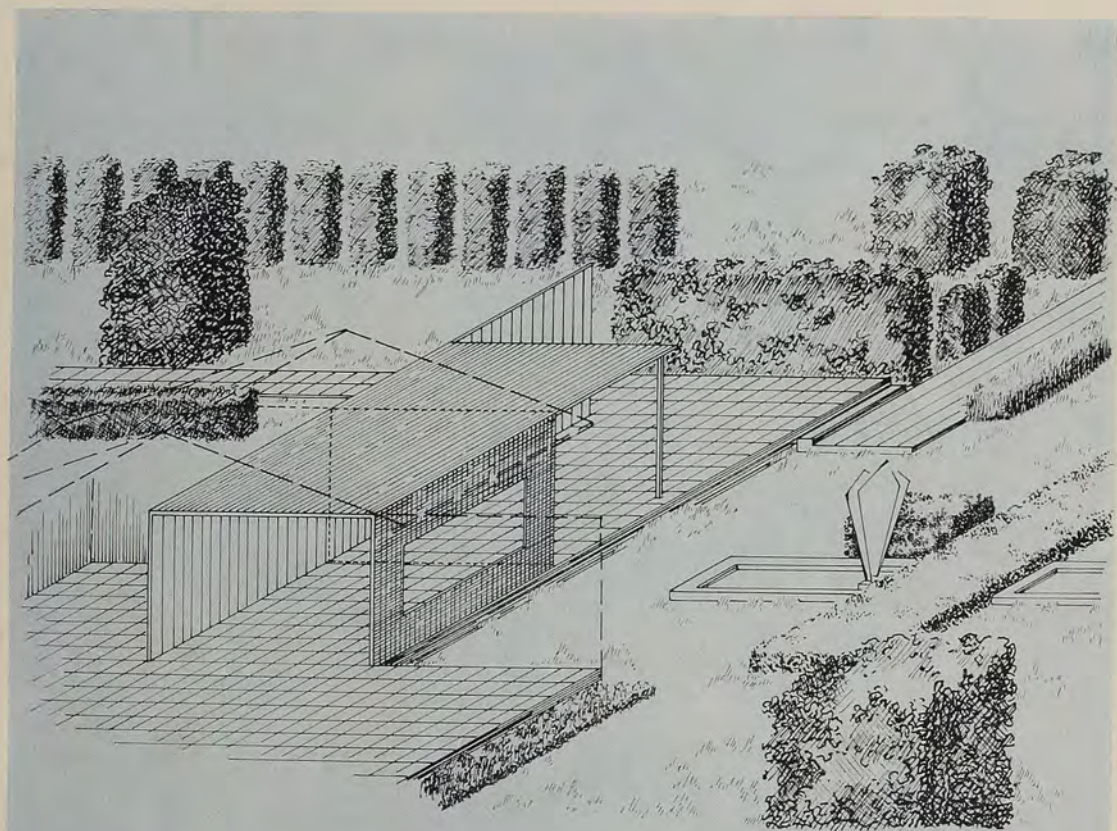


Horticultural

THE NATIONAL
MAGAZINE



DESIGNING AN ENVIRONMENT FOR MAN

- - - integration of the outdoor with indoor space

AMERICAN HORTICULTURAL SOCIETY
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HORTICULTURAL
Magazine



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YEREX BULB FARM

Lilium aurelianense

Aurelian (old Roman name for Orleans) Hybrid of *Lilium sargentiae* and *L. henryi* developed and flowered in 1928 by Edouard Debras of St. Jean-de-Braye near Orleans, France.

The Aurelian Lilies

GEORGE L. SLATE¹

The Aurelian lilies are a very promising group of hybrids derived from crossing various trumpet lily species with *Lilium henryi*. Several generations of breeding and selection have produced a highly variable and beautiful group. A number of named clones and seedling strains have been introduced during the last few years and many more will undoubtedly be named. The Aurelians, when they become better known and more widely disseminated, are destined to enrich greatly our gardens.

The history of this group began in July 1897 when *Lilium leucanthum chloraster* and *L. henryi* were crossed at the Royal Botanic Gardens at Kew, England. The seed parent, *L. leucanthum chloraster*, is a trumpet lily similar to *L. regale*, but the pollen parent *L. henryi*, is very different with its orange, much reflexed Martagon type of flower. One seedling, which first flowered in July 1900, resulted from this cross and it was described as very like *L. auratum* in habit, foliage, size, and form of flower. The flowers had wide-spreading curiously twisted segments with recurving tips, creamy buff in color, becoming almost white with age. This unusual hybrid, which was named *L. kewense*, after its place of origin, did not survive long, but it was figured and described in the gardening periodicals of that time.

Years later Edouard Debras of St. Jean-de-Braye near Orleans, France, was inspired by the account of the origin of *L. kewense* to attempt to produce a similar hybrid. The parents were *L. sargentiae*, another trumpet lily, and *L. henryi*, which supplied the pollen. After many attempts two fertile seeds were obtained in 1925. One seedling soon died, but the other flowered in 1928 and

was named *L. aurelianense*, an old Roman name for Orleans. It soon became infected with a virus, but was tolerant and before the plant was destroyed Debras back-crossed it to the parents to produce another generation of seedlings.

Carleton Yerex, of Newberg, Oregon received a bulb of the original *L. aurelianense* in 1935 and began using it extensively in his breeding work in 1936. Others may have received bulbs or seeds from Mons. Debras about that time.

A third cross between a trumpet lily, this time *L. sulphureum*, and *L. henryi* was made by the late Tom Barry of Lambertville, N. J. in 1933. One capsule of seeds produced a number of very similar plants which were offered in the 1937 catalogue of John Scheepers of New York under the name T. A. Havemeyer. Mr. Barry continued breeding with these seedlings and flowered the second generation in 1937.

The fourth member of this group of trumpet lily species, *L. regale*, has also been crossed with *L. henryi*, the latter being the seed parent. G. W. Skirm has recorded in the *Journal of Heredity*, vol. 33, pp. 211-215, 1942, that E. H. Wetterlow made this cross many times in the previous twenty years without success. Success was finally achieved by Floyd Hager who excised the immature embryos before they aborted and grew them in a suitable medium. When the resulting hybrids were back-crossed to each parent fertile seeds were produced which did not require this special technique for successful germination. Dr. Hager described these hybrids briefly in the 1953 *Lily Yearbook of the North American Lily Society* and noted that they were similar to the hybrids of *L. henryi* with *L. sargentiae* and *L. sulphureum*. There is no record that these hybrids have been disseminated or used by other breeders. We are, therefore, concerned only with the large group of hybrids descended from the original *L. aurelianense* produced by Mons. Debras

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and the descendants of T. A. Havemeyer. These two groups are being merged by lily breeders and because of their similarity cannot be separated.

Mr. Yerex was one of the first to breed Aurelians extensively. Several generations of crossing and the production of many thousands of seedlings have resulted in a number of fine clones and seedling strains. Jan de Graaff, of the Oregon Bulb Farms, Gresham, Oregon, has introduced numerous fine clones and seedling strains. His extensive operations with this group have added and will continue to add worthwhile new varieties to the list of Aurelians.

L. N. Freimann, Bellingham, Washington, and Leslie Woodriff, Harbor, Oregon, have also produced some fine Aurelian types. Edgar L. Kline, Lake Grove, Oregon, has worked with the Havemeyer hybrids and crossed these with the Aurelians.

In the East, Tom Barry, who made the cross which produced T. A. Havemeyer, continued breeding this group for his own pleasure. Several of his hybrids were given to others who recognized their merit and introduced them. The lovely pure yellow, Tom Barry, is one of his hybrids.

E. F. Palmer, now retired as director of the Horticultural Experiment Station at Vineland Station, Ontario, Canada, has raised several generations of Aurelians. He named several fine clones recently and there are several more worthy of naming when sufficient stocks are available.

The Aurelians are a great group of garden plants. The color range is from pure white through ivory and cream colors to pure yellow and deep orange. In form they vary from highly reflexed types similar to *L. henryi* through widely flaring bowl-shaped flowers to the typical trumpets. They vary in flower number and placement and time of bloom. They are beautiful, very spectacular and are greatly admired in gardens and at the shows.

Aurelians and Havemeyer types have come into the market in large numbers in recent years. A survey of recent catalogues revealed that thirty-five strains and thirty named clones are now offered by lily specialists. One catalogue listed twenty-four strains and seventeen clones. They are all described in glowing terms and one not familiar with many of them

would have difficulty in choosing them from catalogue descriptions.

Lily test gardens have not been established as with other flowers and are not likely to be established because of the disease situation. Catalogues, private gardens, and lily shows are the principal sources of information about the Aurelian varieties.

If I were starting from scratch with Aurelians I would acquire several of the named varieties, cross them in various combinations, raise the resulting seeds, select and increase those that I liked, and continue by crossing these selections.

Named clones of Aurelians currently offered by lily bulb dealers, their introducers and descriptions, are the following:

- Alaska (Horsford): white with slight yellow throat, flat, slightly reflexed.
- Apricot Prince (de Graaff): apricot.
- Apricot Queen (Freimann): cream and apricot.
- Bright Cloud (Yerex): white with lemon center, broadly recurved.
- Bright Star (de Graaff): inner half apricot-orange, outer ivory, flaring, star-shaped.
- Coralline (de Graaff): apricot, becoming paler toward tips.
- Edmund L. Kagy (Kline): persimmon orange, recurved tips.
- Eventide (Yerex): creamy saffron, partly reflexed.
- Forsythia (de Graaff): lemon yellow, reflexed, flaring.
- Golden Nugget (Kline): yellow with green throat.
- Ida Jane Calif (Kline): majolica yellow, recurved.
- Ivory (de Graaff): ivory, larger, less reflexed than *L. henryi*.
- Lemonade (Barry-Byam): lemon yellow, flaring.
- Lemon Cup (de Graaff): lemon-yellow.
- Lemon Fair (Gardenside): yellow, widely flaring trumpet.
- Limelight (de Graaff): greenish yellow, bowl-shaped.
- Mme. Edouard Debras (Yerex): yellow, flat, slightly recurved.
- Mei Ling (Yerex): cream with gold center.
- Metawee (Gardenside): yellow, widely flaring trumpet.
- Moonbeam (Palmer): chartreuse with yellow throat, semi-trumpet.

