woody ornamentals, especially flowering shrubs. A goodly percentage of rhododendrons and azaleas now are beginning to be produced in culture. Late behind Europeans, Americans are coming on rapidly. We are beginning to see strong application in shade tree and forestry micropropagation. Also vegetable breeders are becoming interested in the idea of micropropagation, primarily for hybrids which are difficult to produce from seed. In the past it has been uneconomical to produce a single lettuce clone except by seed. Nowadays it is becoming economically feasible by means of micropropagation.

Techniques of Micropropagation

We start with unique genotype, that is, a plant which is particularly valuable: possesses disease resistance, hs particular ornamental qualities, is especially productive of flowers, fruit or has good foliage. But since micropropagation is capable of reproducing plants by the millions, you must select only the best genotype for production. We like to begin with a young actively growing plant.

The first process is sterilization, removing fungi, bacteria and other contaminants, by dipping in a solution of household bleach (sodium hypochlorite). Next we place the propagule or explant, as it is technically called, into a cultural medium where we get initial growth and look for problems of contaminants. On the solid medium we want to stimulate growth of the preformed shoot meristems, either axillary or terminal, and then we transfer this continually. All we are doing is stimulating branching. We get one axillary bud in the initial explant to grow, and then we get the axillary to the axillaries to grow, and so on and on. The point is that we get a large number of shoots emerging from the medium, so that multiplication is by very strongly increasing the branching habit of the plant. Now we have got our plant in culture. This is the beginning of our production cycle. No longer do we have to be concerned with stock plants and their problems of maintenance. Now you must be concerned about the culture itself alone. Everything is under your control. This is essentially the beginning of the new agriculture. All of these cultures are grown in artificial light in a warehouse kind of environment.

In order to get a plant into this branching habit we go through various types of culture cycles. You take some shoots off the original plant and in four weeks you will have a whole new set of shoots. You harvest these while some of these go back into the culture medium which constitures the reiteration cycle. Once it gets into culture it always stays in culture, never returning to the original plant you got it from. You continually maintain it in culture for any length of time.

How do we get our plant out of culture and into the hands of the buyer? We take microcuttings, less than one inch in size, which came out of the culture bottle. These are the kinds of cuttings which we handle now. In order to get these small cuttings into actual plants it is necessary to go through a series of high humidity chambers. These plants come out at essentially 100% humidity, so they are very sensitive to drying out. We have to put them back into a high humidity environment. We package 400 microcuttings per square foot into easily handled containers and slowly reduce the humidity over a period of time. In doing so we get a microplant to act just like a seedling. From then on we can apply normal seedling technology. It is simply a matter of getting roots developed and slowly acclimating the cuttings to lower humidity and room temperatures.

The whole secret is never allow them to stop growing. They are extremely responsive to whatever we do to them.

Reasons for Micropropagation

1) To eliminate some of the problems with our current clonal production techniques, grafting, for example, and grafting compatibilities, plus, of course, understock sprouting.

2) To eliminate the need for a large number of stock plants, especially disease-free plants.

3) To speed up the process of plant multiplication from a single genotype. By conventional methods of plant multiplication it may take upwards of ten years to get a unique plant into production, but by micropropagation we can get a new hybrid plant out onto the market linerwise within a year.

4) The only method of multiplying certain types of plants: *Kalmia*, the mountain laurel, for example, is difficult to root by conventional methods; by microculture it is a weed. There will soon be a large number of *Kalmia* selections on the market, all of which are the result of tissue culture. Tropical plants are another group which cannot be multiplied in any other way except by tissue culture. A really large industry is being developed by tissue culturing tropical foliage plants. Another industry which is turning to micropropagation is the rose industry. As we all realize, there are many new rose selections coming on every year. It is an intensive well-organized program of rose introduction which required a cycle of from five to seven years. We can cut this cycle down to one year. There are now a number of major rose companies getting into micropropagation.

Disease and Pest Control

There is a large number of ornamental crops, both woody and herbaceous, especially in the tropics, which are susceptible to diseases, the solanaceous plants of the tropics, yams, potatoes, tomatoes, etc. We are now seeing major movements by international organizations to set up micropropagation laboratories to provide disease-free material to backyard garden production in the Tropics. It means the increasing of food productivity throughout the world by 20-30% without inventing any new production techniques at all.

5) Growers may now predict or control their production year 'round plus the potential for highly uniform propagules coming out of the system. There are, for instance, a number of people working with crops which are easily able to be multiplied by other ways who are going into tissue culture because they can program their inventories without having to worry about frost killing their stock plants. Programmability is extremely important.

6) Uniformity of propagules

We see propagules coming out of tissue culture in some cases superior to normal cases of propagation method. The P.J.M. rhododendron is an example. It is much better branched and more compact than plants produced by conventional techniques. There are

some producers of P.J.M. rhododendrons who will buy nothing but a tissue cultured rhododendron because of this fact.

What About Lilacs Under Tissue Culture?

I think that we have done enough work with ornamental plants to predict what might become of lilac culture by means of micropropagation. There are three laboratories currently working on lilac. Their results are going to indicate the predictions which I am going to make will come true. In getting a plant into tissue culture and on into commercially acceptable form as far as micropropagation goes there are three things to worrry about: 1) the stock plant you use and the form you get the stock plant in. In some cases getting a plant into tissue culture is a major problem because we hardly look at the plant in the correct form to begin with. 2) The next phase we have to go through is sterilization. We need to get stimulation of axillary buds. Finally, 3) Commercialization which for most of us is a research facility, the need for methods of maintaining microculture, and continual shoot production, and even more important we need to get new methods of root formation. Looking at these factors, is there anything that might be particularly important as far as lilacs are concerned? As with most of our woody shrubs commercialization has not been a major problem I do not expect it to be a major problem with lilacs.

