INTERNATIONAL LILAC SOCIETY, INC.

VOL.3,NO.1

LILACS

CONVENTION
PROCEEDINGS
1974

LILACS is a publication of the International Lilac Society, Inc. and is published in four issues: Fall, Late Winter, Spring and a Convention Proceedings Issue.

All Publications are benefits of membership: $5 individual; $10 Sustaining; and $100 Life Membership. Extra copies of LILACS are $1.50; Proceedings at $2.50. Refer request to Editor: I.L.S., 7359 Branch Rd, Medina, Ohio 44256

Membership:
Walter Oakes, Secretary I.L.S.
Box 315, Rumford,
Maine 04276

Manuscripts, Archives, and Lilac material welcome- refer to Editor, John L. Fiala

LILACS CONVENTION PROCEEDINGS 1974

IN THIS ISSUE

Front Cover: Charles Holetich, of The Royal Botanical Gardens and Convention Chairman, examines a bush of White Swan in the Katie Osborne Lilac Collection.
(credit for the excellent photos of this issue go to M. Golanch of R.B.G.)

Alderman Patricia Ford of Hamilton presents I.L.S. President Robert Clark with the City's symbolic "Builder Bonnett" at banquet.

HAMILTON, OUR FIRST CANADIAN CONVENTION – MAY 1974

By Robert B. Clark
Meredith, New Hampshire

Every dooryard along the way to Hamilton was abloom with lilacs, false blue, red-purple and white. I enjoyed them from southern New England all across upstate New York and the Niagara peninsula to Hamilton, Ontario. The abundance of bloom at Rochester's Highland Park foretold the spectacle of the Royal Botanical Garden's Katie Osborne Memorial lilac collection. And we were rewarded by good weather as well as the gorgeous lilacs in 1974.

Besides the old reliable performers at Highland Park during Lilac Time festival, I discovered Clarke's (1949) 'Bountiful', an early hybrid 8-10 foot upright shrub completely covered with soft gray-blue nodular clusters. This was exquisite. Henceforth, I shall be watching its yearly performance, hoping to include it among my select lilacs. Also at Highland Park this year I saw Dick Fenicchia's 'Rochester' hybrids. It will be two or three years before these plants become adjusted to their new site. However, when I.L.S. meets again at Rochester, we are assured that these F_2s will add a glorious note to an already famous collection. A few I.L.S. members also inspected the 'Rochester' F_4 seedlings which are blooming for the first time in quantity this spring. We salute Dick Fenicchia and the Monroe County parks department for their continued efforts to bring choice lilacs before the public.

Early arrivers at Hamilton were greeted in our Holiday Inn hospitality room on Friday evening. The Directors repaired to an adjoining room for a brief meeting prior to Convention's opening on Saturday morning at the Royal Botanical Gardens' headquarters building. Dr. R. J. Hilton, president of RBG's board of directors, chaired

Dr. W. Cumming, Morden, Manitoba, and Mr. and Mrs. Louis Fiala of Spencer, Ohio, leave bus for headquarter meeting.

the opening session in which four scientific papers on current lilac research and one review were presented, principally by I.L.S. members.

First speaker was Dr. James Pringle of the Royal Botanical Gardens who has raised hybrid lilacs bearing "blood" of four species. Dr. Pringle reported on his studies in the section Villosae, the late blooming lilacs. Delegates had the opportunity on Sunday afternoon to inspect some of these plants in the nursery. Because the seedling population is large and the plants are becoming crowded in the nursery, Dr. Pringle is finding cooperation among city officials to plant lilacs along roadsides where these hybrid seedlings may develop fully and receive further evaluation.

Second speaker was Dr. David G. Nielsen of the Ohio Agricultural Research and Development Center, Wooster, Ohio, who reported on his research on controlling lilac borer, an insect pest of lilacs and plants of the olive family. Dr. Nielsen is an entomologist whose specialty is the study of insects which inhabit the lilac. His investigations are centered around biological control measures, especially the inhibiting of breeding by the wasp-like moths. We shall look forward to hearing of Dr. Nielsen's progress and hope he will honor us again when we meet in Ohio a few years hence.

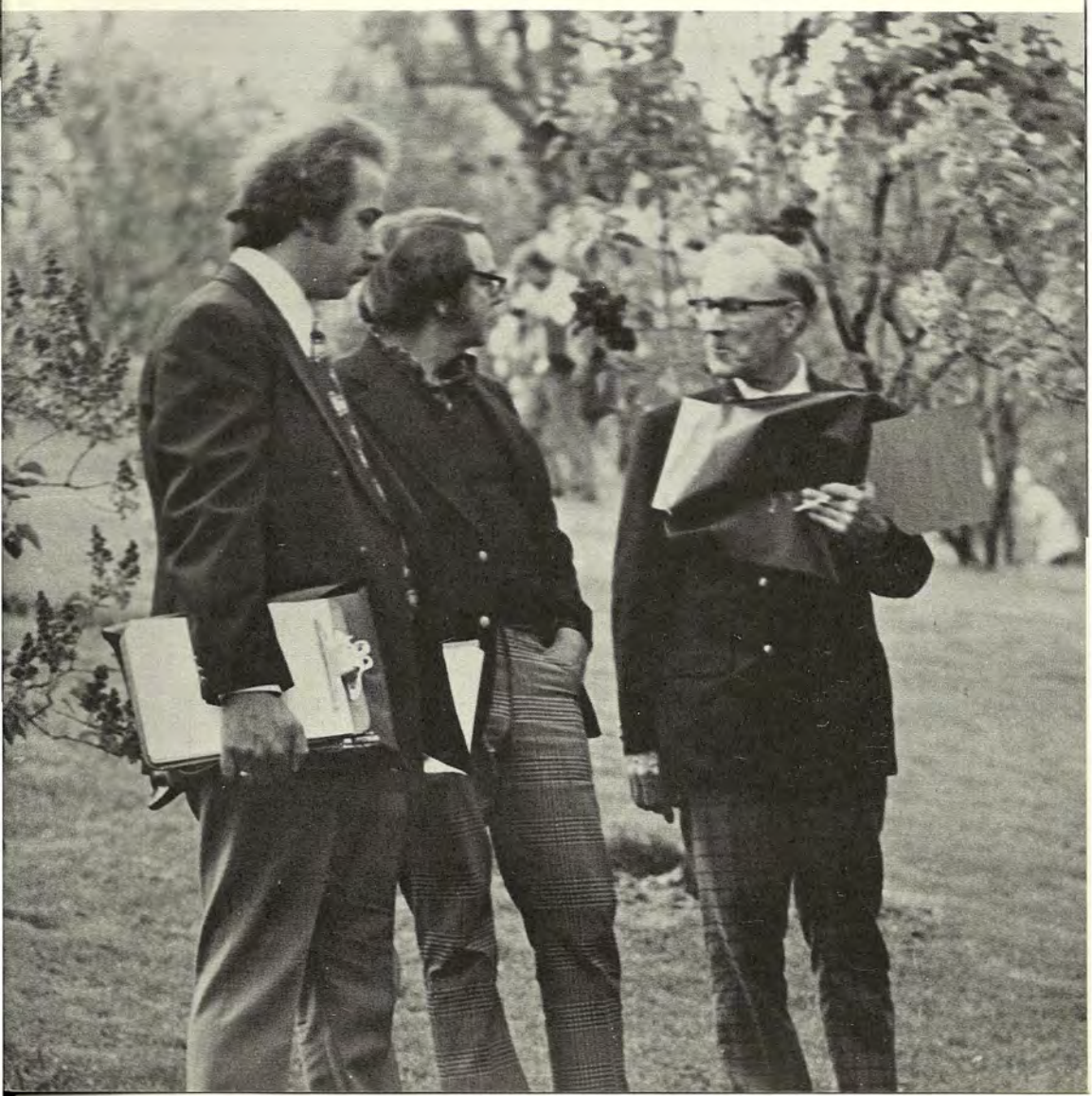
Dr. William Cumming of Morden, Manitoba, and regional vice president for Western Canada, reviewed the history of Canadian lilac breeding in an absorbing report of the works of the late Isabella Preston of Ottawa and the late Dr. F. L. Skinner of Dropmore, Manitoba. Dr. Cumming recounted how Miss Preston depended upon the Arnold Arboretum for genetic materials to breed plants for the northern climates. Dr. Skinner likewise used hardy lilacs as parents for hedge and screen plants for the Great Plains. Canadian plant breeding of lilacs has extended for some eighty years from James Dougall of Windsor, Ontario, in the 1880's to the very present day.

Dr. Owen M. Rogers of Durham, New Hampshire, and New England's regional vice president, spoke briefly of his experiences in observing lilac pollination and told of his techniques of artificial pollination. Since pollination is basic to successful lilac breeding, I believe our practicing genetecists might with profit consider a workshop for delegates in the not too distant future.

Through the occurrence and qualitative analysis of waxes in various species or cultivars of lilacs, Professor Louis M. Lenz of Winnipeg, Manitoba, showed the degrees of relationship among lilacs. His topic was entitled "Application of Chemosystematics to Lilacs", but his pictorial profiles were quite disarming. I should like to examine them at leisure to study the closeness of certain taxa hitherto accepted among students of lilacs.

From about four o'clock until six delegates spent a lovely afternoon in the Katie Osborne Lilac Garden, a dell only three miles from downtown Hamilton yet in another world so remote and secluded it appears bathed in pastels, birdsong and dappled shade. Here the delegates enjoyed the beauties of the lilacs in a garden setting, or dug right in to selecting and comparing cultivars in order to compile data for Frank Niedz's color committee. We look for a summary report in a forthcoming issue of LILACS. Suffice to say that whereas in 1972 at Rochester we saw early hybrids and at Boston last year the late hybrids were just appearing, this year at Hamilton we found the early midseason "French" hybrids in peak bloom while the later very uncommon lilacs showed only unfolding buds, their full glory to bloom after the convention. By 1974 the Katie Osborne Lilac Garden contained 514 cultivars and species. Significantly more lilacs are in RBG nurseries against the time they become large enough for outplanting and a site is prepared to receive them.

Dennis Sauve of Ottawa Agricultural Station Staff, L. Dennis of R.B.G. and Clare Short, Mid-West Vice President from Elyria, Ohio, discuss cultivars in the Katie Osborne Collection of R.B.G.



Following a barbecue that hit the spot, we listened to Ray Halward tell how he propagates lilacs at the Royal Botanical Gardens. Ray joined the staff of RBG after World War II and is widely known for his ability to put roots on plants and grow them on to outplanting size. He also is a leader in the field of horticultural therapy, particularly in its application to rehabilitation of the handicapped. He inspired us to try our hands at multiplying lilacs. In fact he auctioned off his samples to the benefit of I.L.S.'s research and publication funds to the tune of $200.

A Lilac "Kaleidoscope" concluded the full day's program in which Leonard Slater showed slides of 'Agincourt Beauty' and 'Slaters Elegance'.