- Pauline Kline (Kline): majolica yellow shading to saffron.
- Shenandoah (Yerex): outer half ivory, inner deep apricot, widely flaring.
- Silver Prince (Palmer): ivory with golden centers, recurved.
- Stardust (de Graaff): white with orange star and green center.
- Sundance (Palmer): yellow, bowl-shaped, petals curved.
- T. A. Havemeyer (Barry): orange-buff, bowl-shaped.
- Tom Barry (Barry-Kline): yellow, reflexed.
- Wahula (Yerex): light apricot, semi-trumpet.
- White Henryi (Woodriff): white with orange centers, slightly reflexed.
- William Bates (Kline): tangerine orange, shading to ivory, slightly recurved.

The greatest asset of the Aurelians is their toughness and ability to perform well in gardens. This characteristic comes from *L. henryi*, one of the most reliable of all lilies, but the trumpet lily ancestors are by no means difficult to grow. Several generations of breeding under garden and field conditions have undoubtedly gradually adapted the group to garden conditions.

Not much is known about their soil preferences, but *L. henryi* is known to prefer medium to heavy loams and not to perform well on light sands. While they may grow on the lighter types maximum performance is most likely to be on the heavier types of soils.

Good drainage is essential as with all of our garden lilies. None of them will grow where the soil is soggy during the growing season.

As a group these lilies are undoubtedly resistant, perhaps very resistant, to the Fusarium that causes basal rot. Susceptible individuals undoubtedly die out soon and only the resistant survivors persist and are used in breeding. Consequently one need not be concerned about this disease. Those who have lost their Fusarium susceptible lilies, of which there are many, can turn to the Aurelians and still grow lilies.

The Aurelians that I have seen are very tolerant of virus troubles. Even though the plants are infected with a virus they turn in a satisfactory performance. They will grow somewhat better without the virus, but only one who has

compared virus-free and virus-infected stocks of the same clone is likely to know the difference.

This virus tolerance is a big advantage with many, but it poses a problem to one who attempts to grow many different types of lilies in a small garden. Viruses are transmitted from virus-infected plants to healthy plants by aphids and when aphids are abundant the rate of spread can be high. This means that many of the finest lilies will soon be chased out of the garden, or at least ruined for garden decoration, if they are grown near virus-infected Aurelians. Among these susceptible lilies are *auratum* and its hybrids, *japonicum*, *rubellum*, *formosanum*, *canadense*, *superbum*, and probably a number of others.

The presence of the virus can usually be detected by the characteristic mottling of the foliage just as the leaves are expanding a few days after the shoot pushes through the soil in the spring. As soon as the plant has experienced a few hot days the symptoms tend to fade and detection of the virus-infected plants is difficult. If one is attempting to grow only virus-free plants, those that are virus-infected should be destroyed or moved to a far corner away from other lilies. Spraying the plants with a systemic insecticide to reduce the aphid population is helpful in greatly reducing the rate of spread of virus, but aphid control will be most helpful if combined with removal of infected plants.

For those who have invested considerable money in a stock of Aurelians, one solution is to cross pollinate them to get a seed crop and raise the seedlings to replace their parents.

Botrytis is apparently not a serious problem with the Aurelians but if it is, Bordeaux mixture at two week intervals should keep it under control.

Frost is by far the worst hazard I have encountered with the Aurelians. *L. henryi* and the trumpet lilies are all damaged by spring frosts and their descendants have inherited this weakness. If frost threatens after the Aurelians are up in the spring they must be covered or the shoot will be killed, or at least the leaves will be badly distorted. Killing of the stem of a young bulblet may result in the death of the bulb. With an older plant, the bulb will survive to produce a smaller stem next year. The season's bloom and the increase in size of the bulb is lost.

PROPAGATION

The Aurelians may be propagated by seeds, or vegetatively. Seed propagation has the advantage that the seedlings start off virus-free. The genetic constitution of the Aurelians is such that the seedlings may be expected to be a highly diverse lot. Most of them will be good enough for garden decoration. Some will undoubtedly be good enough to increase vegetatively for garden use. None should be named and introduced until their merits have been compared with those of the many already on the market and it is clearly evident that they are superior.

My experience indicates that seeds of the Aurelians germinate better at lower temperatures than are required by many lilies. Seeds planted in April after the weather is warm usually germinated very poorly. In October when the weather became cool the remainder of the seeds germinated and the seedlings were killed by subsequent cold. To avoid this seeds were planted in the open ground during mild weather in mid-March. Germination was excellent and a fine crop of bulbs was secured.

The seedlings remained in the seedbed for two years and were then dug and planted in beds to flower. Care of the seedlings consisted of weeding, fertilizing, protection against late spring frosts, and spraying with Bordeaux mixture to control botrytis because of too close planting. Systox was also used as an aphicide.

The seeds ripen late. To avoid injury from a hard frost the capsules are harvested about mid-October when the temperature is expected to drop to the mid-twenties or lower, and spread out in a warm dry place. When the capsules start to crack open the seeds are shelled out and after a few days drying they are planted. This is usually not earlier than mid-November when temperatures are low enough to prevent germination.

Superior seedlings which one wishes to increase may be increased vegetatively.

For garden purposes natural division of the bulb will be fast enough with some clones. Many clones produce bulb-lets on the base of the stem. These can be removed in late fall and planted in nursery beds to be grown on for garden use.



HERMAN V. WALL

Aurelian Hybrid — Heart's Desire Strain



HERMAN V. WALL

Aurelian Hybrid — Sunburst Strain



YEREX BULB FARM

Aurelian Hybrid — Sunshine Flares Strain



YEREX BULB FARM

Aurelian Hybrid — Jewels Strain



Aurelian Hybrid — Mme. Edouard Debras



Aurelian Hybrids — Bright Cloud (top) Eventide (bottom)

Designing an Environment for Man

ROGER B. THOMPSON

PART III

Development of Indoor-Outdoor Space

The objective of any landscape development is to make some designated area of the greatest possible service and satisfaction to its users, physically, intellectually, emotionally. It has always been so. No matter how sizes, patterns and materials have changed during the several thousand years men have been building towns by "moving sand and stone from place to place" and arranging open land and plants into what we call gardens, the ultimate objective has been the same.

The differing patterns these developments have assumed have been due in part to certain short-range or specific purposes initiated by the culture and customs of the times, such as to impress, to seclude, to provide physical comfort or visual delight. Those which have endured have all recognized and accepted the limitations imposed and the opportunities offered by climate, topography, availability of materials, methods, techniques.

Early gardens of the dry eastern Mediterranean and Mesopotamian regions required walls for protection against both wind and marauders, a water source with canals or paths for its distribution. What was more natural than that the well should be centrally located and paths radiate from it in all directions? This basic pattern of the formal garden, often in later days elaborated to the scale of splendor, remained valid as long as it fulfilled the needs for protection, comfort, irrigation and service.

Hillsides of Italy demanded the stone-supported terrace that land should become sufficiently level for use, balustrades for safety, and offered a range of elevation that made water employable in its most dramatic forms, as waterfalls and fountains. The great gardens of 17th and 18th century France, with large areas of level ground, crowds of people to be accommodated and other crowds to supply labor, exploited intricately designed floral patterns, making the art of broderie their own. In England the availability of considerable areas of rolling land, a climate fostering luxuriant growth of grass, the presence of many grazing animals and their ability to do the work of gardeners before the advent of machines for mowing, all tended to make lawns of great importance in the landscape.

What would the historic forms of gardens have been like if climate had been different or events had occurred at other times or other places? How would gardens in "the cradle of civilization" have looked if this land had received the rainfall of Ceylon? What patterns would have come from the Renaissance if Italy had lain in the path of the monsoon instead of the sirocco? By what gardens would we remember France had its servants risen to arms two centuries earlier, or Spain without its Moors? What would have been the fame of the English landscape without, not Brown and Repton, for they merely exploited the capabilities of the situation, but without sheep?

Forces of the same order are operative today, though money may still purchase counterforces which delay their recognition. Through the media of beautifully illustrated books and nationally circulated magazines we have all become conversant with plans of the most imaginative designers of our day. The mass media have spread something much nearer to a uniformity of culture over our three million-odd square miles than anything this land has ever seen before. The same materials, plant and structural, the same machinery, methods, techniques are available to us all, through mail order houses if not locally.

Unfortunately, not everyone attempting to develop a landscape realizes that diversities of climate and topography are still as great as when the first pioneer built the first cabin and planted the first crop. And penalties for disregarding these diversities when formulating landscape plans are still as inevitable as in the day of the pioneer, though their magnitude is not as great. He incurred disaster; we face only discomfort, discouragement and expense. On all counts they are still unpleasantly severe.

Details of solution must be both local and personal, but can we make some general assumptions of our needs and purposes today? Can we develop a philosophy of design applicable equally to all parts of the country, or at least to those parts with a general uniformity of culture? I think we can. It must be built around the needs of people in the United States in the latter half of the twentieth century. It must be general and flexible enough to sway with the times, sound enough to penetrate local prejudice, cohesive enough to bring together the clouds of half-formed ideas, half-realized emotions.

The greatest need of people today, as I see it, is space in both its physical and psychological aspects. Space must be large enough to accommodate all the dimensions of man, his physical size, his numbers, his activities, and, even though any or all these may be quite small, the illimitable reach of his mind and emotions.

Physically, the cost of indoor space has risen so high that few of us can afford enough, and this expense has drained our pocketbooks to such a degree that we feel unable to spend much

for outdoor space unless we are very certain it will become a valuable investment. Yet everyone who has 1000 square feet of his property under roof probably has at least 4000 more to be maintained in some fashion, the 50' x 100' lot being the usual minimum, and he with 2000 to 3000 square feet in a home usually has 8000 to 18000 more available ($\frac{1}{4}$ - $\frac{1}{2}$ acre).

Psychologically, the situation we are all facing now, and have never before faced in this country except as a wartime imposition, is loss of fields of action in which personal decisions form a major source of satisfaction, where a person can be himself and exploit his personal resources to the highest degree. This is a normal consequence of expanding areas of high population density, and the almost universal possession of lethal machinery demanding a high degree of control and susceptible to a high degree of accident. The situation cannot be expected to become less onerous with time.