There are several things we have to have in order to get a plant really successful in microculture. The first thing is the idea of juvenility-maturity phase change that plants go through. Seedlings are very juvenile passing through a very active stage of non-flowering growth. Eventually they reach the mature phase with flowers but much less growth. The juvenile phase is extremely important. Every plant that we are able to propagate by means of tissue culture is in the juvenile state of growth. So if you are considering a lilac which is in flower, somehow you must get it back into the juvenile stage again. With the lilac that is no great problem. We have methods of rooting them. We have grafting. We have root suckers. Each of these is a juvenile stage. So that is not a major concern. We can get initial juvenile tissue. However the type of shoot growth is also a major concern.

What is the general growth cycle of the plant? This seems to be very important in trying to predict if that plant is going to be successful in tissue culture, particularly with respect to seasonal growth patterns. There are two generalities we can state here. In one instance growth starts in the spring and continues growing as long as the weather remains favorable (willows, poplars, euonymus, privet, honeysuckle are examples). Other plants which we call epistatic are characterized by flushing growth: one flush each season (e.g. pines) or multiple flushes, growing very rapidly, stopping, another flush of growth, stop, and so on. Hemlocks behave this way, some rhododen-

drons too. The type of growth which your plant has is very important with respect to microculture. Continuous growth is easy. A plant that has continuous growth can go into culture very quickly. Epistatic plants, too, are easy if there are multiple flushes during the season.

What about lilacs? I think it depends upon where you are growing them, what state of growth the plant is in, and also the genotype you have. It varies all over the place. We are somewhere between these two types. Let us see what this means, using *Thuja* as an example.

In many cases we can stimulate juvenile growth in culture as with this mature explant from the arborvitae which came directly from a mature tree. Notice how we have juvenils growth coming off that. With *Amelanchier*, the shadbush, too, we have another dicotyledonous plant whose adult growth does not respond readily to culture. However, you can see a juvenile shoot coming out of this initial transplant. We take that juvenile shoot and culture it and that becomes the whole production of this particular *Amelanchier*. In fact, this particular *Amelanchier* had 100,000 plants produced this year from that one shoot! So, getting the juvenile shoot is pretty important.

Micropropagation Successes

Based upon the idea of various types of growth cycles, we may classify plants into a number of groups: (1) Feasible and easy to do, (2) Feasible but difficult to do, or (3) Very difficult but feasible. Lilacs might fall into one of these three categories.

Group 1. **Definitely Feasible.** Such plants have a continuous seasonal growth cycle and well developed axillary buds. Examples among the conifers are *Chamaecyparis, Juniperus* and *Thuja*, among the dicotyledons, birch, elm, willow, poplar and *Amelanchier*. All these plants fall into this group very nicely, responding very well to culture. Because they already have this continuous growth, we do not have to fight this growth response. Roses too are a good example. They will grow continually as long as the environment is favorable, and for that reason you can get roses into culture. Here is a rose six weeks out of culture. It has five leaves and already a flower in bloom. Tell me how it produces that! The potential is to have regular pot plants for Mothers' Day. An Englishman is working on that right now. Lilac does not fall into this category.

Group 2. **Feasible but difficult,** that is you have to know what you are doing. The plants are responding to culture, but not quite as easily as might be anticipated. These are plants with multiple growth flushes per season. They have well developed axillary buds. So that is no problem. Among conifers are yews, arborvitae and hemlocks. These are plants we can get into culture and can work with commercially. Rhododendron, too, has multiple flushes of growth per sea-

son, a plant that responds well to culture, but you have to know what you are doing.

Group 3. **Very difficult yet feasible.** This includes plants which are highly epistatic with but a single flush of growth per season. You may accidentally get another flush, but it is very rare. Why is there only one growth flush per season? It is because all the material that is going to produce that shoot had been laid down the previous season. It is characterized by a very large bud which expands and just forms another one, waiting another year to form the next bud. It also has well developed axillary buds. The spruces, Douglas-fir, pines, and I would say the lilac falls into this category. But one good example is the oak, especially our northern oaks which have but one major flush per year. How does oak respond to culture? This may be the way a lot of lilacs will respond to culture. We take that initial transplant, sterilize it and get it into a medium. It responds very nicely so far. Notice the terminal bud is already established and ther is a very young succulent shoot. Initially axillary bud growth starts and we say "Ha!" We are already to make our first $1,000,000 with this new introduction of red oak. But look! Each of these new growths have terminal buds established. The oak goes through its cyclic growth in culture. All the leaves expand, but they have stopped growing. It sets a terminal bud and sits there. What happens next? It deteriorates. Now we can take this initial shoot, play with it, be very kind to it, start the cycle all over again, but we are always fighting this stoppage of growth. Never quite get there. Put this into commerce, say 100,000 plants. Forget it!

Lilacs are going to be between the second group with multiple flushes and the third group where it is going to be very difficult under present technology.

Prospect in Micropropagation

A breeder who elects to work with red oaks is lost professionally because he can get only two or three generations in a lifetime. Is there any way we can untilize micropropagation to shorten this cycle? Several techniques seem to be coming along: Selection of a superior genotype from a seedling population, then using culture to capitalize on this superior selection is something which looks promising, and secondly, manipulation, or genetic engineering, particularly using somatic hybridization is particularly important. Given a large population - which every breeder has - can you select unique individuals one or two years old, put them into culture and multiply them and get them out for further selection on a much larger scale? The answer, I think, is "yes" in certain cases.

I have here a birch which was graded out of a large field of seedling birches. We graded it for vigor. These birches obviously came out as much more vigorous. If we take this plant, put it in culture, produce a large number of them and put them back out in the field,

would they still display this tremendously greater vigor *vis-a-vis* those similar siblings, or is this something that is illusory? Can we do it only once? So we took samples of this and samples of the others, put them in culture, and put them out in the field the next year. This is an example of what it is, a "super" dwarf birch. The plants that we graded out small remained small through the next several seasons. So far as vigor in a seedling population goes, one can select very early for vigor. And vigor is one thing you want to select for in culture. Now we have large numbers of this vigorous plant we can distribute worldwide in one year to get other parameters like disease resistance. To advance very rapidly out of a seedling population utilizing culture and selction in the early stages is important. If you have a disease that you can select for, like mildew, in a very yough seedling population, this is the way to do it.