On Sunday morning buses took us to Niagara Falls and down the parkway to the Niagara Parks Commission school of horticulture, floral clock, the nearby Lilac Collection, afterwards to a picnic pavilion for lunch. Although temperatures were coolish for many delegates, lilacs were in peak bloom. Two collections were visited. The first, at the School of Horticulture, dates from the mid-1930's (see list) and consists usually of two plants each of several cultivars per bed with spring bulbs and groundcovers. The grafted shrubs are now mature and often exceeding 10 feet tall.

Dr. Radcliffe Pike, Durham, N.H., and William Emerson of Delhi, N.Y., view lilac plantings at Niagara Agricultural School grounds.

I.L.S. Secretary, Walter Oakes, Rumford, Maine, points out a 'lilac sport' to Charles Holetich of R.B.G..

But they bear evidence of having been infested with lilac borer, in consequence of which the blooms, although abundant, were slightly smaller and somewhat paler than normal. Delegates were surprised that certain cultivars, such as 'Firmament' and 'Delepine' showed occasional branches whose blooms appeared to be "sporting", that is, the thyrses were slightly larger, the florets more intensely colored. Animated discussion followed each discovery, but no consensus was reached. I trust that with experience and visiting other notable collections in the years ahead, we shall be able confidently to judge and assign rightly the actual factors contributing to a lilac's floral expression.

North of the Floral Clock is a 9½ acre collection of commercially available contemporary lilacs (see list), planted in odd-number groups in raised beds with broad turf walks which lead one or a large party of visitors from one vantage point to another. A visit to this Lilac Garden at blooming season is transporting. Colors, fragrance, sky, clouds, breezes, birdsong, all conspire to make a late May-early June visit a memorable experience.

Upon returning to the RBG Administration Building we held the briefest of business meetings, committee reports I'm sorry to say were omitted. Election of eight directors for three year term was held: Messrs. Hilton, Margaretten, Niedz and Vrugtman were reelected, the four new directors are Mrs. Emerson, Messrs. Eickhorst, Pike and Sauve. The newly constituted board met to organize, returning the officers for the one year term: Clark, president, Oakes, corresponding secretary, Lois Utley, recording secretary, and Nancy Emerson, treasurer; and Fr. Fiala, editor for 3 year term. (The office of executive vice president is for five years and is held by Bill Utley.). Region 2 vice president, the Mid-Atlantic States, is filled by Franklin Niedz.

While the board of directors meeting was going on, delegates returned to lilac dell and the RBG nurseries to observe lilacs once again and to complete the Color Committee's survey of favorite lilacs 1974.

The Lilac Banquet, held at Hamilton's Holiday Inn Victoria and Albert Room, this year was sponsored by the City of Hamilton. Host was Alderman McDonald

Mr. McDonald presented Alderman Patricia Ford who represented Mayor Victor H. Copps, and, after presenting your president with a bright yellow Builder Bonnet hardhat and certificate symbolizing Hamilton's position as "builder of the nation". Mrs. Ford spoke briefly

The Awards Committee, chaired by Fr. Fiala, cited the following "friends of the lilac" and members with placques (see elsewhere for citations).


WELCOME
to the 3rd
International Lilac Society


to the 3rd

BANQUET ADDRESS – MAY 26, 1974
TO THE INTERNATIONAL LILAC SOCIETY

by Dr. Leslie Laking, Director
Royal Botanical Gardens
Hamilton, Ontario

GREETINGS!

I have been wondering how many of you would have been at the International Horticultural Congress held at the University of Maryland in 1966. At the grand finale of that congress, Dr. Harold Fletcher, at that time Director of the Royal Botanic Garden, Edinburgh, was guest speaker. Among those seated at the head table were Dr. & Mrs. H. B. Tukey. Dr. Tukey, a distinguished American Horticulturist known to many of us, was President of the Congress.

In his opening remarks, Dr. Fletcher told of a congress committee meeting held the previous year which ended in a pleasant, indeed gay occasion, where he was enjoying himself immensely in the company of the charming Mrs. Tukey. He took great pains to embellish the description of his carrying-on with this lady, who incidentally, was seated next to the speaker. He told how Dr. Tukey would glance across at them — in apparent disapproval on several occasions. Finally, as if he could bear it no longer, Dr. Tukey approached them, grim, deep in thought. Dr. Fletcher

poised defensively for a reprimand, looked up. Dr. Tukey said – "Now I know who is to be principal speaker at the finale of the Congress — it is you Harold Fletcher".

"I was so relieved", Dr. Fletcher explained to the frolicking crowd, "that I accepted forthwith, and here I am".

With me, it was different — the blame falls directly on the shoulders of Father Fiala, who was taking quite a chance in making his proposal to the Directors of I.L.S. He knew very little of my performance capabilities under circumstances such as this.

It so happens that I have something to say to lilac enthusiasts, but first I wish to convey to you the story of something good which resulted from an expressway development.

At Royal Botanical Gardens, a selection of French Hybrid Lilacs were planted by Hamilton City Parks on a waterside site along the easterly shore of Cootes Paradise Marsh, before Royal Botanical Gardens was established. This came under Royal Botanical Gardens jurisdiction in 1941. This modest collection was expanded considerably during the 1950's, in fact space for expansion had already been exhausted when news of expropriation for expressway purposes reached us.

Many gardens and arboreta have had to contend with such aspects of progress. Here we fared better than others, and as far as the future of lilacs at Royal Botanical Gardens is concerned this development can be considered a 'fortuitous happening'. The present site was selected and during the winter of 1959-60, site preparation began. The Lilac Collection, comprising 230 plants, was moved to the new dell in the late autumn of 1960, and it became immediately obvious that as far as site is concerned, Royal Botanical Gardens had a winner. Although readily accessible, the dell provides a sense of seclusion which visitors continue to enjoy. It is difficult to imagine that the centre of a metropolitan area is no more than 3 miles away 'as the crow flies! Occasional tall trees have been left in the garden and the effect of a partial upper story is one of the delights of this garden.

Development continued through the first half of the 1960's. We found many friends in the lilac world eager to share their material with us. Our propagator plied his trade, found success with cuttings under mist and our collection continued to expand.

In the mid 1960's, these efforts were being observed by an interested Hamiltonian, Colonel Colin Osborne, who after a process of learning and heightened appreciation, requested that he be allowed to adopt the project as a memorial to his late wife Katie. He provided a fund to reimburse Royal Botanical Gardens for development costs to-date, and provided a fund to continue development for a further 5 years, making it possible to include the adjoining westernmost slopes of the dell.

In addition, an endowment was established, the revenue from which makes a contribution towards maintenance, annually.

The Katie Osborne Lilac Garden came into being at Royal Botanical Gardens and in 1973, the endowment was substantially increased by Col. Osborne's daughter, the late Mrs. Julia Kingstone.

The collection in the public garden numbers 516 species and cultivars (May, 1974), with many more in both the propagation department and nursery. Lilacs are displayed on the banks of the dell, leaving ample space for vistas, and the floor of the dell has deliberately been kept open for people, for concerts and for enjoying the spectacle.

The Katie Osborne Lilac Garden has in this short time, become a spring attraction at Royal Botanical Gardens, with an appeal beyond anything we had dared to imagine. Its influence in the world of lilacs and particularly in promoting lilacs as garden plants, has just begun.

And it is this specific aspect — *lilacs as garden plants*, where we have so much to learn, to observe and above all, to record. To illustrate, permit me to turn to another favorite woody ornamental. During nearly 28 years at this institution, I have been observing woody ornamentals in all seasons, at all stages of development. Consequently I have come to some conclusions about plants, particularly woody plants which have a good potential for humanizing our landscape.

I have watched yellow-wood trees develop, and have interested many gardeners in this native of Tennessee which grows so well here. But it was not until about 6 years ago that I made some observations which heightened my interest in this species. If you have observed this tree from beneath you too, many know that there is much more to it than beautiful chains of white flowers in June.

Looking up into a good sized tree, all the small branches become shaded out; the clean, smooth, light-grey bark of the trunk and structural branches can be followed up to the canopy — the canopy itself is almost entirely peripheral, creating an extremely beautiful light pattern. This is truly a tree to sit under!

A fortnight ago, something else was observed for the first time. The expanding leaves seemed to have stopped growing; indeed they had been destroyed by hard late frosts. As warm weather returned, dormant buds were forced into growth and today foliage is expanding apparently normally. The tree had the means to cope with this situation.

Yellow-wood has been growing here at Royal Botanical Gardens since 1930, yet this little episode serves to point out that our detailed knowledge of ornamental plants, particularly woody plants is often very limited, and if by chance it is considerable, it is often tucked into the corner of the observer's mind. Rarely are such details presented in print.

This raises the pertinent question, what really is the nature of our interest in woody ornamentals? We horticulturists too often get caught up in the collection aspect — cultivars become collector's items per se. The casual gardener observes that he has the white, but he still would like the deep purple and that creamy-coloured lilac. For some, this is enough.

The point is that we who are working with Lilacs must keep to the fore that Lilacs are primarily part of our garden flora, and we must work more diligently towards providing more precise information about individual cultivars, species and hybrids as landscape plants.

What kind of a plant does it make?

The natural form taken by an individual cultivar is important in a garden.

What about the reliability of bloom each spring?

e.g. Mme. Francisque Morel is magnificent this year but there was scarcely a truss on our plants a year ago. Is this irregular flowering pattern inherent in certain cultivars? If so there are some cultivars which should be ditched, because it is not always possible to convince gardeners that a lilac is worth growing even if it fails to bloom in alternate years. Gardeners are more demanding than collectors. It may be his only lilac!

Above all, we need to know what impact the plant has when in bloom. Has it 'presence' in the garden? This has to do with floriferousness, the size and display potential of flower trusses, and of course, the carring power of colour. We are looking at the total landscape potential of the plant, hence foliage too is of consequence as well as susceptibility to problems.

This raises the thought that we may be too pre-occupied with colour of florets as an aid in identification, and less concerned with the cultivar as a garden plant. We need this kind of information too!

When I am asked for a recommendation — i.e. the best deep purple lilac. My reaction is to hedge because I simply do not know the total picture of many cultivars. I may make the mistake of recommending one with lovely trusses of bloom, but a completely hopeless bush. Knowing that the gardener is acquiring a plant for a full year effect, year after year, I feel that I must have more information. Then the final problem arises. You know the answer, but your "pet purple lilac" is not readily available!

We who are working with lilacs can make a contribution on all counts, and this ladies and gentlemen is my challenge. Let us accumulate more information about Lilacs as garden plants, and above all let us get it into print.

Leslie Laking,
DIRECTOR
ROYAL BOTANICAL GARDENS

INTERNATIONAL LILAC SOCIETY AWARDS . . . 1974

The Highest Award of the Society

'HONOR AND ACHIEVEMENT AWARD'
was presented to PROFESSOR ALBERT E. LUMLEY
For his very notable contribution in promoting the Lilac by his outstanding Private Collection open for the public appreciation of the Lilac and for truly outstanding, estate landscaping with the Lilac.

For his dedicated services to the Lilac Society as an outstanding member of its Board.

For his propagation of newer forms of Lilacs making them available to the public. (Lilac Land, Amherst, Massachusetts, U.S.A.)