Man individually must be given the means for personal expression, for the experience of personal control over a larger portion of his universe than he is now accustomed, if he is to retain his sense of freedom in an ever more rigidly controlled world and to mature his feelings of stability and confidence. It is not impossible to create within the confines of a residential property of small to moderate size an environment, stable in its major aspects yet of infinite variety and abounding with continuous change, that will yield satisfactions inexhaustible in a lifetime. It would be impossible to do this within the house alone, within the garden alone, or even within the two as separated by the usual walls, which limit the possible number of environmental situations. We must learn how to employ the total property for living, and how to live in it in ways that will exploit the full richness of its possibilities. Why should we not employ it as living space from boundary to boundary and, as the surroundings may permit, assume views into the landscape far beyond? This has been done. But not often in this country.

What is the first step in the development of any property, that it may be filled with rich and rewarding experiences? Where shall we start? The only logical place is at the home, the place

where we inevitably will spend the greater portion of our time not assigned to the business of earning a living, where comfort demands that we exert the highest degree of control, and where the cost of development is greatest.

What is a house? It is a tiny bit of cubical space which man has separated from the all encompassing void. The enclosure of its walls and the shelter of its roof permit him to maintain in this small area a more comfortable climate, warmer, drier, with less air movement. During recent years he has also found himself able to make it cooler, to moisten and cleanse his atmosphere and move it about his rooms at will, thus thwarting all the vagaries of weather.

When he first built homes it was for simple protection from the extremes of weather and from marauders. Control of temperatures within progressed no farther than the fire on the open hearth, the campfire brought indoors, until very recent times. My great-grandfather owned the first stove in our home town, so family tradition has it, for he was a comparatively well-to-do man, owning one of the infrequent stores or taverns on the "North Great Road," twenty miles out of Boston.

With the stove came more efficiency in heat distribution, it is true, but still the requirement for manual operation and control. Later, much later, with development of a new power source and complex equipment, came complete, precise and automatic control of his little artificial climate. Builders today are able to advertise "automatically climate controlled homes" as not even any longer the height of luxury but a necessity, a necessity at least for their own continued existence in a highly competitive market, indicating the degree of consumer acceptance and demand. Yet the unvarying temperature of 75° within man's artificial shell may not be the greatest of man's needs. If it is coupled with loss of communication, except through the tenuous medium of an insulated wire, his sealed cell, comfortable as it may be to the body, and to the whole person as a retreat in times of stress, may have its imperfections.

Before the advent of transparent building materials every house partook largely of the qualities of the cave, with

wall impervious to both light and air, the small openings shuttered with stout barricades except when needed for light or ventilation. The imagination takes a long stride backward in time to recall that man could not only survive but culture could develop in such conditions, until he is thrust back bodily by stumbling upon such primitive enclosures, singly in mountain cove or prairie interval, row on row in a few parts of the older country where the great fields have not yet taken them. Of board and batten or occasionally brick, with plank doors and shutters over openings innocent of glass or screen, the interiors soot-black with the smoke of cooking fires or insect smudges, we find a few still occupied by human beings, though the greater part now most mercifully abandoned to the dooryard weeds. It is not so many centuries ago we all lived thus.

Glass in even its most primitive forms, translucent or distorting, at least established continuous communication with the day, and in its perfected transparency with all of the outside world. Long reinforced with bars, and at night with wooden or even iron shutters for additional protection, with developing culture and techniques these guardians have given way to police and thermopane.

Even the familiar mullions and minton are disappearing. With improved facilities for manufacture and fabrication came increase of unit size from a few square inches to more than that of a man's stature. It is now possible to build a house with all walls of complete transparency except for a few lines of jointure. Has total communication with the outside world now become reality or is glass still a wall?

With each decrease of opaque enclosure has come a decrease in awareness of separation between interior and exterior space until, with the complete glass envelope, possibility of any separation may be forgotten. Man bumps his nose; birds strike with stunning impact.

When space lacks form, man lacks guidance. The experience is empty which should be rich. Or, confused by an ambiguous position, the experience of the unseen barricade frustrates as surely as the bar of iron. Clearly, total view is not the answer. Freedom of passage in some way must be signified. Space must

be given direction; man must be guided easily in and out. The wonder of perplexity must give way to the wonder of delight.

Separation of interior from exterior space is most noticeable when the characters of a maximum number of surroundings are changed most suddenly, as when in two or three steps one moves from the enclosed room to doorstep, path, and the lawn beyond. The enclosure of the building is seen to give way on all sides, walls and roof disappear, the floor drops inches below its former level, and is suddenly felt as a new surface, rough or resilient, or in winter hazardous with ice. Space has suddenly expanded, and perhaps become completely undefined. All forms and sizes of objects, their colors and textures, have become completely new. The qualities of light, temperature, and air are sharply changed when one passes the rigid line of the door. One is either indoors or out, and no mistake about it.

Contemporary architects, by leading us to these new experiences one at a time, have been able to reduce the shock of emergence so we no longer suffer the sensations of a chicken breaking the egg each time we leave the house, and need not feel sensations of incarceration upon returning.

They have done this by bringing the indoors out, by extending for a distance the familiar surfaces of walls, floor or roof, those elements that give form and direction to space, into the landscape, partially or completely dropping away each in turn, or changing its direction, size and material and thus its surface characteristics of texture and color, until we find ourselves in an outdoor environment completely different in all its qualities from what we have just left. This is the old principle of transition developed in a new context.

It is interesting to watch responses to this situation by people accustomed only to conventional dwellings, as occasionally may be done when a "model" home of real excellence is opened to the public. Reactions range from, "What's he trying to do?" to, "Oh, I like this"! Or, as one lady who came to a sudden stop some four yards after passing through a panel in a glass wall doubted to her companion, "I don't know whether I'm going to like this house or not. I'm not quite sure when I'm *in it*."

In this instance the lady, in passing through the open panel but retaining the sense of roof continuing overhead, the touch of the floor continuing at the same level and with the same material beneath her feet, the wall at her right hand, had not quite realized that the glass wall on the other side had been left behind until, as the space turned, she found herself on a smooth terrace, almost completely surrounded by lawn.

By such methods, instead of two clearly defined spaces, indoors and out, we now have a great number of spaces of varying character and size, each able to provide us with some degree of protection (the intrinsic quality of the house) and exposure (the intrinsic quality of the out-of-doors). These situations, more varied than we have known before, are each a habitat, each useful in its own way to both man and plants. Suitability of the habitat assures not only survival but vigor, luxuriance and fruition to plants. Does it mean less to man?

The direction we must go is outward, step by step developing areas partially enclosed and therefore less expensive than those indoors. This process of expansion need only be arrested by the limits of the property, not even there in some few instances where an advanced type of community planning has provided easy access to semi-public parks.

Usefulness of any space varies with degree of enclosure, orientation and accessibility. There are few properties that cannot have at least (1) privacy everywhere sufficient for the activity, (2) shade in some useful place during all parts of the day, (3) protection from cold or drying winds wherever necessary. Costs usually range from \$1 to \$4 per square foot, depending upon character of enclosure and materials involved, as compared to \$10 to \$12 per square foot for the house itself in most parts of the country. Where plants are the chief material it may be considerably below this minimum. But who can truly assess cost and value? What is the value of a man's life?

Is all this new? Or did the peasant in generation after generation of past time pave his dooryard with flags, shelter it with apple tree or arbor for the vine, and carry on the more portable tasks of the household here for exactly the

same reasons that we now build terraces and erect shade today, because he needed space, and during certain seasons this space was cheap and useful?

Attempts to effect transition by bringing the outdoors in, extension of the position of plant materials, even when confined to the rigid form of a planting box made to penetrate a glass wall, to date usually have been much less successful. Except in sub-tropical climates it is seldom that plants of sufficient similarity can be grown on opposite sides of the glass and made to coordinate with the remainder of the visible out of door plantings to give a real feeling of continuity. Also, in many instances selection of plants for planting boxes seems to have been made with the objective of providing the utmost of diversity, rather than either the construction of a unit coherent in itself or the establishment of a transitional element which would improve indoor-outdoor relationships.

Plants which determine the structure of a landscape, which are used to surface, to enclose, to shelter, and by so doing to give form to space, should be looked upon in the same way that we regard the structural materials of which the house is built. Each has its particular form and surface characteristics. Selection of the plant should be determined by the structural and visual requirements of the situation. The selection of any shrub for enclosure would be determined by how well its characteristics of size, form, density, texture, color meet the requirements of the particular situation.

This is the way the architect selects materials for building, knowing that the appearance of the building is determined by the character of its materials and the methods of their assemblage un-

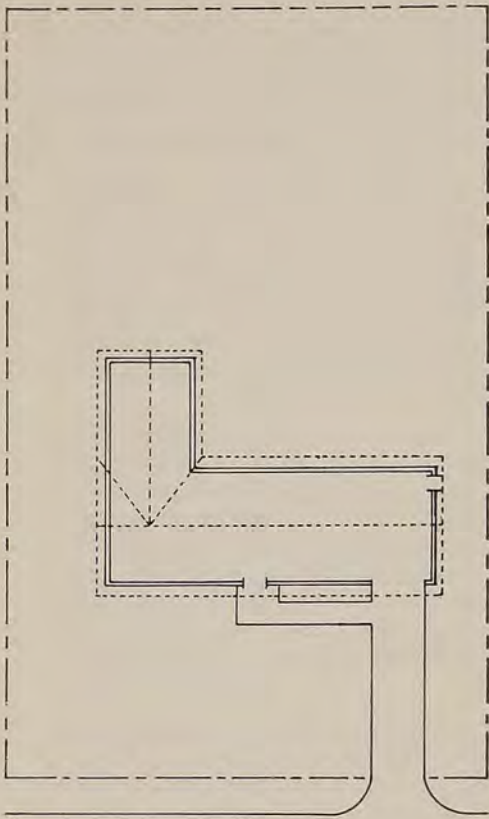
less the surface is to be covered with some applied coating, such as stucco, which will conceal all beneath. This is the method of the landscape architect in selecting the materials for a garden.