Genetic Engineering

The other method that I am sure you have been reading a lot about is genetic engineering. This is something that paper companies are very much interested in, because this is one way they can capitalize on modern technology to advance much more rapidly the genetic quality of their trees. And I can see this coming into our own ornamental crops when the techniques become a little more reasonable in cost. Most of the techniques involve the protoplast. These are plant cells that have had cell walls removed. They do not have anything around them but the membrane. Here are protoplasts from a leaf. You can see the chloroplasts in them. They are green. Where do you think these protoplasts are from? Petals. Yes, floral petals. You can get chloroplasts from any living tissue. The reason I show you these is that they are going to show what is going to happen next. This is protoplast from *Episcia* of the African violet family, and African violet itself which normally are sexually incompatible. You cannot normally make a cross between these two species, but in culture we can fuse the cells. Potential now is a hybrid out of the system where we have a fusion of genetic material from these diverse genera. The advantage now is that we do not have to worry about the sexual cycle, or about a plant getting mature before we do breeding. We have a young seedling whose cells we can fuse directly without having to wait for flowering and seed setting. With woody plants this is very critical because of the long life cycle. There are many problems with this method, nevertheless what we want is for these cells to divide, to reform cell walls. The cells are no longer round; they are cell walls being divided into small cells, which become a callus. We get to differentiate a plant and who knows we may get a lilac which has good fall color!

The main thing I want to leave with you is that here microculture is at hand. In a decade or two these things will be commonplace.

Professor Brent McCown discusses tissue culture propagation of woody ornamentals.

Question and Answer Period

Q. Ed showed us a birch tree yesterday which is 25 years old and it has no borer problems. How come?

A. That tree has been attacked many times. The problem with that tree is that every branch is extremely mature. In fact, every branch has catkins on it all the time and we have not yet found a way of getting that plant back into the juvenile phase. Often grafting reverts a plant into juvenility by getting new shoots to grow, but taking shoots directly off that tree and putting them into culture does not work.

Q. Is it not true of any woody plant which is especially hard to propagate?

A. There are two ways of multiplication by tissue culture. One is by axillary buds which I have described. The other is by taking individual cells like the callus I just showed you and cause all those individual cells to multiply. Here the potential is unreal. From one cutting, for example, you could generate 100,000 plants per year. Using axillary bud multiplication, you could probably get from ten to thirty million per year. But by using callus in tissue culture, you could probably get thirty billion. Who needs that many? But with the callus method you have the potential of numerous genetically abnormal plants developing, since every plant develops from a single cell.

Q. How do you avoid virus problems?
A. In most of microculture this is no problem so long as you are relatively sanitary in your manipulation because you do not have any vectors (white fly, leaf hoppers, aphids) to transmit the virus. But if you should have a virus infected plant and put it into shoot culture, 99% of the time it will contain the virus all through the process. Fortunately there are methods of eliminating the virus before you get it into culture. It is another culturing technique using meristematic tissue after first treating the plant with heat or other agent. You excise the meristematic tip of the growing shoot. It seems that in the newly dividing cells the virus has not had a chance to infect it. You get those cells out and into multiplication, and, of course, you test whether it has the virus or not by classical methods. So you must start with virus-free plants or go through some exotic procedure to insure freedom.
Q. Are there any trade restrictions to prevent flooding the market with micropropagated plants?
A. Plant patenting in this country provides legal protection, but in non-treaty countries, such as Israel, Egypt and Taiwan, the grower is not protected. What are the international restrictions for shipping microcutlures? Probably none, because there is no disease in that foreign country. We are opening up true international horticulture. The prospect is for setting up multimillion dollar national laboratories in Egypt and Taiwan to service the international market. Currently the market is into tropical foliage plants. Woody ornamentals are on the horizon. The P.J.M. rhododendron is going to become a real flood on the market. Already the price is depressed and soon will be zero because it is so easy to produce by microculture. Success will come to the efficient producers.
Q. Where is microculture developed, in universities or in private laboratories?
A. Initially mostly in universities, but is now moving very rapidly into private laboratories, the reason being that commercial nurseries are willing to fund such projects. A lot more patenting is going on. In fact, there is a firm coming to the United States buying up nothing but germ plasm! The one way to beat the opposition is to own patents and enforce them. When this firm develops its U.S.. laboratory in three or four years time it will be in a position to come on the market with a lot of new clones (genotypes) selected by various individuals. It will have the market sown up.
Q. Two or three years ago we were at the Dow Chemical Company's garden at Midland, MI. They were doing this kind of propagating with scientists at Michigan State, working with red maple. How did that work out?
A. It was not commercially successful. In maple tissue culture we get excessive callusing. If you take a shoot and put it into culture you get large calluses which inhibit shoot growth. The more you

speed up the culture the more calluses you get. We do have ways of inhibiting callus formation, but it also inhibits shoot growth. This is a major research project. Someone along the line ought to fund it at the university level and solve the problem. For most of the maples this is a major problem.

Q. You mentioned that there were some laboratories working on lilac?

A. Bruce Briggs nursery at Olympia, WA, Virginia Hildebrandt at Guelph, and one in Italy. (See article below reprinted from *HortScience*, Ed.)

Q. We all know the high price of long-stem roses. Can you foresee cheaper roses in the near future?

A. The costs of energy and labor to produce long-stemmed roses are the big items, therefore a change in price will be insignificant.

Q. Are we assuming correctly that the sterile conditions in your laboratory would be comparable to those of a hospital operating room?