The Society's Scientific-Horticultural Award

'THE DIRECTORS' AWARD' was presented to DR. JAMES S. PRINGLE
For dedicated work in Interspecific Hybridization of the Lilac and in research and selectivity to produce better hybrids of the late blooming forms. (Royal Botanical Gardens, Hamilton, Ontario, Canada)

The Society's Arboretum, Public/Private Garden Award

'THE PRESIDENT'S AWARD' was presented to
THE ROYAL BOTANICAL GARDENS at Hamilton, Ontario, Canada
For outstanding work in presenting one of the finest collection of Lilacs for public display and promoting knowledge of newer cultivars and hybrids.

For outstanding landscape education in the use of lilacs in park landscaping and encouraging their planting.

For promoting research and scientific study and hybridization of Lilacs.

The Society's Award for Outstanding Personal Work or Special Service

'THE AWARD OF MERIT' (six special awards were presented)

to **GEORGE DALBY**, Superintendent of Horticulture, Niagara Parks Commission, Ontario, Canada
"For exceptional work in promoting, planning and designing one of the truly 'outstanding Lilac Gardens' as an example of real beauty in lilac landscaping."

to **RAY HALWARD**, Propagator, Royal Botanical Gardens, Hamilton, Canada
"For dedicated work in propagating and securing newer forms of lilacs for Public Gardens and making them available to lilac collections internationally."

to **CHARLES HOLETICH**, Royal Botanical Gardens, Hamilton, Canada
"For outstanding work in landscape use of the lilac in an outstanding collection and for meritorious work in promoting the Lilac and the Society both in Canada and in the United States."

to **DR. LESTER LAKING**, Director, Royal Botanical Gardens, Hamilton, Canada
"For outstanding efforts in your work as Director in promoting the use and research of the Lilac and making the Lilac collection an international attraction at the Royal Botanical Gardens."

to **FRED LAPE**, Esperance, New York, U.S.A.
"For outstanding service to the Lilac Society and the Public by his scholarly translations of Lilac literature, thus making it available for the general public and extending the findings of Lilac research to others."

to **ANN ROBINSON**, Cherry Hill, Delhi, New York, U.S.A.
"For dedicated and outstanding work in promoting the Lilac in Private and Public Plantings in Delhi, N.Y., and for outstanding service to the Society as a member of the Board of Directors."

SPECIAL COMMENDATION was given to **Charles Holetich**, Chairman of the Convention for his outstanding work.

To the Entire Staff at the Royal Botanical Gardens for a truly outstanding convention.

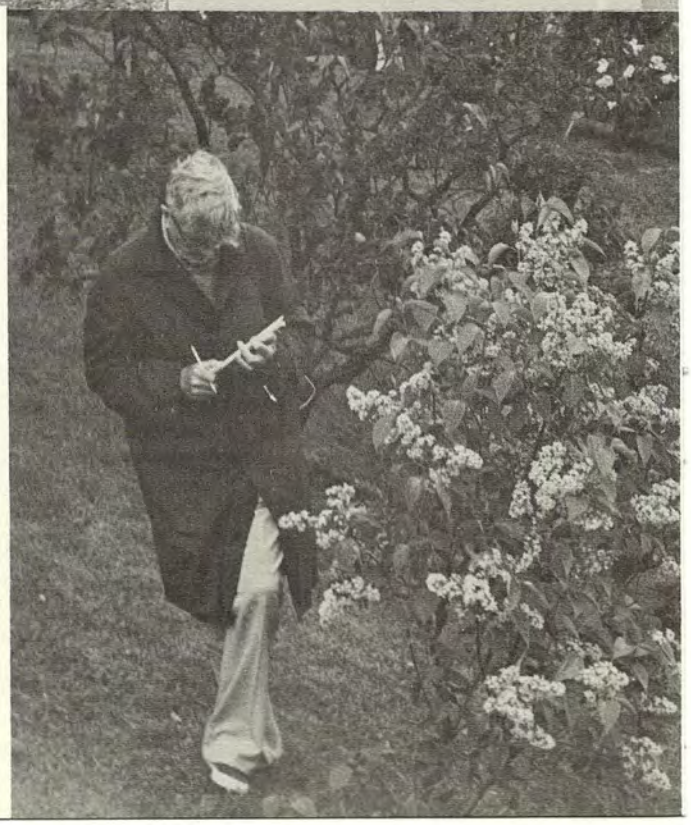
SPECIAL GRATITUDE AND THANKS were extended to the City of Hamilton, to all members of the Canadian Chapter of the International Lilac Society and to all the Guest Speakers whose presentations are in this Journal.

1

2

3

1 – Dr. James Pringle receives Award
2 – Dr. Leslie Laking accepts Award
3 – Award winner Ann Robinson
4 – Surprised Ray Halward of R.B.G.
5 – Merited Award presented to Charles Holetich of R.B.G.



Top left: Dennis Sauve, William Collins (Cole Nursery, Circleville, O.) and Walter Eickhorst, Morton Arb., Lisle, Ill.

Top right: Ann Robinson, Delhi, N.Y., and Mollie and Patrick Pesata, Medina, Ohio.

Lower right: Dr. L. C. Erickson, Riverside, California examines lilacs in dell.

(all photos — M. Golanch R.B.G.)

INTERSPECIFIC HYBRIDIZATION EXPERIMENTS IN *SYRINGA* SERIES *VILLOSAE* AT THE ROYAL BOTANICAL GARDENS

by James S. Pringle,
Royal Botanical Gardens
Hamilton, Ontario
(recipient of I.L.S. Directors' Award for Hybridizing Lilacs)

Syringa series *Villosae*, the Late Lilacs, is represented in cultivation by many selections of interspecific hybrid origin. Among these selections are the cultivars of *S.* X *prestoniae (S. villosa* X *S. reflexa)*, which have become much appreciated in recent years. Other well-known examples include *S.* X *henryi (S. josikaea* X *S. villosa)*, the earliest cross made in this series, and hybrids between *S. josikaea* and *S. reflexa.*

Although *S. josikaea*, *S. reflexa*, and *S. villosa* remain most prominent as the progenitors of popular selections, other species in series *Villosae* have been employed in breeding programs. Late Lilacs currently available include hybrids derived from the three species named above in various combinations with each other and with *S. sweginzowii*, *S. tomentella*, and *S. wolfii.* Not all of the possible combinations involving these species have been made, however, and some species which are rare in cultivation have not been included in any breeding program reported to date.

For the past several years, a breeding program in series *Villosae* has been conducted at the Royal Botanical Gardens, utilizing plants in the Katie Osborne Lilac Garden. Among the hybrids produced are a number of new combinations involving the six species named above, as well as hybrids derived from *S. emodi* and *S. yunnanensis*, species of which no hybrids have previously been reported.

Results are now known for breeding experiments involving all but two of the ten species in series *Villosae.* From the data now available, it appears highly probable that all of the species in this series are interfertile, and that any cross between species in this series will result in viable seedlings, all or most of which will produce fully fertile flowers.

For practical considerations, series *Villosae* may be divided into two groups. One group is characterized by large leaves and relatively dense inflorescences, and includes *S. emodi*, *S. josikaea*, *S. komarowii*, *S. reflexa*, *S. villosa*, and *S. wolfii.* The other group has smaller leaves and more open inflorescences, and comprises *S. sweginzowii*, *S. tigerstedtii*, *S. tomentella*, and *S. yunnanensis.* Crosses between a species from each of these groups have produced some especially attractive hybrids, including cultivars of *S.* X *nanceiana (S.* X *henryi* X *S. sweginzowii)*, and the hybrids

known as "*S. swegiflexa*" *(S. sweginzowii* X *S. reflexa)* and "*S. sweginbretta*" *(S. sweginzowii* X *S. villosa).* Selections from the progenies of such crosses may combine much of the gracefulness and fineness of foliage, which characterizes the small-leaved species, with denser foliage and showier, less open inflorescences inherited from the large-leaved species.

In the experiments conducted at the Royal Botanical Gardens, such crosses produced some of the most attractive seedlings, although other individuals in these progenies were excessively open in both foliage and inflorescences. In addition to the desirable combination of traits noted above, it was found that hybrids having a small-leaved species as one parent were superior in respect to their shedding faded corollas promptly, before they became discolored. This was especially true of hybrids derived from *S. sweginzowii.*

Syringa yunnanensis appears to have especially great potential in ornamental plant breeding. Unlike *S. sweginzowii* and *S. tomentella*, which have pale corollas, *S. yunnanensis* has corollas of an attractive shade of pink. Consequently, among hybrids between large-leaved and small-leaved species, those with *S. yunnanensis* as the small-leaved parent are likely to have more richly colored corollas than those of their counterparts derived from *S. sweginzowii* or *S. tomentella.*

Syringa X *prestoniae* 'Isabella' was found to be especially desirable for crossing with small-leaved taxa. This cultivar is notable for its exceptionally large, dense inflorescences. Its hybrids with small-leaved taxa, therefore, include a relatively high proportion of plants which are acceptable with respect to the size and density of their panicles. However, like any progeny with a hybrid as one of its own parents, the progenies derived from *S.* 'Isabella' generally exhibited considerable variation in a number of traits.

Syringa emodi is another species not previously used in breeding programs. Nearly all of the hybrids of which this species was a parent were relatively upright in habit, and bore erect, proportionately narrow panicles with strongly ascending branches, even when the other parental species was characterized by panicles of very different shape and carriage. *S. emodi* appears to have relatively little potential value in plant breeding, from indications among the first-generation hybrids. These plants were relatively low in total flower production, the panicles were relatively small, and the corolla colors of most of these plants were either pale from the first, or rapidly faded. The upright branching pattern of these shrubs, which is inherited from *S. emodi*, may, however, be useful in some landscaping situations, if, through further breeding, it can be combined with good flower production and color.

Traits characteristic of *S. josikaea* frequently appeared among hybrids of which *S.* X *henryi* was a parent, although some of them were not evident in the plant of *S.* X *henryi* used in these experiments. These traits, which often appeared in combination, included densely villous leaves and panicle branches, and corollas with strongly ascending, hooked lobes. Marcescent corollas presented more of a problem among hybrids of *S.* X *henryi* than in the other progenies obtained from these experiments.

Among the most promising progenies produced in these experiments, from the viewpoint of ornamental horticulture, were the hybrids of *S. yunnanensis* with *S. villosa* and *S.* X *prestoniae* 'Isabella'. These shrubs combined much of the graceful habit of *S. yunnanensis* with larger and denser panicles and larger corollas. Corolla color was variable in these progenies, and included some especially attractive light to medium pink and purplish-pink shades. Attractive plants were also obtained by crossing *S. yunnanensis* with *S.* X *henryi*, although corolla colors were generally paler among these hybrids.

Another especially interesting progeny was that of *S.* X *henryi* X *S. reflexa.* Many of these plants were relatively compact, increasing in height more slowly than plants in other progenies, but nevertheless being relatively quick to come into bloom.

The foliage of many of these plants was an attractive yellowish-green. The panicles were generally small, but were produced in sufficient quantity to compensate for their lack of size. The corollas of most plants were light to medium purple, some being among the "bluest" found in the various progenies, but others being more rose-purple. Corolla shape was highly variable, with the lobes ranging from strongly ascending to reflexed. Corollas with ascending lobes cannot be regarded as being preferable to those with spreading lobes, but are unusual and effective in the landscape. A shortcoming of many plants in this progeny was that of persistent corollas which turned rust-brown.