With the development of new spaces, that is, of spaces with new form, size, continuity and use, comes need for re-appraisal of all materials, both living and architectural. We need to become more fully aware of the contributions all may make to the definition of space and the enrichment of its defining surfaces.

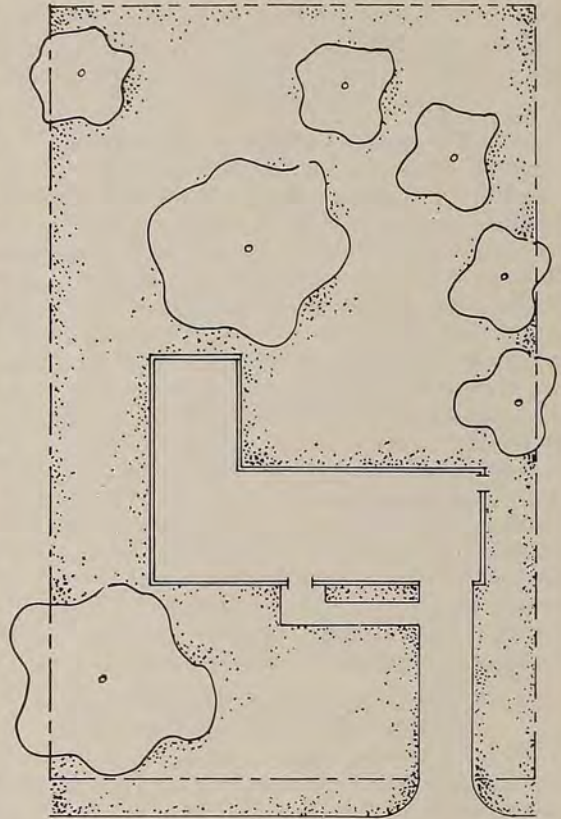
Small but notable beginnings have been made during the past generation. Fences are no longer all of pickets painted white, with individuality permitted only in the pattern of scrollwork upon the picket. The newer materials, patterns and colors do much more than express convention and status; they give us new feelings within the spaces they enclose.

The more frequent use of small vines and other ground cover plants "to add interest" (really, to enrich ground surfaces with new forms, textures, colors) has had the added effect, by denying passage, of giving form to the intervening spaces.

All these works of architect and landscape designer have given clues to methods of formation, integration and enrichment of space. We need now to extend and amplify. We need also to consult the nature of our experiences within these spaces. We will gradually learn how to produce those that are most rewarding, that give us needed peace or stimulation, and return to us the feeling that here we have produced an environment where we may most fully develop our individual potentialities.



a



b

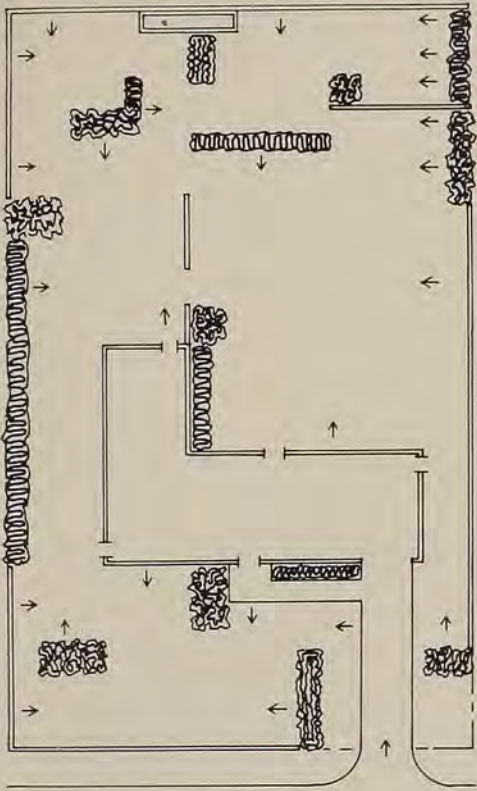
a *Typical plan of a small house and lot, as might appear in a deed.* Areas shown are within the house (where a high degree of control of privacy may be obtained), the rear of house (where some privacy from neighbors but little from other residents of the home is usually provided), and the area between house and street (where control is seldom attempted).

b *Shade pattern from plantings and house.* This alone might be the first step in a low-budget development, since it brings coherence to the entire area.

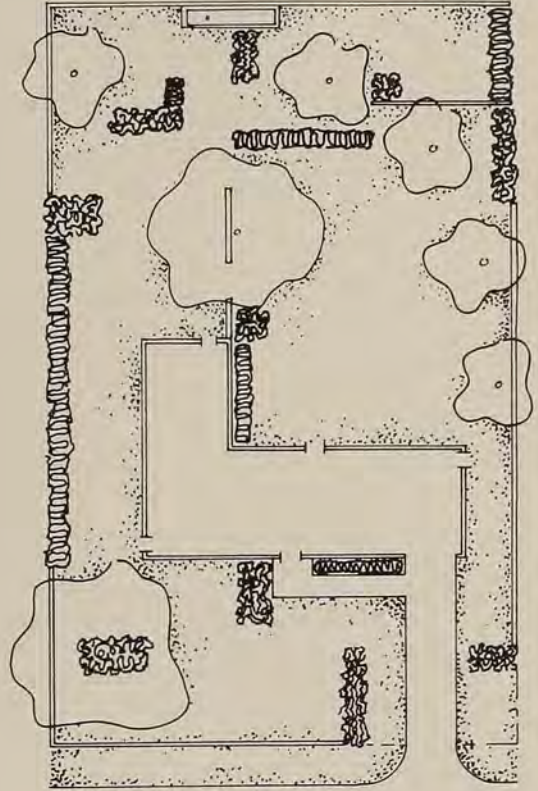
c *Position and size of areas, and character of separation between them.* Heights of separations are not indicated—they might range from a few inches to above eye level. Turn illustration and view from direction of each arrow to see variety of views obtainable. Twenty-five are indicated; many others are possible.

d *Space, separations, and shade.* A complete plan would also include pavements, shelters, seats, etc., and more plants for purely decorative effect. This would require a large-scale presentation for clarity.

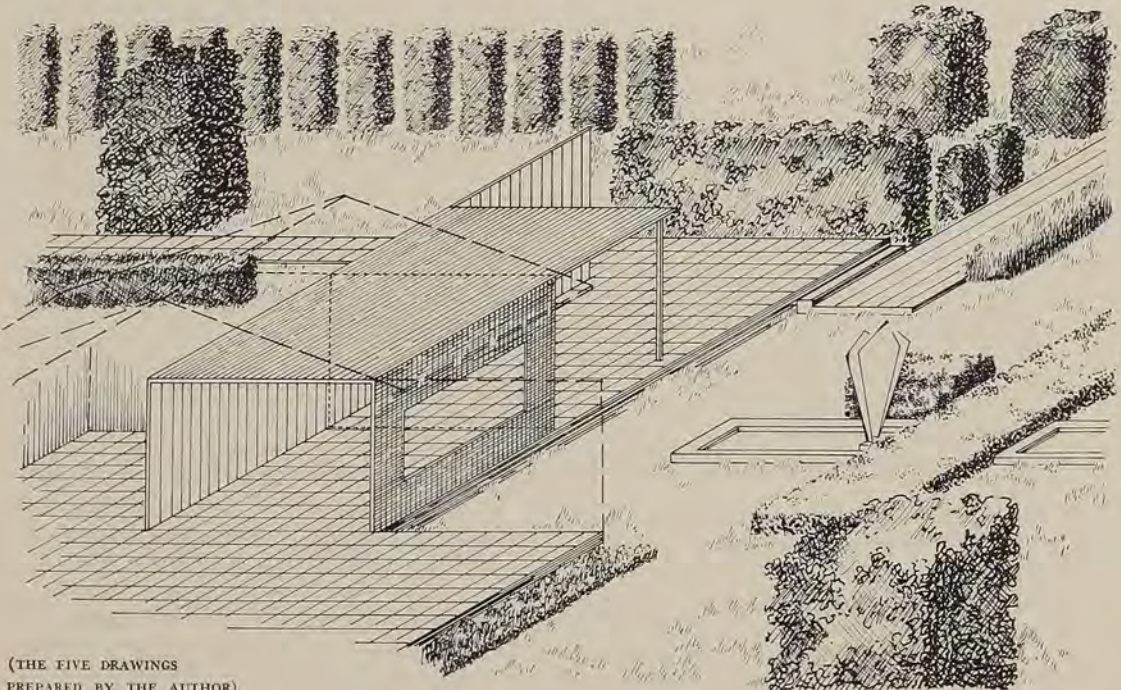
e *Integration of outdoor with indoor space.* Position of house is indicated by floor and dashed lines. Enclosure of one room is shown in detail, extending to glass wall at dotted lines. Floor, roof, and one wall are extended into the landscape. Outdoor space is developed as a series of "rooms," each enclosed to a greater or less degree as privacy may require. Foliage masses are presented in cubical form for clearer three-dimensional effect, but are not to be considered as necessarily clipped.



c



d



e

(THE FIVE DRAWINGS
PREPARED BY THE AUTHOR)

Designing an Environment for Man

ROGER B. THOMPSON

PART IV

The Enrichment of Experiences

The house and its surrounding landscape, if it is to become an environment in which man may flourish and develop to the highest possible degree, must furnish him with those experiences for which the practice of his occupation and his outside interests offer him no sufficient liberty of action.

Few of us, perhaps none at all, completely understand our needs for happiness in this increasingly complex, abundant and wasteful culture we call American. Many who formerly felt that they possessed a large degree of control over their lives and have now lost it, many who have never known this control and are now seeking it, sometimes in directions dangerous physically, economically, emotionally, may find in a small property designed to suit their personal needs answers that are elsewhere absent.

This end, individual fulfillment, is what all the more perceptive landscape designers, professional and amateur, who design for individuals are working toward. The forms they discover may be strange, but if they clearly meet individual needs they are not capricious. They may become so when copied, for then they become the phrase out of context, the transplanted organ in an alien body.