A. Not *my* laboratory! There are certain procedures which demand sterility and there are certain laboratories which take this beyond what is needed (smocks, footgear, etc.) . This is more of a training procedure for technicians to be careful. However there are instances in which this is important. If I were considering a site for a laboratory I would choose to locate it in the North because of possible contamination by spores and fungi in Florida and southern California, whereas in the North on a day like this nothing grows, including fungi.

Q. What would be the cost of such laboratories?

A. This depends upon how much capital you are willing to invest, probably not less than $15,000.

A. I have heard of a figure of $60,000.

With a commercial laboratory you need a room for preparation (media making, bottle cleaning, etc.) equipped with pH meters, hot plates, etc., secondly, a transfer room with sterilized air, a chamber and transfer hood, thirdly, a room for manipulation of plant material coming out of culture (sticking in cuttings, mailing room), fourth, room for growing cultures, and fifth, room for rooting or acclimating (usually a greenhouse). That means five rooms plus equipment. The major cost is the structure.

Q. Are there laboratories around the country which solicit business for propagating?

A. Yes, there are several types of institutions set up for tissue culture laboratories, but more commonly tissue culture laboratories are a part of an established horticultural operation. Micropropagation laboratories *per se* are just beginning to make a profit. The reason is that their products are just now coming into acceptance. There is fierce competition because they are all bidding for the same market: 50-100 thousands of propagules per week in order to

make it work. A second type of operation is that attached to an ongoing facility where they will take outside contracts as a sideline.

Q. In the long run doesn't the contract propagator spite himself?

A. There is a lot of demand out there yet. That is a typical marketing operation in a free society. When the product does become accepted, the demand will be enormous. We are talking about the majority of horticultural crops going through microculture. Presently we have been dealing with perhaps 2% of the total market.

Q. How soon will lilacs be propagated by tissue culture?

A. Getting a plant into micropropagation is a kind of serendipity. Some practitioners have a high degree of success, others using the same technique do not. The main limitation on this system right now is trained personnel, people who really know what they are doing, people who are not only able to manage a laboratory, but also personnel.

I know several laboratories which have worked on *Amelanchier* and failed, but there are two or three laboratories who have done it rather quickly and very successfully. A lot of it is to know what to do at the right time.

Except for those lilacs which are very epistatic, I would say that lilacs could be done with our established techniques, but you do have to know what you are doing. There are probably a large number of genotypes, probably more hardy, probably more northern ones which are more adaptable to our northern areas which will have to wait for some way of overcoming this cyclic phenomenon.

Q. What nurseries are there on the West Coast who are set up for micropropagation?

A. In the United States as a whole I know of 25. There is a consortium in California set up to do fruit trees and maples. Talk to your local county agricultural agent. Another thing you do not have to regionalize micropropagation. I can ship cultures worldwide. Find a person who will do it for you and whom you have confidence in, and not necessarily one at your back door, even though it may be convenient to have him there.

Q. Will micropropagation open up possibilities of interspecific hybridization?

A. Somatic hybridization has potential but not as strong as you might wish. There still seems to be some inhibitions in cell cycles and chromosome doubling to inhibit it. But the important thing is it opens up the possibility of getting some particular chromosome pieces.

Q. What was the special interest in the *Amelanchier*?

A. There are some beautiful selections of *Amelanchier*. It is a nice ornamental plant which does not easily propagate clonally, right Bernie?

Fourrier: Softwood cuttings.

In Vitro Propagation of *Syringa vulgaris* 'Vesper'

By Virginia Hildebrandt[1] and Patricia M. Harney[2], Department of Horticultural Science, University of Guelph, Guelph, Ont., Canada N1G 2W1

Abstract. **Explants of actively growing shoot tips from greenhouse-grown plants of 'Vesper' lilac *(Syringa vulgaris* L.) initiated new shoots in 2-4 weeks on a modified Murashige and Skoog (MS) revised medium plus 0.1 mg/liter 6-benzulamino purine (BA) and either 0.125, 0.25, or 0.5 mg/liter indoleacetic acid (IAA). These shoots were transferred for multiplication to the same medium but with 7.5 mg/liter BA and 0.1 mg/liter B/napthaleneacetic acid (NAA). In 5-6 weeks about 6 shoots, 12-15 mm in length, had been produced per explant. There was no increase in the number os shoots by placing them in either a horizontal or inverted position compared to upright. Although excised shoots would root *in vitro*, rooting was more successful in vermiculite in a plastic-covered flat.**

Although the lilac may be propagated by softwood cuttings taken 10-14 days after flowering (13), only 35-60% of some lilac cultivars root successfully. As a result, many cultivars are propagated commercially by grafting onto seedling lilac or privet rootstock (5). The recent success with *in vitro* techniques in the propagation of a number of woody species (4, 7) suggested the possibility of using such techniques with lilacs.

Cultures of 'Vesper' lilac were initiated from actively growing shoot tips collected from 1½ to 2-year-old greenhouse-grown plants. Explants, 5- to 10-mm-long, were prepared from these shoot tips by removing the leaves and soaking them for 5-10 minutes successively in 0.5% sodium hypochlorite (10% commercial bleach) with one drop of Tween 20 per 50 ml and 2 times in sterile distilled water. The explants were cultured on solid medium containing MS salts (12) and per liter: 100 mg myo-inositol, 1 mg nicotinic acid, 1 mg pyridoxine HCl, 1 mg thiamine HCl, 30 g sucrose, and 7 g agar at either pH 4.5 or 5.6. Three different concentrations of IAA (0.125, 0.25 and 0.5 mg/liter) and 0.1 mg/liter BA were added to this basic medium. The medium was dispensed in 10-ml aliquots to 25 x 150-mm test tubes and in 15-ml aliquots to 35-mm, square sampling bottles, autoclaved at 1.4 kg/cm^2 and 121°C for 15 min, and then cooled at room temperature for 24 hr before use. Shoot tip cultures were incubated at 27 to 28°C with a light intensity of 41 $\mu Es^{-1}m^{-2}$ for 18hr/day.