Large panicles of flowers with attractive light pink corollas were produced by a number of plants in the progenies of *S.* 'Albida' *(S. sweginzowii* X *S. tomentella)* crossed with *S.* X *henryi* and with *S.* X *prestoniae* 'Isabella'. These plants were generally intermediate in habit between *S.* 'Albida' and the large-leaved, dense-panicled taxa with which it was crossed. The dark green leaves of intermediate size which many of these hybrids bore were notably attractive.

Among the hybrids of *S. emodi*, those with *S.* X *prestoniae* 'Isabella' were most desirable horticulturally, because of their relatively large panicles. Corollas in this progeny were mostly pinkish-violet, with the expanded lobes often being much paler than the tubes or buds. The relatively variable progeny of *S. emodi* X *S. sweginzowii* also included some choice plants, with good-sized panicles intermediate between those of the parental species in density. Corolla colors included some attractive shades of lilac-pink.

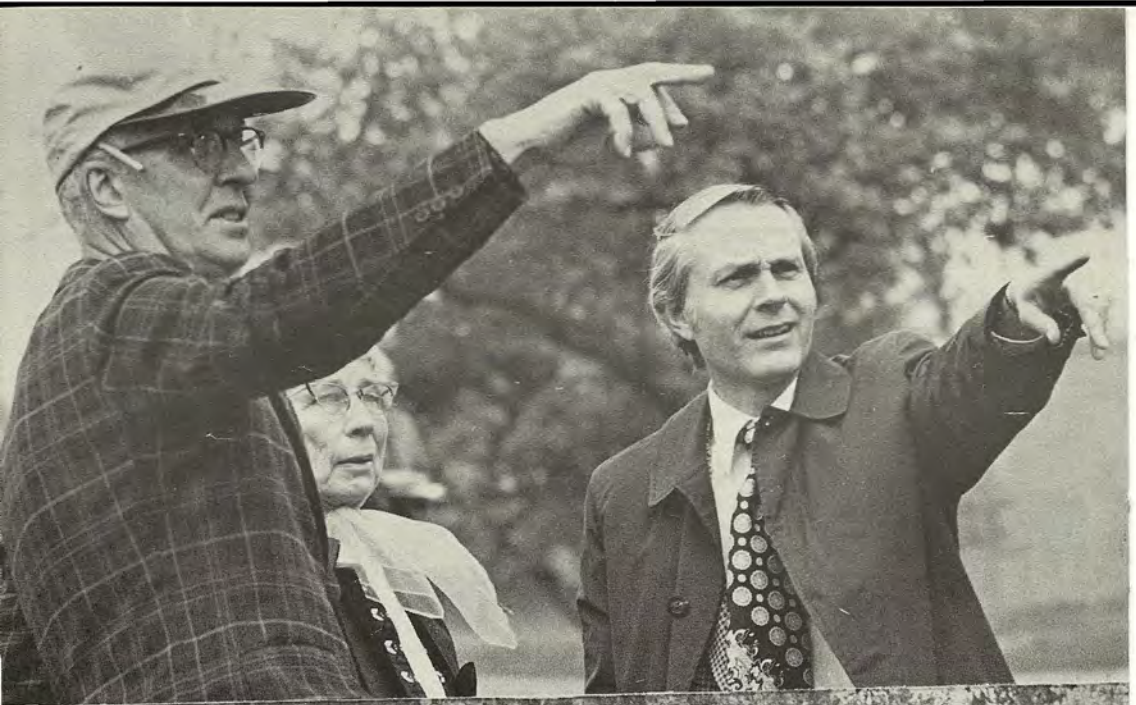
Other seedlings of considerable horticultural merit were obtained from a plant which had been received by the Gardens as "*S. wolfii* hybrid." The ancestry of this plant is not known, but is considered most likely to be *S. wolfii* X *S. sweginzowii.* Hybrids between this plant and *S. yunnanensis* included some especially showy individuals, with large panicles which were often "shouldered" or accompanied by secondary panicles. Many of the hybrids with *S. emodi* were also very attractive, with numerous large panicles and bright lilac-pink corollas. Marcescent corollas, however, were frequently a drawback among these hybrids, although not among the hybrids with *S. yunnanensis.*

A more complete report of these breeding experiments, including citations of voucher specimens, is planned for publication in *Baileya.*

Leonard Slater (1973 Award Winner and originator of Agincourt Beauty) examines lilac hybrids in R.B.G. Nursery.

Figure 1. *Syringa* X *henryi* X *S. sweginzowii.* **Figure 2.** *S. sweginzowii* X *S. reflexa.*
Figure 3. *S. emodi* X *S. sweginzowii.* **Figure 4.** *S. emodi* X *S.* X *prestoniae* 'Isabella'.

Figure 5. *Syringa* X *henryi* X *S.* X *prestoniae* 'Isabella'. **Figure 6.** *S.* x *henryi* X *S. reflexa* (inflorescences from two plants). **Figure 7.** *S.* X *henryi* X *S. emodi.* **Figure 8.** *S. "wolfii* hybrid" X *S. yunnanensis.*



Top: **Dr. Owen Rogers points out lilacs of interest to touring members.** *Lower picture:* **Jack and Nancy Alexander, Hanson Ma. (of Alexander's Lilacs) examine rare cultivars in R.B.G. collection.**

Canadian plant breeders have made a very significant contribution to the interspecific variety of lilac cultivars now available in both the early and late flowering classes. Two plant breeders working independently and many miles apart are easily the leaders. I refer to the late Miss Isabella Preston of Ottawa, Ontario and the late Dr. Frank L. Skinner of Dropmore, Manitoba.

Miss Preston joined the staff of the Division of Horticulture of the Central Experimental Farm, Canada Department of Agriculture at Ottawa on May 1st, 1920 as an ornamentals plant breeder. She was born in Lancashire, England in 1881 and graduated from Swanley Horticultural School in 1906. Subsequent to her appointment at Ottawa she worked under the noted lily breeder Prof. J. W. Crowe at the University of Guelph where she developed the Creelman lily and later at Ottawa the Stenographer group of lilies and others. Up until her retirement in 1946 Miss Preston was a prolific plant breeder; beside lilacs and lilies she produced the rosybloom series of ornamental crabapples, many hardy shrub roses and a series of Siberian iris which were named after Canadian rivers. She passed away at Georgetown, Ontario in 1965.

We are concerned in this paper with recording her contributions in the genus *Syringa*. She was responsible for the hybrid species *S.* x *prestoniae* described by Mrs. Susan Delano McKelvey in 1927 and for *S.* x *josiflexa* which she officially described. A total of 47 new lilac cultivars, products of Miss Preston's breeding work, were described by her. Another 36 lilac cultivars were given names but were never officially described.

Miss Preston lost little time after her appointment at Ottawa in getting on with her lilac breeding, for by the fall of 1920 she had produced 696 seeds of *S. villosa* ♀ x *S. reflexa* ♂ and a few seeds of *S. josikaea* ♀ x *S. reflexa* ♂. In the spring she lined out 299 seedlings of the villosa cross. She later discarded 60 of these which had variegated leaves. I am sure that every lilac breeder has run into the problem of either a total or partial lack of chlorophyll in the cotyledons or leaves, particularly in interspecific crosses. Only one seedling of *S. josikaea* x *S. reflexa* survived and from it the interspecific hybrid *S.* x *josiflexa* was described and it was given the cultivar name 'Guinevere' a few years later. Five open-pollinated seedlings of 'Guinevere' were named in the period 1934-1948.

In November of 1925 Miss Preston wrote to Mrs. McKelvey and described the progress she had made with the controlled cross seedlings, stating in part "In 1924 the majority bloomed and I think this year they all did so". She must have stirred up some keen interest among people working at the Arnold Arboretum for on June 20th and 21st, 1927, both Mrs. McKelvey and Alfred Rehder visited Ottawa with the

express purpose of making an on-the-spot evaluation of Miss Preston's work. They must have been impressed for they chose two seedlings representing examples of the extremes found in this group of seedlings to become the types for a new interspecific hybrid species, *Syringa* x *prestoniae* of which Mrs. McKelvey published an official description later that same year. The type cultivars were also named and described by Mrs. McKelvey. 'Isabella' for the originator and 'W. T. Macoun' for the incumbent Dominion Horticulturist, one of two Dominion Horticulturists under whose direction Miss Preston worked. Dr. Macoun was succeeded by Dr. M. B. Davis in 1933 and his official title was changed to Chief of the Division of Horticulture.

Mrs. McKelvey must have been an advocate of equal rights and used the alphabetical system in recording the parentage of *S.* x *prestoniae* as *S. reflexa* x *S. villosa*, hence the confusion which exists when more chivalrous writers, like myself, insist on placing the female parent first, thus *S. villosa* x *S. reflexa.* Both are technically correct according to the International Code of Botanical Nomenclature.

From the reciprocal cross *S. reflexa* ♀ x *S. villosa* ♂ also made in 1920, one seedling selection was named 'Diana' in 1926. The better known cultivar 'Romeo' is an open-pollinated seedling of 'Diana'.

The cultivar 'Ethel M. Webster' resulted from a cross made in 1930 — (*S. reflexa* ♀ x unknown ♂) and 'Fountain' from a backcross made in 1933 — (*S. reflexa* x *S. sweginzowii)* ♀ x *S. reflexa* ♂. According to "Lilacs in America", one cultivar 'Carlton' was named from the cross *S. reflexa* x *S. sweginzowii.*

In 1925 Miss Preston was successful in crossing *S. villosa* with both *S. chinensis* and *S. vulgaris* but resulting seedlings of both were inferior and were discarded.

Among the late flowering lilacs which Miss Preston introduced, the following have performed well at Morden: 'Desdemona', 'Elinor', 'Fransisca', 'Guinevere', 'Isabella', 'Jessica' and 'Virgilia'. Starting in the late thirties we have evaluated 50 of these Ottawa late flowering lilacs at Morden. Open-pollinated seedlings of *S.* x *prestoniae* are commonly used for hedges and windbreaks on the Canadian prairies; so much so that it is now difficult to find a true strain of *S. villosa.* These hybrid seedlings are commonly referred to as Preston lilacs.

Miss Preston was also active in producing early flowering lilacs of the hybrid species *S.* x *hyacinthiflora.* From crosses made in 1922 — *S. vulgaris* 'Negro' x *S. hyacinthiflora* 'Lamartine' she described and named the three cultivars 'Maureen', 'Muriel' and 'Norah' and from open-pollinated seedlings of 'Lamartine' two more cultivars were named, 'Peggy' and 'Grace'.

Miss Isabella Preston's story is truly international. As Canadians we are grateful that this English woman chose to work in Canada's capital city and that an American woman, Mrs. Susan Delano McKelvey, chose to perpetuate her name with both *Syringa* x *prestoniae* and the lilac cultivar 'Isabella'.