All organizations of space, all arrangements of materials, are empty achievements if they fail to contribute to the enrichment of the experience of man. To make them rich he may need guidance, not obviously with printed signs, but through direct impact upon his

senses of experiences of pleasure, of realization that these are things of value and reward.

In the northeastern part of our country the typical house is still seclusive, inward-looking, still partaking of some of the qualities of the castle. Proportion of wall to window space is relatively large, number of exterior doors a minimum, their positions restricted to permit access only to particular rooms. Original reasons for this are quite obvious in the north-European heritage, the frequently inclement climate, available materials and social attitudes. The characteristics have been perpetuated by a firmly ingrained idea of "what a house should look like" long after changes in these factors have made such a type of building unnecessary. An additional factor still obtains and has become increasingly important: the need for privacy where window stares at neighbor's window at close range.

Farther south, under the more benign architectural influence of France and Spain and a more than casual connection with the West Indies, the long period of heat and humidity, and a culture more free in its interconnections, more open forms developed. The long hall of the antebellum mansion opened straight from front doors to doors opening on the garden, partially freeing the house space from its enclosure. French windows in series laid open whole sides of rooms, or wide galleries encompassed the entire body of the building.

It was only a step from these, with new materials and methods of construction, to the outward-looking house of today. This new type was first and most eagerly accepted in the far western region where physical and social climates found its particular characteristics most advantageous. With its glass walls and partially enclosed terraces, its opening up to let the outdoors in and pushing out to include greater freedoms under the sky, it provided satisfactions hitherto unknown.

The architect, while developing the outward-looking house to its present degree of permeability, has been slow to develop new ways to control the inward view. Often it appears that all thought of control has been abandoned, except that which may be periodically applied by the drawing of some sort of blind or curtain. The inevitable result of this archaic method is a reduction of view outward, a contradiction of the purpose for which the wide expanse of glass was intended. Fabrics of even the most contemporary materials render it more or less translucent; the most artful use of opaque materials fractures it to splintered patterns of transparency and cover.

If the architect has lost control of his space, it is within the power of the landscape designer to regain it. We have only to abandon the concept of the house as a completely independent unit and to accept the idea of house and landscape as complementary parts of a more commodious unit, the total living space of the property.

Wide public acceptance of the outward-looking house in all except spacious grounds, where privacy may be obtained by distance, may depend upon development of this complement, the inward-looking landscape. I have heard too many comments such as, "It was nice, but we couldn't *live* in it. There wasn't any privacy." Yet, in all such cases I have examined, the house was a beauty, most sensitively and efficiently designed. Deficiency lay only in its surroundings.

How must this inward-looking landscape operate if it is to fulfill all the new demands upon it? It must pick up the operational ideas of the architect and extend them to greater distances and ex-

panded areas. The house is organized to accommodate all the needs of the family throughout the changing hours of the day, and to anticipate the family's changing needs as it varies in composition and structure through the years.

The variable requirements of age and sex and personality insistently demand changes in environment wherein the different interests of the individuals may find expression. It must somehow meet all the needs for work and active play, for privacy and rest and relaxation. Childhood, adolescence, maturity and decline must find here the answers denied in the increasingly public world. The landscape must operate as the house operates, but on an enlarged scale.

What forms must it assume if it is to meet these needs, or do the persistent variables preclude suggestion of any definite form? Houses, certainly, have clear forms, although the present trend is toward an increase of interior flexibility and exterior variety. All landscapes that have met with approval for long periods of time have also possessed a clarity of form so evident it was not easily obscured by abuse or neglect.

The "informal" and "naturalistic" are subject to rapid degradation when denied sensitive care, since the process of growth implies continuous change and demands continuous selection during the activities of maintenance. Not even the most comprehensive blueprint can include the entire vision of the designer. When he ceases to direct, his incompletely understood intentions are easily subverted.

The "formal" garden, on the other hand, possessed great clarity. Its form was indisputable. The designer's intentions remained clear to generations of maintenance men who sheared hedges and trimmed walks to precise lines, permitting no noticeable deviation from decade to decade. Though the rigidity of the formal garden has long been criticized, the deficiencies of this type of organization did not lie so much in its possession of precise form as in its lack of variety in spatial patterns, and redundancies forced by adherence to the idea of bisymmetry, a redundancy which even a complex arrangement of

cross axes and terminals could not disguise.

The result, on the small property where space for development was insufficient for multiple gardens which might vary widely in character, was monotony and a lack of the element of surprise. Pleasure does not lie in the continuous observation of one object, no matter how beautiful, but in the comparison of objects of different character, the opportunity to select objects to suit the mood, and arrival of the unexpected. To satisfy our present needs all of these qualities, as well as clarity form, should be present. Some truly amazing results have been achieved within the confines of very small properties.

How may integration of indoors and outdoors be accomplished? When viewed from the interior, the dissolution of the wall as barrier to view and to movement, the extension of the room as space, of its surfaces as continuing forms, colors, textures combine to produce this effect.

Any reduction of impervious wall is of primary importance. Since, in our temperate zone, another material must be substituted to provide climate control, we commonly become more quickly aware of increased expanse of glass than of diminished brick and plaster. The effect on spatial integration becomes striking when glass extends from floor to ceiling, giving one the feeling of being able to walk through it, and reaches its ultimate when it stretches across the entire room from side to side.

But liberation of view is merely permissive. If one is to actually walk out one must have something to walk upon. Extension of the floor at the same level is an obvious second step. It becomes most clearly an extension of the indoor floor if indoor textures and colors are retained.

Extensions of walls and roof have similar uses, but must be employed with somewhat more caution and examined more carefully for both interior and exterior effects. Walls are more important than floor or ground surfaces because they approach or exceed the eye level, and therefore contribute more to the feeling of enclosure. A roof overhead is

of even more importance than any wall, being very closely associated with feelings of the complete enclosure of space.

The extension of too many of these surfaces, however, simply serves to continue the complete enclosure rather than to effect transition. There must be a gradual breaking away of the restrictive forms, the termination of a roof, the change in direction of a wall, and change in level of a floor. Steps down or up are always significant of an end or a change in character of movement, and even the thought of movement. The small porch at floor level will appear more a part of the house than a large terrace below a flight of steps, and will be more freely used unless the latter has superior attractions. With every step away comes a feeling of increased freedom coupled with the feeling that we are still in personal though more lax control.

When seen from the outside, these extensions of the building forms, colors and textures are felt conversely as a gradual enclosure of space, an increase in protection and degree of control.

The extension of structural materials into outdoor space need not diminish the use of plant materials and will probably suggest additional possibilities for their employment. Plants divide as well as occupy space, just as structural materials do, and increased opportunities for display against a contrasting background promote increased use. The landscape where we see either of these exploited to its highest degree is rare indeed; the generality are barren in comparison with the richness of their possibilities.

Shrubs and small trees used either singly or grouped in their conventional patterns, except as used in formal gardens, do not divide space clearly, and consequently do not give us a clear perception of spatial form. The typical "group of three" is often of indefinite form, and when succeeded by other groups of dissimilar character may produce confusion. The assemblage of more plants of the same species into forms of greater clarity gives greater clarity to the spaces between them. This does not, most emphatically does not, imply that they should be planted in straight lines

or should be sheared or clipped in any way. The accompanying diagrams have been greatly simplified in order to show as clearly as possible the meaning of form of objects and form of space. In actual practice all possible diversities may be used.

Nor will the use of single plants be diminished. Rather, the opportunities for use of single plants will be increased as the number of possible backgrounds of differing forms, textures, colors is increased. The "specimen," isolated in space and without clear relationship to its nearest neighbors has always been distracting. The same plant used as climax becomes the "something added" that gives distinction to the scene.

Foliage seen against foliage permits only a limited number and range of contrasts. Extension of the structural materials from the building, perhaps even to the perimeter of the lot, greatly extends possibilities for both number and diversity. Contrast between Southern Magnolia and Thunberg Spirea is about the limit when using foliage alone, but when the two are opposed to red brick and glass the possibilities for dramatic display are immeasurably increased. Shadows cast by foliage on foliage are largely lost, but shadows upon the smoother surfaces of refined structural materials are an additional beauty, not only momentarily but for their continuous change.

These attributes of the contemporary landscape, the clear forms of masses, the diverse forms and sizes of related space, the multitude of contrasts, can produce a mosaic in three dimensions stored with refreshing surprises that open new worlds of delight at every step. They have power to bring the luxury of landscaped acres within the dimensions of the city lot, of the modest pocket book, of time and energy consonant with the demands and permissions of our present culture. Above all, they have a flexibility to meet personal needs that neither the conventional formal, informal or naturalistic could provide.

The large remaining question is: how does one proceed to plan all this? Although many ideas will inevitably crowd the mind at all times, the making of ma-

ior decisions in the following sequence will help to bring order.

1. Plan position and size of outdoor areas according to the uses required of them by the particular needs of your family. Position should permit easy access from areas indoors to areas of similar use outdoors. Are there enough doors in your house? Size will be determined by numbers and activities of the people, and will be different for each family. As the family changes, size and use of areas will often change. Shape will depend somewhat upon factors to be considered later, so should not be precisely determined at first.

2. Plan formation of the ground. Where tables and chairs are to stand or competitive games played the surface must be essentially level. Leveling of land implies cutting and filling, and these in turn imply short, steep slopes to compensate for the longer, gentler ones that have been leveled. Such slopes act as barriers to movement; they will affect need for other separations, and possibilities for circulation. If drainage pattern has been upset, now is the time to reorganize it.

3. Decide upon position, height and density of separations between areas. Sometimes we find that low barriers are sufficient; a patch of ground cover or a shallow pool will block traffic without obstructing view. A line of three-foot shrubs allows one to sit in privacy with only the face exposed, or sprawl entirely concealed. Five or six feet of height gives complete seclusion.

A small tree lets view beneath, but may completely block view from a neighboring window. The tall perimeter planting is seldom necessary. People habitually use only a restricted number of places, so we usually find complete blockage warranted only on lines of sight between these.

4. Lay out the circulation pattern between house and grounds and between spaces of different use, so that those devoted to the more general use shall have the greater freedom of access, and those where privacy is desired shall be not only assured of privacy but accessible by private means.