After 2-4 weeks in initiation medium, explants produced elongated shoots either from the apex or from lateral buds. The percentage of explants initiating shoots showed little variation with the least response at 0.5mg/liter, pH 5.6 (Fig. 1).

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[2]Professor

Preliminary experiments showed that low BA favored the production of callus, and, as noted by Uhring (16) and Minocha (11), this callus did not differentiate. About 90% of the samples in a shooting medium with 7.5 mg/liter BA and 0.1 mg/liter NAA had multiple shoots. The mean number of shoots increased with each subculture up to the 4th. There was considerable variation from one subculture to another and among replicates of a subculture. By the 4th subculture, production ranged from 1 to 9 per explant, with shoots smaller than 2 mm in length unable to survive transfer.

Upright or horizontal position of the explants in the media had no effect on either the number or length of shoots produced with either 0.1 mg/liter IAA or NAA (Table 1). A significantly greater number of shoots was harvested from explants in the IAA medium regardless of their prosition, but shoot length was significantly greater in the NAA medium for upright position and highly significantly greater for horizontal. Because NAA is usually more active than IAA and less prone to biological degradation, it may have augmented natural apical dominance, hence decreasing the shoot number and accounting for the increased length of those shoots which had formed. Lloyd and McCown (9) found a similar inverse effect between shoot number and shoot length in mountain laurel.

Although breaking apical dominance by inverting explants in the medium had been effective in increasing shoot proliferation in pear (6), this technique did not yield a significantly greater number of shoots from lilac explants (Table 2). The shoots from upright explants were significantly longer than those from inverted ones which often had thickened stems and were twisted and difficult to separate from one another.

The time at which shoots were harvested from explants significantly affected shoot number and length. By week 4, shoot number had nearly doubled compared to weeks 2 and 3. Shoots were almost twice as long at week 6 as at week 2.

Rooting media containing NAA at 0.05, 0.1, 0.2, and 0.4 mg/liter in combination with 0.25, 0.5, 1.0, and 2.0 mg/liter BA were tested for their influence on root initiation. After 5 weeks, up to 58% of harvested shoots, 10-30 mm in size, had rooted *in vitro* at the concentrations of BA and NAA tested (Fig. 2). The lack of strong correlation between rooting and increased NAA concentration and/or decreased BA concentration may indicate that other rooting or environmental factors also were important (2, 8).

The effect of sucrose concentration on rooting was investigated by comparing 1, 2, 3, and 4% sucrose in media containging 1.0 mg/liter BA and either 0.1 or 0.2 mg/liter NAA. Sucrose concentrations below 3% lowered the perecentage of rooting (Fig. 3), although Cheng and Voqui (3) found 0.5% optimal for rooting douglas-fir shoots. Skirvin and Chu (15) maintained 3% sucrose for both shoot proliferation and rooting of roses; this concentration appeared to be optimal for lilacs as well.

Shoots of varying sizes were treated with 0.1% IBA talc and placed in moistened vermiculite in a mist bed or in flats covered with a clear plastic lid in a growth room at 27°C and a light intensity of 65 μE $s^{-1}m^{-2}$ for 18 hr/day. Rooting in vermiculite after dusting the base of the shoot with 0.1% IBA was more successful than *in vitro* rooting, with as many as 81% of the shoots producing roots (Table 3). The highest rooting *in vitro* was 58% (Fig. 3). Shoots placed in vermiculite in a flat covered with a plastic lid rooted in 3-4 weeks, compared to 6-8 weeks for those in a mist bed. The data show that the best rooting was obtained on shoots larger than 11 mm in the plastic-covered flat (Table 3), with no difference in rooting ability in the 11-mm = 31-mm range except a drop at 21-30 mm, which is probably not significant.

After 3-4 weeks, rooted shoots were potted in 7.5-cm^2 pots in moistened 1 peat: 1 perlite: 1 vermiculite (by volume) and placed in a mist bed for 2-3 weeks, after which the plants were moved to a shade house and gradually exposed to full sunlight. Plants could be transplanted from vermiculite to a soil mix 4-6 weeks earlier than could be done with *in vitro*-rooted plants. Another advantage was that, after transplanting, few roots were lost from plants rooted in vermiculite, but a large number of roots were lost from *in vitro*-rooted plants which had to be induced to root again. *In vivo* rooting of shoots has been found to be more successful than *in vitro* rooting in a number of other horticultural species (1, 10, 14).

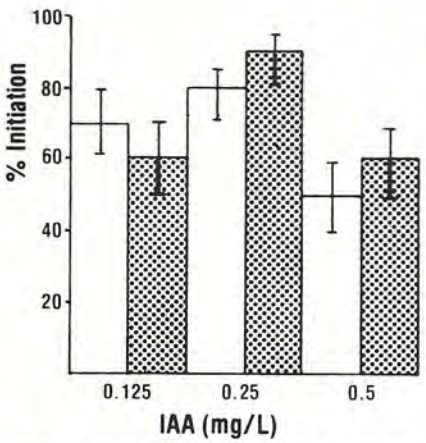

Fig. 1. Effect of IAA and pH on shoot initiation in 'Vesper' lilac. Media pH = 5.6 (open bars) on 4.5 (shaded bars). Vertical lines represent 95% confidence limits.

Table 1. Multiplication of explants placed in either an upright or horizontal position in media containing 7.5 mg/liter BA and 0.1 mg/liter NAA or IAA.

Explant position	No. shoots/explant (± SE)	Shoot length (mm ± SE)
	IAA	
Upright	8.3 ± 0.36*	8.6 ± 0.30
Horizontal	9.3 ± 0.42*	8.5 ± 0.25
	NAA	
Upright	5.9 ± 0.34	11.0 ± 0.32*
Horizontal	6.0 ± 0.34	11.2 ± 0.31**

* **Differences between response to IAA and NAA significant at 5% (*) or 1%(**) level by *t* test.