Dr. Frank L. Skinner, L.L.D., M.B.E., came to Canada in 1895 at the age of 13 when his family left Scotland to settle in an outpost of north-western Manitoba to become cattle ranchers and grain producers. Frank Skinner, because of circumstances, received little formal education but by a consuming interest and sheer perseverance he became internationally known as a horticulturist, a plant explorer and a plant breeder. He could well be described as a genius with plants and could easily hold his own with leading horticultural professionals in all countries of the northern hemisphere, whom he either knew personally or by correspondence. All of this he managed to accomplish from his own personal resources and labor and he was honored in Canada and abroad with both governmental and horticultures highest awards. His first and only financial help from outside sources was a grant from the federal government which was given to him after he had reached the age of 80 to record his experiences for benefit of posterity. This he accomplished and it was published in the form of a book entitled "Horticultural Horizons" in 1967 by the Manitoba Department of Agriculture about 6 months before his death on August 27th, 1967 in this 86th year.

Again I would point out through success with many genera of plants, this paper deals only with lilacs. On his first visit to the Arnold Arboretum in 1918, Frank Skinner secured small seedlings of *S. oblata dilatata* and *S. velutina* from Prof. C. S. Sargent. The former were grown from seed collected on the Diamond Mountains of Korea by E. H. Wilson in 1917. In the spring of 1920 he attempted his first lilac crosses using pollen of *S. reflexa* on flowers of *S. villosa* which were blooming at his home in Dropmore, Manitoba. This first effort produced nothing, but it does record the fact that two Canadians working independently and many miles apart had simultaneously chosen the same plant combinations. Miss Preston was successful in her first attempt and Frank Skinner had to wait until the spring of 1922 when he again got pollen of *S. reflexa* from the Arnold Arboretum and applied it to emasculated flowers of *S. villosa* with success. From the first generation seedlings arising from this cross Skinner introduced 4 cultivars, 'Handel', 'Helen' and 'Hiawatha' in 1935 and 'Hecla' in 1936. From 2nd generation open-pollinated seedlings the cultivar 'Donald Wyman' was named in 1944. The latter, in my opinion, is the best of the Skinner cultivars belonging to the hybrid species *S.* x *prestoniae* and it is rather a coincidence that the name 'Donald Wyman' should be so intimately linked with the Arnold Arboretum from whom Dr. Skinner received the pollen for the original cross.

In the spring of 1921 the seedlings of *S. oblata dilatata*, secured in 1918 from Sargent, commenced blooming and Skinner began his crosses using cultivars of *S. vulgaris* as pollen parents. The first two cultivars from these crosses were named in 1932, 'Asessippi' and 'Minnehaha'. The last one that Dr. Skinner introduced was in 1965 — 'Royal Purple'. My choice of the 20 other cultivars of this group introduced by Skinner in the intervening years are 'Pocahontas' — 1935, 'Gertrude Leslie' and 'Swarthmore' — 1954, 'Sister Justina' — 1956, 'Mount Baker' and 'The Bride' — 1961, and 'Dr. Chadwick' — 1962. He dubbed these as the "American Lilacs". Taxonomically, they are considered to belong to the hybrid species *S.* x *hyacinthiflora.* They are, however, much hardier than cultivars of this hybrid species derived from *S. oblata giraldii.*

Using *S. velutina*, which he brought back with him from the Arnold Arboretum in 1918, to the pollen of *S. pubescens* he created the hybrid species which perpetuates his name, *S.* x *skinneri* officially described by Rehder in 1947.

Cultivars of three other species hybrids were introduced by Dr. Skinner. *S. villosa* x *S. sweginzowii* gave us 'Hedin' in 1936, (*S. vulgaris* x *S. oblata dilatata*) x *S. persica* gave us 'Grace McKenzie' in 1942, and *S. microphylla superba* x *S. vulgaris* resulted in 'Maidens Blush' in 1966.

Lilac work at Canada Agriculture's Research Station, Morden, Manitoba was at first based on Miss Preston's work at Ottawa and in later years combined the work of Preston and Skinner. Dr. W. R. Leslie who was the Superintendent of this station for 35 years combined his administration duties with the supervision and direction of ornamentals research. Second generation seedlings of both *S.* x *prestoniae* and *S.* x *josiflexa* were received at Morden from Ottawa in the mid twenties and planted out separately. Five cultivars from the *S. prestoniae* group were named in 1936 and 1937 by Dr. Leslie. The best known of these are 'Coral', 'Dawn' and 'Nocturne'. From the *S. josiflexa* seedlings Leslie named the two well known cultivars, 'Royalty' and 'Redwine' in 1935 and 1936, respectively.

Under the direction of the author of this paper, who took over as Head of the Ornamentals Section in 1956 after Dr. Leslie's retirement, two more late flowering lilacs have been developed, named and introduced. 'Miss Canada' in 1967 to honor Canada's centennial year is the product of the cross *S. josiflexa* 'Redwine' x *S. prestoniae* 'Hiawatha', 'Minuet' described and released in 1972 from the cross *S. josiflexa* 'Redwine' x *S. prestoniae* 'Donald Wyman'. 'Redwine', named at Morden, resulted from Miss Preston's work at Ottawa and both 'Hiawatha' and 'Donald Wyman' are Dr. Skinner's introductions.

Breeding work with lilacs continues at Morden, mostly interspecific crosses under the direction of W. G. Ronald.

There have been and are still many private individuals in Canada who have been responsible for the introduction of new lilac cultivars. With two exceptions, these introductions are crosses between cultivars or open-pollinated seedlings of *Syringa vulgaris.*

John A. Wallace of Beaverlodge, Alberta introduced 'Campsie' in 1972 which is a dwarf cultivar selected from seedlings of Skinner's *S. hyacinthiflora* cultivars.

Sheridan Nurseries, Oakville, Ontario selected and introduced 'Ivory Silk' in 1973. This is the first cultivar of *S. reticulata* synonym *(S. amurensis japonica)* of which I am aware.

The following is an alphabetical list of Canadians not mentioned previously who have been responsible for the introduction of *S. vulgaris* cultivars:

Miss M. E. Blacklock (deceased) who gave us 'Heavenly Blue'.

Miss Minerva S. Castle who was the recipient of Award of Merit from your society in 1972 and who for many years, along with Miss Blacklock ran a specialty nursery known as Rowancroft Gardens at Meadowvale, Ontario. 'White Surprise' and 'Mrs. Harry Bickle' are two of her introductions; also, 'St. Joan', 'St. Margaret', 'Purple Glory', and 'Rowancroft Pink'.

Leslie Hancock is a well known and much respected horticulturist and nurseryman of Mississauga, Ontario. Les, as he is affectionately known among the international fraternity of horticulturists, has given us 'Woodland Blue' named after his Woodland Nursery.

Mrs. Frank Patterson (deceased) introduced several cultivars through Ellesmere Nurseries, Pickering, Ontario.

Edward G. Robinson, owner of Gaybird Nurseries at Wawanesa, Manitoba has given us 'Redbud', 'Pom' and 'Lucelle'.

John Schloen, Brooklin, Ontario retired from his Ellesmere Nursery, who along with Mrs. Patterson has given us among others 'Frank Patterson', 'Helen Schloen', 'Dr. Brethour' and 'W. T. Lee'.

Hugh W. Skinner has taken over Skinner's Nursery Ltd., Roblin, Manitoba, former address Dropmore, Manitoba, and will continue his father's work.

Leonard K. Slater, Agincourt, Ontario, a retired Railway foreman, whom this society honored with a Merit Award in 1973, is still quite active in lilac breeding and has named and introduced 3 *S. vulgaris* cultivars to date; one of them, 'Agincourt Beauty', is being featured by "Gardens Canada" in their 1974 promotion of Canadian introductions, and the new white 'Agincourt Elegance', to be released hopefully in 1975.

I trust that I have not omitted anyone who is responsible for Canadian lilac introductions; if so, my apologies. I expect that in the near future we will be adding the name of Dr. James Pringle of our host institution, The Royal Botanic Gardens of Hamilton, Ontario, to the list of Canadian lilac introducers and Dr. Pringle will tell you more about his work with lilacs later in the program.

I am sure that you will agree with me that Canadians have made very significant contributions to the variety of lilacs available and that continued new hybrid species and cultivars can be expected in the future.

THE APPLICATION OF CHEMOSYSTEMATICS TO LILACS

by L. M. Lenz,
Winnipeg, Manitoba

With the development of natural products chemistry, botanists and chemists have expressed the opinion that it should be possible to employ chemical constituents in helping to characterize, describe and classify taxa. The determination of correlations between morphological and chemical groups of taxa is a very old one. As early as 1699, there were publications on such correlations between medicinal or chemical properties and certain morphological groupings eg. Umbelliferae, Labiatae, etc. Although the concept of employing chemical data in systematics is an old one, a genuine interest in an understanding of the possible correlations between plant constituents and classification has been relatively recent. The interest in this type of investigation has increased with the expanded data coming from biochemical, immunochemical and organic chemical research, and the development of relatively quick and simple analytical techniques. The coming of age of phytochemistry was aptly presented by Harborne in 1967 when he indicated that chemotaxonomy is one of the aspects of the subject of phytochemistry. He also indicated that the rapidly developing interest in phytochemistry recognized it as a discipline distinct from pure chemistry. It should be indicated that the international taxonomic and chemical association have established a joint committee on chemotaxonomy.

Without reviewing the definitions and history of all the names that have been applied to such taxonomic research, the terms most appropriately used are chemotaxonomy and/or chemosystematics.

Taxonomists constantly group organisms on the basis of general resemblances based upon a wide range of characteristics. These types of comparative relationships have proven valuable in classification in the past as well as the present. Recognized taxa do not express the same degree of distinctiveness therefore data obtained from diverse disciplines should help reflect this state of flux. By revising the taxonomic systems, taxonomists strive to develop a more accurate and readily understandable

explanation of the nature and status of taxa. Thus tentative conclusions sometimes must be expressed because of incomplete data; and the search for more facts must be continued using different methods and characteristics, if the systematic classification of the taxa is to be improved. The various kinds of chemical tests used in chemotaxonomic research often yield data that can be included as additional characteristics which contribute to the construction of taxonomic profiles.

The current interest in chemotaxonomy is indicated by the reports frequently published in scientific journals, symposia and books. Upon reading a larger portion of the chemosystematics publications, it is discovered that many of the statements and claims presented have been conservative and warn that the data offers no "cure-all". However, in contrast radical claims have been made by others engaged in this type of research. Chemotaxonomic researchers do not yet have command of the overall perspective which is needed, this is still an immature area of research. The same criteria should be used when evaluating chemical data in systematics as must be used in evaluating data from any other method. This means the relative value of employing a certain chemical technique should be judged only after analysis of the appropriate chemical concepts and principles have been made and related to those concepts, principles and guides employed in classification. Therefore a knowledge of some of the basic principles and concepts of the specific chemical approach, as well as of systematics contributes to a better appreciation of the role of a chemotaxonomic endeavour.

Which chemical tests and products should be investigated is a question that is often asked. What are studied are properties associated with a class of compounds and from these properties the presence of the compound or compounds is inferred.