5. Refine all forms. Some plan first with stiff circles, squares or rectangles. Compressions and tensions against these transform them into shapes more useful and often more exciting. Others do all the early work with a slack, indifferent line that needs sharpening with a few vigorous pulls this way and that to snap life into it.

Now is the time to really put yourself into the design and imagine what is happening to you there. Few have the ability to do this when examining the plan from one position only. Faults and unnoticed opportunities appear when you observe it from all sides and trace your own progress through the grounds in all directions.

6. Shade must be provided where shade is needed. Shade patterns change continuously. Something must be known of daily and seasonal activities before these can be planned.

When shade is required early or late in the day, when the sun's rays are at a sharp angle with the horizontal, the shade producer or shelter will not be directly above the ground shaded. Vertical surfaces, such as the west sides of buildings, need vertical screens for shading.

7. Examine every surface, every separation and shelter, and decide whether plant or structural materials will best serve the purpose. With surfaces the amount of wear they will receive, or in what weathers they must be used, may be of critical importance.

A fence may be given preference over a shrub mass simply because no more than a foot of width can be spared, or because it can give privacy tomorrow. Nor is it practical to wait years for a tree to grow if sun is giving you discomfort today. Planning for both present and future will prevent sacrifice of either.

8. Organize textures and colors throughout in such terms as coarse, fine, dark green, light yellowish brown. Be guided only by needs of the situation, such as intensity and direction of light that will be thrown upon them, and the relationships between one and another and to the whole.

9. It is only now, after all relationships of mass and space, color and texture have been planned, that we can

safely name the plants or other materials which will bring them to reality. Thinking in terms of names too early in the planning always brings in feelings of like and dislike. There are not so many things available that we can afford to eliminate any by prejudgement, nor should we reduce our desires because we cannot at the moment think of anything that will fulfill them. The "best possible" development can never be made unless we keep our eyes continuously on this goal. Modifications we may have to make, but the time for them is at the end, not the beginning.

Sources of esthetic pleasure are not easily defined. Critics have sometimes identified it with complexity and difficulty of comprehension, but these ideas cannot be carried to their ultimates without producing chaos and frustration. We can, however, profitably aim toward some ground midway between monotony and chaos, seeking the degree of ordered complexity that will give most pleasure to the particular users.

In order to achieve this it is necessary that order should be recognizable. The greater the complexity of detail, the more simple it is necessary to make the basic forms lest they be obliterated, as a mass of rococo ornament on a building submerges all but the most basic features of its structure. Conversely, as complexity of basic forms increases, that is, as the rectangle and readily apprehended curve give way to "free forms" and angles no longer right, the more need is there that these forms be clear and not overwhelmed by diversity of smaller forms, textures, colors derived from plant or other materials.

The wealth of possibilities in the 50-foot cube of even the small back yard are far greater than most people realize. A rectangular or irregularly shaped lot offers more than a square, a sloping one more than one completely level. This implies that it will often be useful, when we come to divide space, to create within the rectangular lot smaller spaces of diverse forms, and to deliberately raise or lower the surface of portions of a property that is too obviously flat.

These ideas are very old. Formal gardens of two hundred years ago often had their beds broken into triangles and

complex curves; the mound and sunken garden were common landscape features. It is only that since we abandoned these details we frequently seem to have forgotten that they were based on sound principles which we may profitably recall.

Complex and changing patterns of human culture have been continually operative, absorbing, discarding, combining, resisting. Each culture looked back to those that had gone before, the present always carrying with it some of the past, presenting something to the future. Each adapted to local situations, developing new patterns of its own.

It is the function of the artist to direct the attention of man toward qualities of this world of which he might otherwise be unaware. The poet does this with words, the painter with his colors, the landscape architect by the organization of space, the selection and arrangement of materials into forms that bring new meanings to experience. His purpose is to design an environment more appropriate to our society, not a retreat from massculture, but rather an adventure into the unexplored world of the individual.

If the landscape is to be truly the environment of man, the "best" landscape is the one that best serves man, biologically, socially, economically, culturally, emotionally, both stimulating and soothing in its various aspects. In it he commonly grows plants, but he grows them because to do so satisfies his own needs for growth.

Landscapes created for man are particular and personal, as each man is particular, and are built to serve his particular purposes and fulfill his particular needs. Casual visits, as to parks and gardens of our friends, do not give experience in depth. There is neither time nor incentive for involvement, the state in which personal response becomes so complete that the contribution of the environment becomes permanent, continuous and reciprocal. The recipient needs to become saturated, not veneered, a surface easily lost in an abrasive society. Here he may pursue the eternal quest of man: manfinding. Here he may find himself, in company or in solitude, in space, in the clear articulation of sculptural form or the small splendor of the intricately structured leaf. What are the dimensions of a man's life? In this small personal cosmos he may find himself larger than he thought.

Names for Cultivated Plants

FREDERIC P. LEE¹

A uniform international system for applying names to plants has to meet problems attributable to two opposing plant characteristics, natural variation and man-induced uniformity. Variation, great or small, is found between all the innumerable individuals that compose the wild plant population of the world. This produces an urge for classification and division for working purposes into a hierarchy of smaller and smaller groups whose members have more and more characteristics in common; and so the International Code of Botanical Nomenclature, commonly called the "Botanical Code." The members of the smallest of these groups, *species*, are still varied and differ one from another genetically just as do people.

On the other hand man by his techniques of vegetative propagation and line and line-hybrid breeding, can establish groups of plants all of whose members are identical, or in case of line and line-hybrid breeding, are substantially uniform. These groups are primarily dealt with by the new International Code of Nomenclature for Cultivated Plants.² Commonly it is referred to as the "Horticultural Code." Since, as finally prepared, the Code is directed to agriculturists and foresters, as well as horticulturists, it is likely to become generally known as the "Cultivated Plant Code" and is so referred to herein.

BOTANISTS' CATEGORIES

Botanists like Latin. Under their Code botanists classify plants in Latin-named categories by a descending sequence, as follows: *divisio* (division), *classis* (class), *ordo* (order), *familia* (family), *genus* (genus), and *species* (species). As the scale is descended the number of similar characteristics in form and anatomy among plants of the groups increases while at the same time reproductive isolation diminishes and ability to hybridize increases. For example, rhododendrons belong to the division *Spermatophyta*, the seed bearing plants; the class *Dicotyledonae*, plants with two cotyledons in the seed embryo; the order *Ericales*, which is a grouping of several related families, one of which is the heath-like plants, the family *Ericaceae*. This family includes among its 70 or so genera, the genus *Rhododendron*, which has around 800 species, such as *Rhododendron maximum*, *carolinianum*, *calendulaceum*, and *catawbiense* found in the Appalachian Mountains.

Each of the above categories may also be divided into subgroups, as families into subfamilies, genera into subgenera or series, and species into subspecies. Sometimes the botanists add in *tribus* (tribe) between family and genus and *sectio* (section) between genus and species. Plants within a species (or subspecies) may be segregated geographically or by some sporadic characteristic into a *varietas* (variety or var.) or *forma* (form or f.).

A botanical species is a group of numerous individual plants, usually within definable geographical limits, all with so many common characteristics transmitted by seeds without loss from generation to generation, that the plants are considered closely related and of a common descent. They are therefore

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²Copies of the Code are obtainable from the Secretary, American Horticultural Council, c/o Arnold Arboretum, Jamaica Plain 30, Massachusetts.

given the same name. The species name is the Latin name for the genus plus a Latin epithet. For example, *Ilex opaca* is the species popularity known as the American Holly, *Ilex* being the name of the genus and *opaca* (meaning dull surface) being the epithet which designates the particular species. Some American Hollies have yellow instead of red berries, thus *I. opaca* var. *xanthocarpa*, or entire, non-spiny leaves, *I. opaca* f. *subintegra*. Since yellow berries are not a geographical, but a sporadic, characteristic, probably *xanthocarpa* should be a form and not a variety, but botanists, like the rest of us, are not always consistent.

HORTICULTURISTS' CATEGORIES

The Botanical Code has never adequately covered the stable groups of identical or substantially uniform plants which are important to the gardener. This stability, as opposed to natural variation, may be brought about in several ways. Three are common.

Clone—One way is asexual or vegetative reproduction by cuttings, grafts, layers, or divisions of a single plant selected for its outstanding characteristics. The original selected plant and the aggregate of plants descended from it by vegetative reproduction constitute a *clone*, as *Ilex opaca* Delia Bradley. The plant selected for vegetative reproduction may be one of the individuals composing a species (or variety or form of a species), or it may be one of the individuals composing a group resulting from natural or artificial crossing or hybridization of plants. All plants of a clone are genetically identical.

Line—The second way is by repeatedly propagating sexually from the seeds of a clone or of an in-bred line but each time roguing the seedlings to a uniform standard of appearance with respect to desired characters. The population so maintained is a *line*, as *Petunia* Rosy Morn or *Rhododendron* J. C. Van Tol. All plants of a line, while they may not be genetically uniform, are substantially uniform in appearance for gardening purposes. An occasional aberrant plant may still appear in the garden and need to be rogued to preserve the uniform appearance.

Line-hybrid—Still another method of stabilization is a first generation hybrid group regularly reconstituted by repeating the cross, the parents being two or more breeding stocks maintained either as separate clones or as in-bred lines. A population so maintained is a *line-hybrid*, as *Rhododendron* Koster's Brilliant Red.

Any identical or substantially uniform group of plants, such as a clone, line, or line-hybrid, the horticulturist or gardener calls a "variety," "garden variety," "horticultural variety," "cultivated variety," or "named variety." He wants a name for each such variety but rules for such names are not included in the Botanical Code. And so through efforts initiated by the botanists themselves, there has recently evolved the Cultivated Plant Code, adopted in 1958. This is the horticulturists' Code.

Horticulturists like the vernacular. Their Code provides that the name for a variety shall not be in Latin form although Latin names have frequently been used as variety names in the past, such as *Ilex aquifolium* Altaclarensis. Hereafter only "fancy" names are to be used for such varieties, names in the vernacular of a modern language, as *Ilex aquifolium* Rederly.