Table 2. Differences in number and length of shoots from explants in an upright or inverted position in media containing 7.5 mg/liter BA and 0.1 mg/liter IAA.

Explant position	No. shoots/explant (± SE)	Shoot length (MM ± SE)
Upright	9.4 ± 0.97	21.9 ± 0.48*
Inverted	8.0 ± 1.00	14.4 ± 0.48

*Difference in shoot length significant at 5% level by *t* test.

Table 3. Rooting after 4 weeks in vermiculite of shoots of various sizes dusted with 0.1% IBA.

Shoot size (mm)	No. tested	Rooting (%)
≤ 5	30	17
6-10	30	17
11-15	21	76
16-20	23	78
21-30	20	60
≥ 31	21	81

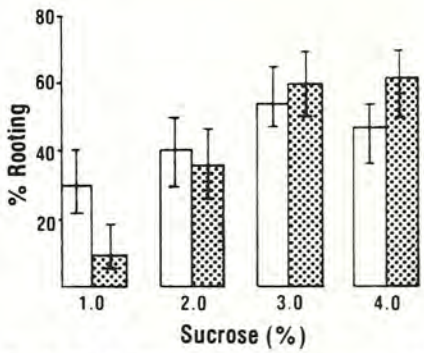

Fig. 2. Effect of NAA and BA on *in vitro* rooting of 'Vesper' lilac. Vertical lines represent 95% confidence limits.

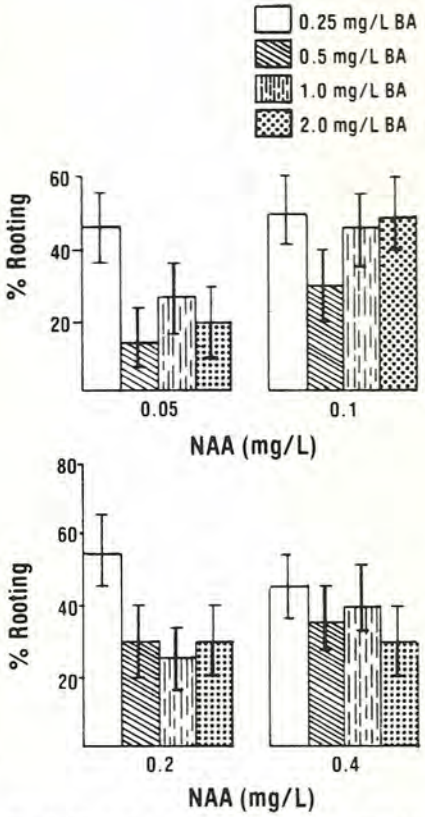

Fig. 3. Effect of sucrose and growth regulators on *in vitro* rooting of 'Vesper' lilac. Growth regulators on *in vitro* rooting of 'Vesper' lilac. Growth regulator concentrations were 0.1 mg/liter NAA and 1.0 mg/liter BA (open bars) and 0.2 mg/liter NAA and 1.0 mg/liter BA (shaded bars). Vertical lines represent 95% confidence limits.

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Annual Meeting of the International Lilac Society, May 13, 1983

SECRETARY'S REPORT

The meeting was called to order at 8:10 by President Rogers who first requested a moment of silence in honor of Dr. John C. Wister, who died during the winter.

The treasurer's report (see below) recorded a balance on hand in all accounts at $10,467.49.

Colonel Schenker reported on the **1982 Auction** which netted the Society $273.75 U.S. dollars, and $247.00 Canadian dollars ECR. The list of lilacs available for auction on Saturday, May 14, 1983 was read. Persons bringing lilacs to be auctioned in the future are requested to send a list of cultivars to Mr. Holetich before the convention so that he can bring appropriate slides to show at the auction.

Nominations Committee members are asked to put their names, addresses and phone numbers on a pad being circulated. Those who do not wish their phone numbers published will indicate by circling the number.

Dr. Rogers announced that if enough members **travel by air** to the convention, there may be an opportunity to get a reduced air-fare. Eight members flew to Madison this year.

Future **convention sites** were announced by Mr. Martin:

1984 - Burlington, VT on May 31, June 1 and 2. Host will be Mr. Thomas Chieppo.

1985 - New York City. Host will be the Brooklyn Botanical Gardens.

1986 - Hamilton, Ontario. The host will be the Royal Botanic Garden.

1987 -

1988 - Rochester, New York. This will be on the 100th anniversary of Highland Park.

Mr. Chieppo explained the 1984 Convention arrangements and presented the possible gardens to visit in the area. The Shelbourne Museum will be the place to see old lilacs. Mr. Chieppo's estate will be visited to see young plantings of lilacs. Possibilities of post-convention tours include an invitation to Dr. Clark's "Birchwood" on Lake Winnipesaukee in New Hampshire, the plantings at the University of New Hampshire, and other members' home gardens located in the area.

Propagation and Distribution: The program is over-subscribed. There were 56 orders of which 23 could be filled on a first-come, first-served basis. Distribution was made to 17 states covering

the country from New Hampshire in the East to Oregon in the West and North Dakota in the North to Alabama in the South. The last of the plants will be mailed out after the convention.

Publication Committee: Copies of the "Upton Scrapbooks of Lilac Information" are available for $22.50. This and other publications will be advertised through the *Lilac Newsletter.*

Membership: Mr. Holetich reported that there are now 340 members, 292 of whom are from the USA, 37 of whom are from Canada, and 11 of whom are from other countries. About 40% of the total members are delinquent with their dues at this time. International members all have complimentary memberships, but they are required to maintain a dialogue with the Society and contribute to the publications. There is a resurgence of interest in the lilac as evidenced by magazine articles and larger offerings by mail order nurseries. Changes in the election procedure of the board of directors are being considered and will be announced at a later date.