Plant tissues are a complex mixture of chemical substances, a first step in the study of these substances is the separation and purification of the compound under study from that mixture. The method varies with the kind of substance to be separated, but usually consists of extraction with some appropriate solvent followed by chromatographic or electrophoretic separation. These last two methods have come into existence in the last twenty years and they have greatly simplified the task of separating natural products so that it is now possible to sample routinely from relatively large populations for the presence of the compound. These new methods also permit analyzing samples formed by small quantities. A last step is the chemical identification of the various compounds that have been extracted and separated. Precise chemical identification usually requires specialized chemical knowledge.

THE LEAF WAXES

The surface of terrestrial plants which are exposed to the atmosphere usually have a cuticle which contains wax. The amount of epicuticular wax varies greatly with species but can be sizeable, for instance, up to 4% of the green weight of the leaf and 15% of the dry weight.

The wax when present, undoubtedly serves to preserve the water balance of the plant and its other protective function may include minimizing mechanical damage to leaf cells and inhibiting fungal and insect attack. Agricultural sprays must come in contact with the cuticle if they are to be effective, and the presence or absence of wax, as well as composition and structure seems to govern the wettability of leaves and the penetration of the spray chemicals.

Interest in the epiculticular wax is by no means a new phenomenon. The physical structure was studied as early as 1871 and the chemical composition during the 1930's. Man's use of plant waxes extends back into prehistory and includes the uses of bayberry wax and carnauba wax.

CHEMICAL CONSTITUTION

Early studies revealed that leaf waxes were generally mixtures which were difficult to separate by then available methods. The newer chromatographic and spectroscopic procedures have resulted in rapid advances. The surface waxes are now known to be complex mixtures of long chain alkanes, alcohols, ketones, aldehydes, esters and acids. The compounds in these chemical classes are often present as homologous series. The chain length of homologues is usually from C_{21} to C_{37} with the odd carbon numbered members predominating over the even numbered members. The picture is complicated by the positioning and number of functional groups, degree of chain branching etc., in other words, the infinite number of isomers which may be found. The proportion of any one component in the wax differs for the different plant species.

The epicuticular waxes can be obtained by washings or dissolution in chloroform. Column chromatography using alumina is a simple method of separating the different groups of compounds. The hydrocarbon fraction is easiest to isolate from the total fraction, being eluted in hexane or petroleum ether. The alkane fraction can then be further separated into the homologous series by gas-liquid chromatography using temperature programmed operation. The large molecular weights of the alkanes necessitate high temperatures for gas-liquid chromatography analysis; this requirement limits the choice of stationary phases to rather stable types at low loadings. The high resolution afforded by long capillary columns is desirable. The carboxylic acid fraction can be analyzed by gas-liquid chromatography either as the corresponding methyl esters or after reduction to the saturated hydrocarbons. The alcohol fraction can be analyzed by gas-liquid chromatography either as the free alcohols or as their acetates. The complexity of most plant waxes has discouraged attempts at complete analysis of the constituents of individual waxes.

Plant-wax constituents have received some study from the standpoint of chemotaxonomy. Their use in plant taxonomy would seem advantageous in view of the almost universal occurence of these coatings; the species variation in wax composition; the fact that the wax is extra-cellular and almost certainly an end product insulated from the regular, essential metabolic functions of the plant; the simplicity of sampling; and the present day availability of precise and rapid microanalytical tools. Because of its speed and simplicity, even direct thin-layer chromatography has been used to provide patterns which might be used taxonomically.

The most valuable substances taxonomically are not those which are involved in primary metabolic processes but those which are relatively stable by-products in their biological environment. The plant-wax hydrocarbon fraction meets this requirement quite well, while its very complexity is a positive advantage in that it provides a taxonomic fingerprint.

Attempting to test this approach, Eglinton and his colleagues examined the leaf waxes of a compact group of closely related genera of the subfamily Sempervivoideae (Crassulaceae), endemic to the Canary Islands, which had already been extensively studied botanically. It had been stated that, from the standpoint of evolution, *Aeonium* species present a situation comparable in many ways to the finches of the Galapagos. The conclusion drawn from the alkane carbon number patterns were that in *Aeonium* species, such comparisons could serve to confirm relationships between closely related species but that the differences between related genera were often insufficiently discriminating. Moreover, even similar species sometimes had widely differing patterns and there was only a rough parallelism of hydrocarbon pattern and botanical classification.

Mold *et al.* found closely similar alkane distributions for three different varieties of tobacco. The alkane fractions from South African species of *Aloe* (Liliaceae) have been examined recently by Herbin. Petal waxes and leaf waxes for

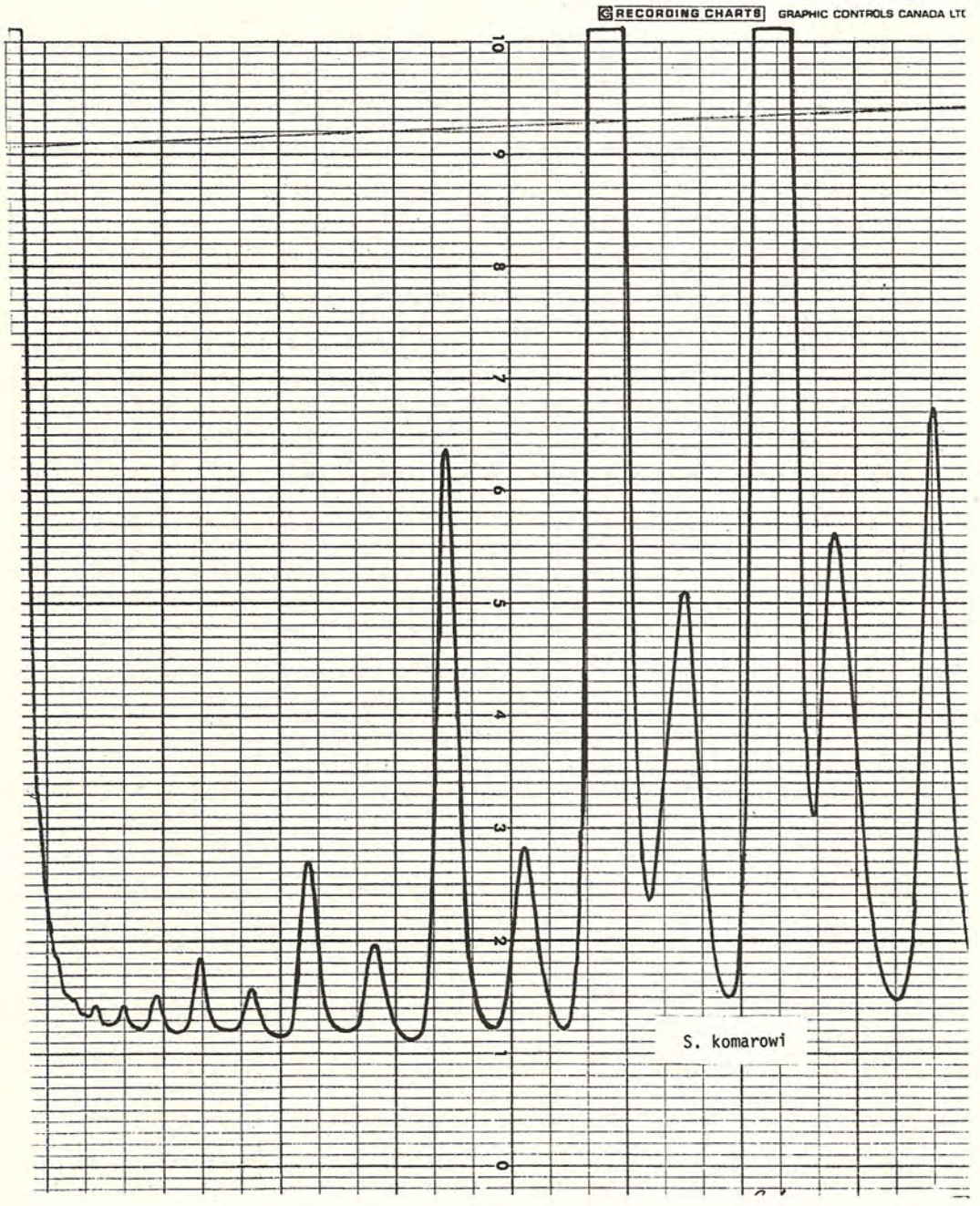
Chromatogram No. 2302 Sample No. 81-70-3-1

Taxa Syringa vulgaris 'Belle de Nancy'

Peak No.	Retention Time	Peak Counts	Percent of Total
1	35	2,531	0.25
2	48	5,150	0.50
3	64	3,349	0.33
4	80	23,310	2.27
5	101	7,143	0.70
6	120	72,607	7.08
7	144	14,290	1.39
8	167	366,505	35.75
9	190	36,419	3.55
10	214	362,186	35.33
11	237	39,808	3.88
12	260	91,890	8.96
TOTAL		1,025,188	100.00

Chart A (above) a Chromatogram of S. vulgaris 'Belle de Nancy'

Chart B (opposite page) a Chromatograph of S. komarowi


RECORDING CHARTS GRAPHIC CONTROLS CANADA LTD
10
9
8
7
6
5
4
3
2
1
0
S. komarowi

each species were separately studied. He concluded that the petal and leaf wax patterns for the same species differed considerably. The botanical sections, subsections and groups showed little or no correlation with the leaf-alkane distribution. In another study, Borges del Castillo *et al.* examined representatives of the families Podocarpaceae (33 species), Auaucariaceae (6 species) and Cupressaceae (7 species). Here there did appear to be some correlation between carbon number distribution and botanical classification.

THE LILACS

The species of the genus *Syringa* are not morphologically distinctive and since they readily hybridize, have given rise to several groups of interspecific hybrids. Numerous ornamental clones have been selected from this hybrid complex and their lineage has become obscure. The purpose of our study was to utilize chemotaxonomic methods for recognition and validation of the species and hybrid complex.

The mature leaves of 50 species and hybrids of lilacs were collected during the autumn of 1969 and 1970 at the Research Station Morden (See List). Similar genotypes of different sources were also considered and collections were made at other geographical locations *eg.* the University of Manitoba; Research Station Brandon and North Dakota State University. Some collections were also made during the months of July and August to determine the effects of seasonal change and flower were considered to determine the similarity of the wax constituents. The leaves selected were healthy, avoiding sucker growth and selected from all over the plant, however specific collections were made with respect to location on the plant. The leaves of each individual plant were analyzed separately. Generally, only two plants of each specific genotype were available.

As soon as possible, generally within 48 hours after collection, the leaves were first washed in 1 percent hydrochloric acid solution to remove surfacial extraneous accumulations. Then samples of 100 grams of leaves by wet weight were washed in chloroform, consisting of 3 washes in each of 100 mls. of solvent to remove the wax. The remainder of the leaves were frozen for future use. The chloroform washings were bulked and reduced in volume on the flask evaporator. These samples were stored until analyzed. All laboratory equipment used was glass or metal because of the effects of some organic solvents on plastics.