VARIETY AND CULTIVAR

Another designation that is a catch-all like the horticulturist's "variety," and that may be used in lieu of it to blanket these identical or substantially uniform groups, such as clone, line, and line-hybrid, is a relatively new term, "cultivar," a contraction of "cultivated variety." A botanist's objection to the gardener's use of "variety" is that it may be confused (by a botanist) with the English translation of his Latin "*varietas*" which is a group of somewhat variable plants rather than of identical or substantially uniform cultivated plants.

The Cultivated Plant Code does not bar the use, wherever appropriate, of the more precise terms, clone, line, or line-hybrid. On the other hand where a broader and less precise term is required, the use of either variety or cultivar is permissible. There is no compulsion to use cultivar as a substitute for variety, or vice versa. The preface of the Cul-

tivated Plant Code states—

"It is laid down that, while "cultivar" is the technical, international term, for what in English is known as a 'variety' . . . anyone is free, without violating the Code, to use his own national term* if he so wishes; and this is emphasized by placing 'variety' in brackets after 'cultivar' throughout the Code. The term 'cultivar,' however, is rapidly gaining favour in many groups of cultivated plants, as a convenient and unambiguous word for general use."

Some have the impression that both cultivar and variety are too often used lazily to avoid precise terms such as clone, line, and line-hybrid, or wrongly to cover groups of miscellaneous hybrid seedlings. But in any event cultivar and variety, when correctly used, are "exact equivalents," as the Cultivated Plant Code says.

CULTIVATED PLANTS

Every plant should, for nomenclatural purposes, fall under one Code or the other, not both. Nevertheless, cultivated plants struggle in the grasp of the tentacles of both Codes. The Cultivated Plant Code applies to cultivated plants and only to them. The Botanical Code itself says that a species name based on plants found in the wild continues to apply to plants, not fundamentally different, brought into cultivation from the wild. The Botanical Code does not admit that it also applies to the naming of cultivated plants that have *never* been found in the wild, but only in cultivation. It does so apply, however, and the Cultivated Plant Code so states as to its sister Code. It has to, since botanists have not limited themselves only to plants found in the wild. Many *species*, *varietas*, and *formae* established by botanists in the past were based on cultivated plants first seen by them in gardens and never later found in the wild. This is particularly true of certain species in such groups as hostas, evergreen azaleas, camellias, and chrysanthemums, originally obtained from gardens of a few seaport cities of China and Japan

during the more than two centuries that these countries were largely closed to Westerners for trade and plant exploration in the wild. The Ginkgo tree (*Ginkgo biloba*) is another example of a species never found in the wild.

In case of a new cultivated plant, which Code does govern? About the best you can get out of the two Codes is that if the plant is to be given a scientific (Latin) name, the Botanical Code governs; if a fancy (vernacular) name, the Cultivated Plant Code governs. But which kind of name is the new cultivated plant to be given?

The answer seems to lie in this: If the new cultivated plant ties into *no existing* species, it is described as a new species and gets a Latin name. If it is a clone, line, or line-hybrid of an *existing* species, it gets a fancy name.

In the past names in Latin form, as well as fancy names, have been frequently used for cultivated varieties (clones, lines, and line-hybrids). For the future the Cultivated Plant Code abolishes this practice and requires a fancy name. We will, under the Codes, still have Latin names for some old cultivated varieties (clones, lines, and line-hybrids), but they will be distinguished typographically as *Hemerocallis Alba Striata*, not *Hemerocallis alba striata*. Also, botanists will still on occasion establish new species from cultivated plants not found in the wild.

While all botanists would disagree, it would be a happy day if they restricted themselves to plants found in the wild, leaving to horticulturists the naming of all cultivated plants for which no wild species were known as forebears. We might then avoid several ineffable botanical taxonomic messes that prevail in such groups as the hostas, evergreen azaleas, camellias, and chrysanthemums mentioned above and a number of other genera. One should have no illusion that such views, although embodying a consummation devoutly to be wished (by horticulturists), are anything more than pious hopes.

THE INTERNATIONAL DOCUMENTS

Choosing a "legitimate" name for a new plant can get one "inextricably in-

* For example, "variety" in English, "variete" in French, "variedad" in Spanish, "Sorte" in German, "sort" in the Scandinavian languages and in Russian, "ras" or "varieteit" in Dutch, "razza" in Italian, etc.

ter-twined" with international plant nomenclatural law.—The Botanical Code, the Cultivated Plant Code, and the International Check List, if any, for the particular genus. Taking a look at these international documents, we find—

1. THE BOTANICAL CODE. This is officially called the *International Code of Botanical Nomenclature*. Origins of the present Botanical Code are found in the "de Candolle Rules" for botanical nomenclature adopted at the first International Botanical Congress in Paris in 1867. These were amended at Vienna in 1905 and at Brussels in 1910. The Third Edition of the International Rules for Botanical Nomenclature approved at Cambridge in 1930 harmonized the basic differences between European and American thinking on these matters and became the first Botanical Code of real international acceptance. These rules were again amended at Amsterdam (1935), at Stockholm (1950), and at Paris in 1954.

2. THE CULTIVATED PLANT CODE. This is officially called the *International Code of Nomenclature for Cultivated Plants*. It was prepared in 1957 by the Commission for Nomenclature of Cultivated Plants, an agency of a "UNESCO" organization known as the International Union of Biological Sciences. The Commission represents three groups, agriculturists (Food and Agricultural Organization of the United Nations), foresters (International Union of Forest Research Organizations), and horticulturists (International Horticultural Congress). George H. M. Lawrence, director, Bailey Hortorium, Cornell University, was the United States member among the horticulturists and represented the American Horticultural Council.

All three groups should adopt the Cultivated Plant Code. The horticulturists have already done so at the 15th International Horticultural Congress, Nice, France, 1958.

3. THE INTERNATIONAL CHECK LIST (if any) for the particular kind of plants. The International Horticultural Congress has designated nine International Registration Authorities for certain genera of ornamentals:

American Gesneria Society: gesneriads except saintpaulia.

American Iris Society: iris except bulbous.

American Rose Society: roses.

Hemerocallis Society of America: hemerocallis.

Holly Society of America: ilex.

American Begonia Society: begonias.

Royal Horticultural Society (Great Britain): rhododendron (including azaleas); lilium (including notholirion, nomocharis, and cardiocrinum); narcissus; delphinium (perennials only).

National Chrysanthemum Society (Great Britain): chrysanthemums (perennials only).

Royal General Dutch Bulb Growers Society: tulipa; hardy bulbous and tuberous-rooted plants (except dahlia, gladiolus, lilium, narcissus).

Each such Authority is directed to compile and publish a list of names of varieties in cultivation and of varieties in cultivation and of varieties no longer in cultivation but still of historical importance, plus all known synonyms of such varieties. Such lists have been prepared so far for rhododendron (including azalea), narcissus, tulip, hardly bulbous and tuberous-rooted plants, begonia, holly, hemerocallis, and in part gesneria. The Authority for roses has published *Modern Roses V*, but it is far from an international check list. Lists are underway for chrysanthemum, iris, lily, and delphinium.

Probably the number of international registration authorities designated will slowly increase to cover other genera or groups of related genera, as paeonia, palms, fuchsia, bromeliads, camellia, hibiscus, dahlia, orchids, primula, geranium and pelargonium, gladiolus, and others. Consequently the number of published international check lists will increase.

The American Nurserymen's Association, Washington, D. C., still maintains a registration and name publication system for "any woody plant new to horticulture, originating or introduced into the United States, exclusive of fruits, nuts and roses." The Association is not, however, designated as an international registration authority, and the Arnold Arboretum is currently seeking this responsibility at the national level as an agent of the American Horticultural Congress.

INTERNATIONAL CHECK LISTS

The lists so far issued, with a few exceptions, are not truly international check lists. The narcissus list fails to include many originations in Australia, New Zealand, and the United States, important daffodil nations. This results from the Royal Horticultural Society's sitting back and waiting for data to be sent it by originators and introducers 8,000 miles away who never heard of the Society and do not lament their ignorance, or if they have heard, are uninterested. The Society apparently rejects (at least as to some genera) the concept of a cooperative National Registration Center in each other country where the particular genus is important.

The check list of hardy bulbous and tuberous-rooted plants covers mainly genera in the Dutch and British bulb trade and includes them whether or not hardy and even though corms and rhizomes rather than bulbs and tubers. Despite the Dutch redefinition of the scope of their authorization, as many important genera are omitted as are included,—thus *crinum*, *freesia*, *sternbergia*, and *zantedeschia* are covered but not *clivia*, *alstroemeria*, *liriope*, and *hedychium*.

The rhododendron list is one where the Royal Horticultural Society has sought cooperation. The American Horticultural Society, the American Rhododendron Society, and the United States National Arboretum, have all helped, as requested, but on the other hand liaison was not established directly with Japan which has done more in developing evergreen azaleas than any other country. No fully adequate international check list of the azalea series of rhododendrons is likely to be published without the assistance of the Kyushu Horticultural Field Station, the University of Utsunomiya, and others in Japan.

Americans and Canadians through the North American Lily Society, Australians and, probably, New Zealanders, are cooperating in the preparation of the lily list to be published by the Royal Horticultural Society of Great Britain. By reason of the more extensive work being done in the United States and Canada on lilies, probably the North American Lily Society would better have been the Society designated as the international

registration authority. Designations are likely to accrue, however, to societies which actively solicit the work and are unmistakably heard at International Horticultural Congresses. And again as to lilies the Japanese are not participating, yet they are one of the major sources of introductions.

The iris list underway is limited to clones available in this country. The chrysanthemum list will cover clones in both the United States and Great Britain, but so far as is known, no contacts have been arranged in Japan or Western Germany. So also the holly list is principally representative of clones already in this country without detailed regard to Great Britain, South America, and Japan. The tulip list is truly international but the problem was relatively simple since practically all garden varieties of tulips have originated in a single country, the Netherlands. Further, the Dutch and British have been working on such a list since World War I. Similarly, the *hemerocallis* list is international for again we have a one-country situation. Nearly all *hemerocallis* clones, save a few early originations of Yeld and Perry, come out of the United States.

In general the check lists reflect too much national self-satisfaction and too little international cooperation and willingness to give the effort and time, and incur the expense, necessary for a truly international check list. Of course, lack of communication with iron-curtain countries complicates the situation.