Election Committee: Attachment No. 7

327 ballots were distributed to members. 113 ballots were returned, of which 5 were invalid. Re-elected to the board of directors for three years are:

Mr. John Carvill, Latham, NY
Mrs. Nancy Emerson, Delhi, NY
Mr. Walter Eickhorst, Naperville, IL
Mrs. Pauline Fiala, Spencer, OH
Mr. Lyle Littlefield, Orono, ME
Mr. Winfried Martin, Mentor, OH
Dr. Joel Margaretten, Leona Valley, CA
Mrs. Marie Chaykowski, Mantua, OH

Dr. Rogers thanked the convention committee for their fine job in taking care of our needs and making the convention run smoothly. He also thanked them for arranging to have the rain fall only in the morning, allowing us to enjoy the arboretum in the afternoon.

The meeting was adjourned at 8:50 p.m.

INTERNATIONAL LILAC SOCIETY
FINANCIAL REPORT
MAY - 1983

Balance brought forward		$ 11,796.12
RECEIPTS		
Membership	$ 2,176.50	
Auction	273.75	+ (247.00 ECR)
John Wister Memorial	20.00	
Donation Toward Proceedings (R. Clark)	500.00	
Upton Scrapbooks	132.16	
Interest	502.47	
Interest on $2,000 certificate 2½ yrs.	847.71	
TOTAL RECEIPTS	$ 4,452.59	
		4,452.59
TOTAL		$ 16,248.71
EXPENDITURES		
Letterheads and Envelopes	$ 72.51	
Nominating Committee	80.25	
Convention Advance (Kenneth Wood)	500.00	
Lilac Refund	270.20	
Monthly Mailings (newsletter/P.F.)	49.01	
Mailing Permit - Env. for Newsletter Envelopes for Proceedings (J.F.)	359.00	
Advance for Permit and Mailing (J.F.)	262.00	
Merks Jewelry - Trophies	342.60	
Postage for Upton Scrapbook (W.O.)	38.14	
General Postage (W.O.)	44.19	
Proceedings - 1981	1,152.19	
Proceedings - 1982	2,122.33	
National Council of State Garden Clubs	15.00	
1,000 #10 Envelopes (W.O.)	47.04	
Rolls Stamps for due bills (W.O.)	85.08	
Mailings and Envelopes (J.F.)	250.00	
Slides for Film Education (O.R.)	75.80	
Editor's Expenses (M.S.)	33.88	
TOTAL EXPENDITURES	$ 5,781.22	
		5,781.22
TOTAL ALL ACCOUNTS		$ 10,467.49

CASH BALANCE RECONCILIATION

Life Membership	$ 2,000.00
Legal	331.96
By-Laws	210.25
C.C. Clark Fund	400.00
Upton Scrapbook	2,366.73
Hans Conried Memorial	50.00
Education and Research	3,195.29
John Wister Memorial	20.00
Operating	1,893.26
TOTAL	$10,467.49

Respectfully submitted,
Marie F. Chaykowski
Treasurer I.L.S.

May 1982

President's Award

presented to

NATIONAL CAPITOL COMMISSION OF OTTAWA, CANADA

for its outstanding use and landscaping with lilacs and for the excellence of its planning and maintenance of the lilacs so as to make them an outstanding shrub for public viewing and beauty.

Accepted by Ed Hulobowicz. See *Lilacs* 11 (1): 47. 1982.

presented to

AGRICULTURE CANADA OTTAWA RESEARCH STATION

for developing, growing and displaying such a large selection of *Syringa* cultivars in an outstanding Arboretum and its surrounding campus and ornamental grounds, and for educating the general public as to the beauty and use of the lilac as a landscaping shrub of great merit.

Accepted by Dr. Vern Burrows. See *Lilacs* 11 (1): 47. 1982.

Award of Merit

presented to

Arthur R. Buckley, Curator Emeritus of the Dominion Arboretum, Ottawa

for outstanding work with the lilac in his 35 years as curator of the Dominion Arboretum and for the efforts in gathering an outstanding lilac collection, and for his promotion of the lilac as a garden writer throughout Canada making it an outstanding landscape and garden shrub, and for his special focus on the lilac in his book, "The Trees and Shrubs of the Dominion Arboretum".

See *Lilacs* 11 (1): 46. 1982.

presented to

Trevor J. Cole, Curator of Plant Collections, Ottawa Research Station

for promotion and research with the lilac for better cultivars for Cananda, and for outstanding work to establish and maintain a most excellent collection of lilacs for public viewing at the Research Station, and for promotion of the lilac in Canada, the United States and Europe, and for outstanding work to promote the Society.

See *Lilacs* 11 (1): 46. 1982.

presented to

Colonel Hanssen Schenker, Freedom, New Hampshire

for his outstanding work in behalf of the International Lilac Society in promoting the lilac, the Society, and for outstanding work as the promoter of the Annual Lilac Auction as principal auctioneer, and for an excellent collection of garden lilacs for public viewing and education established with his wife, Sally Schenker, at their home in Freedom, New Hampshire.

See *Lilacs* 11 (1): 48. 1982

May, 1983

Honors and Achievement Award

presented to

Dr. Joel Margaretten, Leona Valley, California

for his outstanding service to the International Lilac Society as a member of the Board of Directors and as a Pacific Regional Vice President in which offices he has done outstanding work in promoting the lilac and the Society, in obtaining new members, in informational presentations and lectures about the lilac especially for the California and Pacific areas. For his monumental work in growing lilacs under new and most difficult circumstances, for the promotion of the lilac as cut-flower commerce. For a most outstanding and unique collection of *Syringa vulgaris* cultivars and species lilacs unmatched in the Far West, and for his growing of the newest and most outstanding cultivars for public viewing and information.