Column chromatography using alumina was utilized to separate the various classes of compounds. The hydrocarbons are eluted first using petroleum ether. All fractions were evaporated to dryness and weighed. Only the hydrocarbons which constitute about 10 percent of the total, were analyzed further. The alkanes were analyzed utilizing a Varian Aerograph Hi-fi gas-liquid chromatograph with a hydrogen flame director. This was connected to a chart recorder (see chromatogram) and digital integrator for calculating the peak areas (see samples). The column used was a 3 foot x 1/8 inch O.D. copper tube packed with the solid phase chromosorb G which was coated with 3 percent by weight of the liquid phase SE-30. The carrier gas was nitrogen at a flower rate of 14 mls. per minute. The samples were dissolved in 10 mls. of chloroform and a 3 microliter volume was injected into the chromatograph using a Hamilton microliter syringe. Each sample was temperature programmed at 2°C per minute from 180°C to 250°C.

The percentages and ratios have been calculated for 12 constituents in the range of C_{24} and C_{35} inclusive. These constituents were labelled by comparison with known standards.

By way of illustration of some of the results obtained in this study, I will show a few examples of the carbon number distributions. These indicate that there is some correlation between carbon number distribution and botanical classification.

NEW APPROACHES IN LILAC BORER CONTROL

by David G. Nielsen
Department of Entomology
Ohio Agricultural Research and Development Center
Wooster, Ohio

My first responsibility as a new faculty member at the OARDC was to establish research priorities in the field of woody ornamentals entomology. I soon learned that control recommendations for borers are extremely poor. In fact, we know so little about seasonal histories of borers that we are often unable to time insecticide application with borer flight. This, of course, is critical since borers are invulnerable to foliar, contact insecticides after larvae have chewed through the bark and constructed galleries. Insecticides that are currently recommended for control of borers are either relatively ineffective (compared to unlabeled organophosphorous compounds) or are in jeopardy of cancellation by the Environmental Protection Agency.

After determining that we should establish a research program to improve borer control methods, we began to look for a model insect species, a borer that is extremely common or that could be easily reared. Although none of the borers could be reared easily in the laboratory we found an area in Ohio where several thousand French hybrid lilacs, *Syringa vulgaris, cv.* were infested with lilac borer, *Podosesia syringae.* This clearwing moth (Lepidoptera: Sesiidae) is a day flier that mimics a wasp. Therefore behavioral studies can be conducted during the day, another good reason for choosing this insect as a borer model. We also knew that several other clearwing moths are serious pests of woody ornamental plants, and reasoned that results obtained from lilac borer studies might be applicable to dogwood borer, rhododendron borer, an oak borer, ash borer, and the two peach tree borers.

Biological control, natural plant resistance, cultural control, conventional chemical control, and behavioral manipulation were all considered as potential methods to improve control for and reduce damage by borers. We chose to (1) evaluate the new organophosphorous and carbamate insecticides (both systemics and non-systemics), and (2) determine if lilac borer uses a sex attractant (pheromone) to facilitate mate location. We would then try to learn how to use this pheromone to reduce lilac borer infestations. Today I would like to inform you about our approach to borer control and summarize our progress.

Lilac borer overwinters as larvae inside galleries constructed in the heartwood of their hosts (Figure 1). They resume feeding the following spring and pupate in the larval gallery, usually in mid- to late May in Ohio. Approximately two weeks later the pupa moves through the larval gallery until half of its body protrudes out of the exit hole. The pupal skin then splits, and the adult moth emerges (Figure 2). Mating probably occurs within an hour, after which females begin to oviposit in bark crevices on host plants. Oviposition may continue for several days. This cycle is repeated annually in Ohio.

Lilac borer larvae damage trees by feeding in the cambium and excavating galleries in supportive (woody) tissues. The plant is girdled when enough cambium is destroyed and death occurs. Plants that have supported several lilac borer larvae are weakened structurally and are easily broken. Nursery and landscape lilacs are commonly attacked by lilac borer in the Northcentral and Northeastern United States. Many nurserymen in Ohio no longer plant lilac, primarily because they have been unable to control lilac borer.

Few people see or are aware that they see lilac borer moths because they mimic a polistes wasp. In flight or at rest lilac borer moths and many other clearwing moths resemble common wasps so closely that few people are interested in collecting them. Several museums in the U.S. have had clearwing moths included in their wasp collection. Another reason why most people who see these insects think they are wasps is that most moths are night fliers: clearwings fly during the day.

In 1971 we designed an experiment to determine if lilac borer uses a sex pheromone to facilitate mate location. Virgin female moths were placed in individual

Figure 1. Lilac borer larva inside its gallery.

Figure 2. Virgin female lilac borer moth in calling (pheromone emitting) position.

screen cages within traps that were coated with Tacktrap (a sticky substance). Two different trap designs and trap heights were evaluated for their effectiveness in trapping male moths. The results of this study demonstrated that virgin female lilac borers produce a volatile chemical sex pheromone that attracts conspecific (lilac borer) males. Males of another clearwing moth, *Paranthrene simulans*, also responded to virgin female lilac borers.

Subsequent experimentation has shown that at least four genera of clearwings are attracted to lilac borer females. Knowledge of this intergeneric sex attraction led us to believe that (1) studying the pheromone chemistry of one sesiid would generate valuable information about and might be directly applicable to other sesiids, and (2) techniques developed for using pheromones to control one sesiid might be useful for controlling other clearwing borers.

Lesser peach tree borer, *Synanthedon pictipes*, has been mass reared for a number of years as part of a pheromone study by the United States Department of Agriculture, Agricultural Research Service. Dr. James H. Tumlinson of the Insect Attractants, Behavior and Basic Biology Research Laboratory at Gainesville, Florida began studying the pheromone chemistry of this pest in 1972. We informed him about our lilac borer program and our belief that his work could be extremely important to us. We soon began cooperative studies: Tumlinson began fractionating, characterizing and synthesizing sex attractants and we bioassayed these chemical compounds for attractiveness to male moths.

The first interesting and exciting result with pheromone fractions from lesser peach tree borer occurred when we bioassayed a fraction (small part) and found it to be attractive to lilac borer males[1]. At that time we were convinced that we would find a sex attractant for lilac borer by working with chemists who were studying pheromones of other sesiids.

In 1973 we and others demonstrated that a synthetic 18 carbon acetate from Tumlinson's laboratory is attractive to an oak borer, *Paranthrene simulans*, and the peach tree borer, *Sanninoidea exitiosa.* Subsequent studies in 1974 revealed that the same compound is attractive to lilac borer moths (those that emerge in June in Ohio).

We are currently part of a rather large team which is developing these synthetic sex attractants for use in monitoring and/or controlling sesiid borers. We are learning how to formulate the attractants for optimum longevity and efficacy and are determining the best kind of pheromone trap for each pest species. We believe that this technique will eventually be used by homeowners, nurserymen and others to (1) improve chemical control practices by knowing when adults are flying (this will improve timing application of insecticides), or (2) trap male moths and reduce mating success.

Concurrent with the behavioral studies, we began evaluating insecticides for control of lilac borer in 1971. Forty-seven different treatments were tested on a total of 2100 French hybrid lilacs in Lake County, Ohio. Systemic insecticides were placed in the soil one month before adult emergence and when adults emerged: they were also applied as thorough coverage sprays. Non-systemics were applied only as foliar sprays. Results indicated that none of the treatments with systemic insecticides were effective and that three or four non-systemics merited additional evaluation. Subsequent testing in 1972 and '73 confirmed earlier results (Table 1).

Dursban 2E is extremely effective for controlling lilac borer in lilac or ash. In all of our tests we used one pound of active insecticide (2 quarts) in 100 gallons of water and sprayed entire plants (leaves and branches) to runoff when adult moths began to emerge. It is often difficult to determine when moths begin emerging, so we are hopeful that pheromone traps will become available soon (2-3 yrs.) for this use. The manufacturer of Dursban is currently requesting the Environmental Protection Agency to label it for use against lilac borer. The combination of pheromone traps and Dursban, applied as a foliar spray, should relegate lilac borer to a "manageable pest" status.

[1] *Lilac borer is used for moths that emerge from lilac and ash in June and from ash in September in Ohio. The late-flight males responded to this pheromone fraction from lesser peach tree borer.*

Figure 1. Insecticides evaluated for control of lilac borer in Ohio from 1971-1973.

Insecticide	Number of Applications	1971 Number[1] of larvae (50 plants after treatment)	1972 Number of plants (max.= 50) infested after treatment	1973 Mean number of larvae tree[2]
Dursban	1	0	0	0.4
Dursban	3	0	1	x
Guthion	1	4	1	7.5
Guthion	3	0	1	x
Diazinon	1	6	1	4.6
Diazinon	3	0	0	x
Phosvel	1	2	1	2.0
Phosvel	3	2	1	x
Orthene	1	x	6	2.2
Orthene	3	x	0	x
Thiodan	1	3	2	4.1
Thiodan	3	3	3	x
Dieldrin	1	3	x	x
Dieldrin	3	4	x	x
Methoxychlor	1	10	x	x
Methoxychlor	3	6	x	x
Lindane	1	x	1	0.3
Lindane	3	x	2	x
check	—	13	6	9.2

[1] 1971 test with infested lilac

[2] Ten ash trees were sprayed with each treatment

x means not tested.

LILAC PROPAGATION
AT THE ROYAL BOTANICAL GARDENS, HAMILTON.

by Ray E. Halward
PROPAGATOR

During the past seven years propagating lilacs in the R.B.G. has become a regular practice. Previous to 1967 we had a basic collection which included most varieties available in the trade.

Due to the excellent co-operation of the various Botanical Gardens, Arboretums, and Park Areas, long noted for their lilac collections, we started to broaden our collection and from 1967 have propagated, by grafting and cuttings, over 600 species and varieties. The first time we grafted lilacs we used rooted cuttings of privet with fairly good results, but have since switched to syringa villosa seedlings and more recently to rooted cuttings of syringa villosa, keeping a supply of one and two year cuttings on hand for various sized scions. The cuttings do have a superior root system for grafting.

The types of grafts used are whip and tongue, saddle, or cleft; quite often depending on size of scions and understock. The only difficulty I have encountered is the late arrival of scions. I like to graft no later than middle of March, but have on occasions run into April, and once in May, which proved to be less successful without temperature control.

It is also desirable to use vegetative rather than flowering wood and quite often scions received are well budded with flower-buds advanced. Fortunately lilacs are easy to graft so many difficulties can be overcome.

After the graft is made a callousing period takes place, and stock is potted and encouraged to grow. When sufficient growth is made soft wood cuttings are taken off the grafted plants to establish our root plants.

N.D. We started to propagate under mist in 1956 with an intermittent mist set-up, and found it so successful for many types of woody ornamentals that we eventually expanded our facilities. The controls are commercial types, all except the electronic leaf which was devised in 1957, by myself consisting of a pair of bee's wings suspended between two electrodes and this has been our standby ever since. Our mist system is housed in a fibre-glass plastic lined house, and shaded with 46% shade saran outside plus burlap shade on the inside. Heating cable in the sandbed is set at 70° during the summer.

If we must go far afield to collect cuttings, then plastics bags are a necessity and we have had lilac cuttings in bags for almost a week before sticking. I am thinking particularly of my trip to Morden, Manitoba, in 1969.