President's Award

presented to

The University of Wisconsin Arboretum, Madison

for developing and maintaining an outstanding lilac collection for public viewing and knowledge, and for hosting the 1983 International Lilac Convention.
Received by Catharine Bradley, Arboretum Director.

presented to

Bickelhaupt Arboretum, Clinton, Iowa, and to **Robert and Frances Bickelhaupt,** co-founders of the Arboretum

for devoting time, resources and their knowledge in promoting ornamental horticulture, but especially for establishing at the Arboretum a select collection of outstanding lilacs for public education and viewing.

presented to

The Albert Lea Nursery and to **Don Wedge,** Albert Lea, Minnesota

for a truly outstanding love and devotion in promoting the lilac in global distrubution and for searching out new and outstanding lilac cultivars, and for promotion of the lilac and the Society in lectures, promotions and in making newer lilacs available to the general public.

Award of Merit

presented to

Edward R. Hasselkus, of the University of Wisconsin, Madison

for his contribution toward developing a magnificent lilac collection at the University of Wisconsin and for educational promotion of the lilac in his classes and in the field.

presented to

Herbert H. and Gertrude F. Trautman, Trautman Nurseries, Franksville, Wisconsin

for unceasing search for outstanding lilacs presented to lilac growers since 1924, including imported cultivars of the then rare lilacs of V. Lemoine & Fils, Nancy, France, and for making available to lilac nurseries and arboretums these outstanding cultivars.

presented to

John E. Voight, Retired Director of the Boerner Botanical Gardens, Milwaukee County, Wisconsin

for his lifelong devotion to public Horticulture and for his outstanding efforts in developing an excellent lilac collection open to the public at the Botanical Gardens.

presented to

Kenneth W. Wood, Madison, Wisconsin

for his educational work in promoting the lilac in public tours, in educational promotions for the University of Wisconsin, in publications and information on the culture of the lilac and for heroic services to the Society at its Mid-west Convention at Madison, May 1983.

Effect of Another Unusual Spring on Lilac Bloom at Hamilton

By Charles Holetich

Springtime in eastern North America is certainly capricious. Of the dozen Annual Meetings of the Society, always scheduled at least a year in advance, only a very few coincided with peak bloom. Frost damage to lilacs and to other spring flowering trees and shrubs was reported in this journal for 1981 (vol. 10, pp. 24-30). The past spring, 1983, was unusual at the Royal Botanical Gardens in that a number of early hybred cultivars, *S. x hyacinthiflora*, reached their peak of bloom *after* many of the French Hybrid cultivars peaked. The amount of bloom generally was less, but colour intensity, especially in the purple and reddish flowering groups, was noticeably pronounced. Fading rapidity among some of the early hybrids, e.g. 'Maidens Blush' and 'Norah', was so great that in three days time they changed from purple at bud opening to pink, or purple to light lilac respectively.

In southern Ontario early hybrid lilacs usually bloom from seven to ten days prior to peak bloom of the French Hybrids, but in 1983 this pattern was disturbed. Out of sixty-one early hybrid cultivars in the Katie Osborne Lilac collection most did bloom in their usual early fashion, all, that is, except for the following twelve:

Cultivar name	*Florets on May 30*	*Their stage on June 7*
'Bountiful'	at bud stage	well past the peak
'Esther Staley'	2/3 open	well past the peak
'Grace Mackenzie'	1/6 open	at the peak
'Maureen'	1/2 open	just past the peak
'Pink Cloud'	1/3 open	just past the peak
'Pink Spray'	at bud stage	just past the peak
'Pocahontas'	1/3 open	well past the peak
'Purple Glory'	at bud stage	at the peak
'Splendour'	1/6 open	just past the peak
'Summer Skies'	1/4 open	just past the peak
'The Bride'	1/6 open	just past the peak
'White Hyacinth'	1/3 open	at the peak

In comparison, sixty French hybrid cultivars out of a total of 436 in the collection reached their peak bloom on June 3rd, and the majority did so on June 5th or 6th. The earlier sixty cultivars with one-half to two-thirds of florets open on June 3rd were the following:

'Amor'	'Burgemeester Voller'	'Coerulea Superba'
'Arthur William Paul'	'Charles Joly'	'Colbert'
'Bertha Phair'	'City of Longview'	'Compte de Kerchove'

'Condorcet'
'Dappled Dawn'
'De Humboldt'
'De Saussure'
'Desfontaines'
'Dr. Von Regel'
'Duc de Massa'
'Dwight D. Eisenhower'
'Edna Dunham'
'General Sherman'
'Gloire de la Rochelle'
'Gortenzia'
'Hippolyte Maringer'
'Jean Bart'
'Jules Simon'
'Kremlevskie Kuranty'
'Lemoinei'
'Le Printemps'
'Leon Gambetta'
'Lewis Maddock'
'Marc Micheli'
'Marlyensis Pallida'
'Marechal Foch'
'Marshal Vasilevski'
'Maurice de Vilmorin'
'Maximowicz'
'Mildred Louette'
'Mme. Henri Guillaud'
'Mrs. Harry Bickle'
'Ogni Donbassa'
'Ostankino'
'Patrick Henry'
'Paul Hariot'
'President Carnot'
'President Harding'
'Pride of Descanso'
'Prinzessin Klotilde'
'Rene Jarry-Desloges'
'Renoncule'
'Ronsard'
'Rubra Insignis'
'Schermerhornii'
'Sholokov'
'Silver King'
'Stadtgartner Rothpletz'
'Sumierki'
'Versaliensis'
'William C. Barry'

I wish I could give you the reason why
But I am unable no matter how hard I try!
I am hopeful that one day I may,
Today, however, I could only hope and pray!

Eugene Coffman, Bellevue, Iowa (right) asks the expert, Charles Holetich, Hamilton, Ontario (center) to identify some early hybrid lilacs while "Col." Hanssen Schenker, Freedom, NH (left) looks on.