Many propagators prefer taking cuttings a week or two after blooming. We started to take our cuttings the latter part of June and have taken them as late as July 10, with success. I find cuttings taken later will not dessicate as quickly as real soft wood.

All cuttings are wounded on the bottom third of the cutting in two places, one each side, and as many leaves as possible (2-3 sets) are left on, very large leaves are sometimes reduced in size to take less space.

We have tried most mediums and combinations suggested by other propagators and have come back to 3 parts sand and 1 part peat mixture. Peat-perlite half and half is another good mix.

We have tried hormone powders and liquid dips, and various fungicides alone and mixed with hormone powders. Our most successful was Seradix No. 3, which is about 75% I.B.A. mixed with equal parts of Captan 50W.

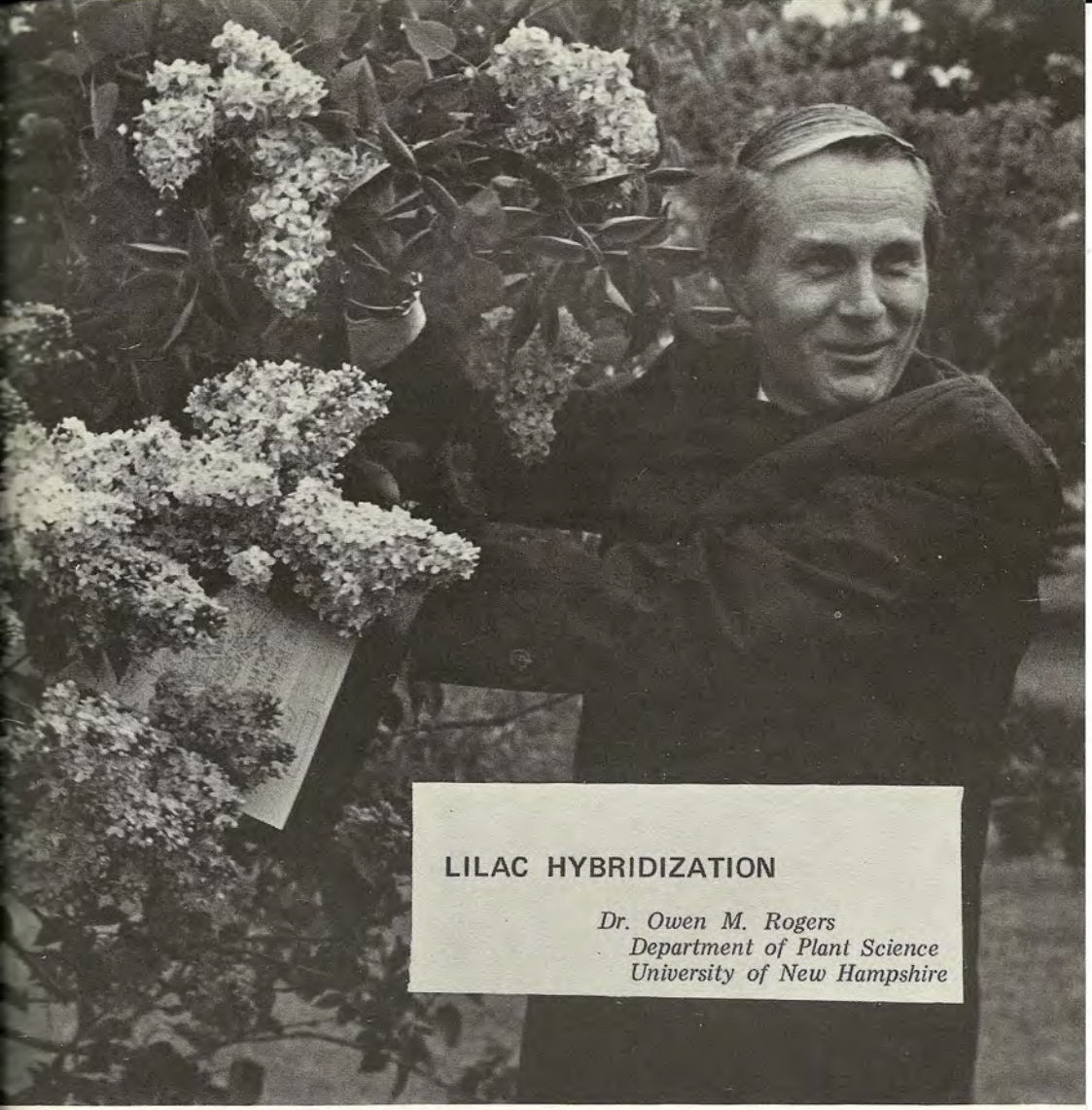
Consistently our overall average was 75-80% on a total of 150 varieties.

Cuttings are given extra light (16 hour day), from time to time they are stuck until late September then hardened off.

The rooted plants are over-wintered in the same area with cable set at 32° to prevent freezing.

Plants are potted in early spring and are well started when set out.

Dennis Sauve (Ottawa Agr. Station) explains lilac collection at his Alma Mater, Niagara Agri School, to Elsie Bogdan of Columbia Station, Ohio, and Marie Chaykowski of Mantua, Ohio (members of I.L.S. Ohio Chapter).



LILAC HYBRIDIZATION

Dr. Owen M. Rogers
Department of Plant Science
University of New Hampshire

Planned crosses in lilacs require that selected pollen be placed on a selected stigma and that unwanted pollen be excluded. This is easy in the lilac and it opens the exciting challenge of producing new plant and flower types to anyone willing to spend a little time learning a few principles and techniques. No one should ever shy away from plant breeding because he considers himself an "amateur." Amateur plant breeders have always played a considerable role in the development of new plants. In such groups as the iris, garden roses, and gladiolus, a great many of the new forms have been produced by amateur breeders. So should it be with the lilac.

The first step in breeding the lilac, as with any crop, is to study the flower structure. Figure 1 shows a diagram of the lilac floret. Compare it to a fresh floret and locate the anthers which bear the pollen and the pistil with its stigma which must receive the pollen. The structure will vary in double florets and in some, where the anthers have been transformed into extra petals, there may be no pollen at all. Start your study with a single-flowered cultivar and then branch out into the more complicated doubles. In the lilac the anthers are attached to the petal tube and spill out their yellow pollen about the time that the flowers open. Therefore, if there are

anthers in the florets to be pollinated, they should be removed before the pollen sheds. This is called emasculation and is most easily accomplished in the lilac by pulling off the petals of a bud just ready to open. I select an inflorescence that has just a few florets open, since that will select the one with the greatest number of nice, fat buds. I totally remove the few open flowers, since unwanted pollinations may have already taken place, and then, holding the stems in my left hand, I pull gently on the petal tube. With a little practice the whole tube should snap off, leaving the sepals and the ovary surmounted with the style and stigma. Starting at the bottom of the inflorescence, I continue to emasculate upwards until the buds become too small to emasculate easily, at which point I snap off the rest of the tip. After a few tries, it is often possible to emasculate a hundred or more florets in one thyrsus in less than five minutes.

I always collect the pollen to use in the cross the day before the cross is made. I take fat buds from the plant selected to provide the pollen, and separate the anthers from the flowers over a sheet of paper. Different people develop unique techniques to get the anthers out. Some pull open the petals until the anthers are visible and can be flipped off with fingernail or tweezers. Others will take tweezers and work down into the floret until the anthers can be grasped and pulled out. I like to snap off the head of the bud just above the anthers and then work them out like squeezing toothpaste from a tube. You will have to experiment to find the method easiest for you. With a little practice it is soon possible to collect 50 to 100 anthers free from petal debris onto the paper in a matter of minutes. At New Hampshire, we store pollen in the Rad Pike manner. That is, we collect the freshly picked anthers in Size 00 empty gelatin capsules that are available at any drugstore. Then the capsules are placed in

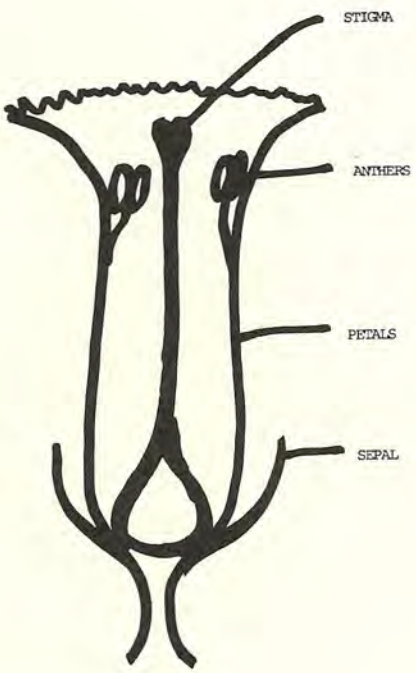


FIGURE 1

LILAC FLORET

FIGURE 2

STORAGE DESICCATOR

small desiccators made by putting calcium chloride pellets into a small bottle and holding the pellets down with a wad of cotton (Figure 2). This leaves a chamber that will hold two or three capsules each with 50 to 100 anthers. The desiccators can be stored in the refrigerator if the pollen is to be stored for more than a few days. We call it the Rad Pike method because he developed the idea for use with rhododendrons and we have found that it is the most practical yet flexible storage system around.

After the fresh anthers have dried for several hours (I leave them overnight), they will shed great quantities of pollen inside the gelatin capsule and everything is ready for the cross. A small paint brush can then be dipped into the pollen capsule and pollen "painted" on all the freshly emasculated stigmas. I know some hybridizers who stick a flat toothpick into an open lilac flower and use it as an applicator to get pollen onto emasculated stigmas. I defend my capsule/paint brush method because it makes me plan ahead, deciding in advance which plant is to be used as the pollen parent and which plant is to be the seed parent. Also, the brush can do 100 or more pollinations in just a couple of minutes and this easily compensates for the extra step of dipping the brush in alcohol between crosses to prevent contamination.

On the morning that crosses are to be made I go to the selected bushes carrying pollen collected one or more days earlier. After removing all open flowers and emasculating all the buds, I immediately brush on the chosen pollen and then enclose the whole flower in a small kraft paper bag, securing it with a twist tie. The bag protects the flowers from unwanted pollinations and prevents the stigmas from desiccation while the pollen is germinating.

The only thing left to do is to take the records. When talking about the cross I said to find the easiest, most labor-saving method possible, but do not take any shortcuts when it comes to records. The female and male parents as well as the purpose and date of the cross can easily be remembered right after the cross is made, but what about next week? At seed harvest? Or next year? Complicate this by making several similar crosses on the same plant and the need for complete records becomes obvious. If the whole thing is too much to write on the tag attached just below the flower, the cross could be assigned a number and the whole story recorded in a garden notebook. The system is not important, but a complete record of each cross is important.

Seed can be harvested as soon as a few pods start to brown, although I admit that I have checked inside the bag long before this to see which crosses took and which are failures. Don't wait until the pods are all open because some seed could be lost. I break off the entire fruiting branch and slip it into a clean paper bag for storage until all the pods have opened and I'm ready to collect and clean the seed.

Mabel Franklin, Minn. and Misses E. W. and Freda Foerster, Garden City, N.J., arrive at R.B.G..

Holiday Inn