REQUIREMENTS FOR NAMES OF NEW CULTIVATED PLANTS

The process of selecting a legitimate name for a new garden plant in a genus for which there is an international registration authority and an international check list has three steps:

First, the American originator or introducer should select a name that has not previously been published or accepted by the international registration authority as shown by the check list. No other person may name the plant without permission of the originator or introducer.

Second, he should see to it that the name is a fancy (vernacular) name, in English not in Latin form; that it is not

a scientific or common name of another genus or species (as *Camellia* Rose); that it is not excessively long (one word preferable, three short words a maximum); that it has no initial article or title (as A, The, President, or General) or abbreviation (as Mt., Wm., Mrs., Dr., or U.N.R.R.A.); that is not an exaggeration or vaguely descriptive (as Best of All, Supreme Select, Curly, or Pink); and that it is not similar to a prior name (as Aries and Ariel, Caroline and Carolina, Willem III and William II, and Viola, Violet, Violetta and Viola-cea).

Third, he then submits the selected name to the International Registration Authority for the particular genus, accompanied by the name and nationality of the originator and introducer, parentage of the plant when known, a description in English (or any other language) including color (preferably with reference to a color chart), and classification (if any) of the plant under the scheme recognized for the genus. Illustrative of such schemes are the 11 daffodil divisions, the 23 tulip divisions, and the groupings used for azaleas in the *International Rhododendron Register*. The Authority will publish the name when approved.

The Code necessitates that the International Registration Authority require a description of the new plant, but does not attempt to specify what is an acceptable description, leaving this to the Authority.

Where there is no international registration authority and list, the steps are the same except that the originator or introducer, instead of submitting the name to a registration authority, investigates to be certain that his name has not previously been validly published and then must arrange for the publication of the name and description in some printed or other mechanically reproduced and dated publication (except a newspaper) distributed to the public, preferably a horticultural publication.

TYPOGRAPHY FOR NAMES

The proper way of setting up in print a fancy name for a cultivar or variety confuses some. The one or more words in the fancy name must each have an initial capital. The fancy name when

directly attached to a scientific or common name for the genus or species must be distinguished either by typography or by preceding it with "cv." Single, but not double, quotation marks may be used as the typographical distinction or the initial capitals and roman type alone may suffice. Thus the rhododendron cultivar Fairy Queen from the Mollis Hybrid Group of Azaleas or the rhododendron cultivar Warai-gishi which is a variety of the species *R. indicum*. For the former all the following are correct:

1. *Rhododendron* cv. Fairy Queen
2. *R.* var. Fairy Queen
3. *R.* 'Fairy Queen'
4. *R.* Fairy Queen

Azalea Series and/or Mollis Hybrids or Mollis Group or Mollis g., could be added in parenthesis to show where within the genus *Rhododendron* the particular cultivated variety falls; similarly *Tulipa* (Fosteriana div.) Red Emperor or Narcissus (Triandrus div.) Moonshine.

For the azalea Warai-gishi the following are all correct:

Rhododendron indicum cv. Warai-gishi.

R. indicum var. Warai-gishi.

R. indicum 'Warai-gishi.'

R. indicum Warai-gishi.

R. 'Warai-gishi.'

R. Warai-gishi.

Azalea Series or Satsuki Group or Satsuki g. could be added in parenthesis.

GROUP NAMES

The Cultivated Plant Code has been discussed up to this point as though it were limited solely to groups of which all the individual plants are identical or substantially uniform, as clones, lines, and line-hybrids. The Code also deals meagrely with what it calls a supplementary category, groups of miscellaneous seedlings from the same cross. In the past Latin or fancy names have been given to such groups, particularly abroad, as *Rhododendron* Loderi. All members of the seedling group vary but a particularly good plant may be selected and given its own name, as *R. Loderi* King George.

Occasionally persons take advantage of group names, by showing a picture

of some fine selection from the seedling group, but sending out under that name any plant in the group even though inferior to the one pictured. Again, the Knap Hill Hybrid azaleas are a group of crosses of *R. molle*, *calendulaceum*, *occidentale*, and *arborescens* and their progeny, and the Exbury strain is a sub-group developed by the late Lionel de Rothchild at Exbury, Southampton, England. There are numerous excellent selected Exburys that have been named and are propagated as clones. To sell miscellaneous Exbury seedlings, however, under the name of "de Rothchild Supreme Azaleas, a fabulous, new, . . . exclusive" without clearly indicating that the plants offered are merely miscellaneous unnamed seedlings from a group, and at that not a new and exclusive, but an old and widespread, seedling group, seems unjustifiable.

The Cultivated Plant Code legitimates, with limitations, names for these miscellaneous seedling groups. It provides that assemblages of cultivated individuals within either a species or an interspecific hybrid may be designated by a group fancy name that must have as a part of it some such word as hybrid, cross, or group or the abbreviation "g." taken from the Latin "grex," meaning group. Thus *R.* (Loderi Hybrids), or *R.* (Loderi Group), or *R.* (Loderi g.) would be correct. Whether this sort of naming should be carried on to a group within a group where the sub-group does not differ materially from the group, is questionable. Surely, a portion of the plants within an established well known group should not be segregated and given a new group name solely for sales purposes.

COMMERCIAL SYNONYMS

The Cultivated Plant Code does, however, specifically recognize commercial synonyms for sales purposes in case of names of clones, lines, and line-hybrids. Thus the original name may be transliterated from Japanese script into a roman alphabet, as *Prunus serrulata* Amanogawa; or translated (if not a personal name), as *Rhododendron* Empress of India for *R. Imperatrice des Indes*; or the original name may (with approval of the originator and the international registration authority if there is one) be replaced by a name that is commercially more acceptable because easier to pronounce or avoiding undesirable implications, as *Rosa* Van Nes for *Rosa* Mevrouw van Straaten-van Nes, and *Crocus* Black Prince for *Crocus* Nigger Boy.

The Code authorization of group names and commercial synonyms is far from an unmixed blessing for the ordinary gardener, whatever it may be for the trade. Gardeners usually lose when buying mixed seedlings under fancy names, and a name with "sales appeal" does not mean a plant superior to one with a name strange to American eyes and tongues.

The Cultivated Plant Code, together with the system of international check lists and registration authorities, is a most important advance in stabilizing plant names. Greater perfection should come with experience over the years. Under some circumstances the Code and the lists have a part in determining civil liability for deceptive sales practices. Irrespective of this facet, public interest requires that the Code and the lists should be conscientiously observed by originators and introducers, horticultural writers and editors, plant society registrars, and nurserymen.

Gibberellins in Horticulture

A Preliminary Review

HENRY M. CATHEY¹

Gibberellins, a group of naturally occurring growth regulators, have aroused the interest of horticulturists because of highly publicized reports about their spectacular effects on plants. The types of responses obtained on a wide range of economic plants suggest that gibberellins can produce some effects so far not induced by any other means. Since gibberellins are commercially available, horticulturists should know their limitations and the danger of improper use. This paper describes the history, methods of production and application of some of the plant responses observed thus far, and indicates how gibberellins might be useful to horticulturists in modifying plant growth.

Since the aim of this review is to point out some of the facts known about gibberellins, a great deal of information contained in this review is preliminary. Recommendations have not been formulated as to the most effective methods of application of gibberellins on many plants. More precise information on the various aspects of the action of gibberellins may be found in reviews with these viewpoints: species (40),² chemical (57), physiology (59), and agriculture (61, 67).

Several chemical companies have prepared abstracts of the gibberellin literature. None of these publications compare with the complete abstraction of the literature prepared by Stodola (58) and entitled, *Source Book on Gibberellin 1828-1957*. All aspects of the literature from a historical, chemical, and plant bias have been thoroughly annotated.

HISTORY OF GIBBERELLINS

In 1926, Kurosawa, a Japanese plant pathologist working in Formosa, investigated a fungus disease on rice that caused abnormal stem elongation and etiolation of the leaves. The causal fungus, *Gibberella fujikuroi*, also reduced root growth and tillering (29). Plants so affected were called "bakanae" (foolish seedlings), and flowering was generally two to three days earlier than that of healthy plants. The stem-elongation effect was produced on maize and rice seedlings by applying medium in which *Gibberella fujikuroi* had been grown (59). The growth stimulation of the treated plants was similar in every way to the growth of rice plants infected with this fungus. In 1938 Yabuta and Sumiki (70) isolated the active principle of the fungus and separated it into two biologically active substances. The active principle became inactive on ashing but was heat-stable, nonvolatile, easily soluble in some solvents and poorly soluble in ether and water.

Gibberellins are produced commercially by growth of *Gibberella fujikuroi* in a liquid culture medium from which the active material is extracted. The process is similar to the methods used to produce antibiotics. Depending upon the nutrient solution, aeration, and period of growth, yields vary from eight to five hundred and forty-four milligram per liter (mg/l). Since a medicinally pure form is not needed, gibberellins can be produced about as cheaply as penicillin.

So far four forms of gibberellins have been isolated. They are gibberellin A₁, gibberellin A₂, gibberellin A₃ (gibberellin x, gibberellic acid) and gibberellin A₄. In a preliminary report, the biological activity of these forms has been reported in this order for a large number of different plant responses: A₃, greater

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²See corresponding references in the literature citations concluding this paper.

than A_1 ; A_4 , almost equally active, greater than A_2 (12). Gibberellin A_3 predominates in most gibberellins available commercially. Gibberellin will be used in this review to denote the several gibberellins usually produced by *Gibberella fujikuroi*.

Filtrates from *Gibberella fujikuroi* were found by Curtis (18) to be the only ones from a disease organism among a thousand fungi and five hundred actinomycetes which caused increase in seedling height.

POSSIBLE NATURAL OCCURRENCES OF GIBBERELLIN IN FLOWERING PLANTS

Extracts from seed or fruit of a number of flowering plants have been shown to stimulate plant growth just as gibberellin does (32, 42, 43, 51). Nine different plant genera representing seven families have been found to give gibberellin-like activity, and this list is being added to all the time (44, 50). A dwarf maize, lacking the gene controlling tallness, is induced to develop normal growth when gibberellin is applied (49).

Extracts from the seed of *Lupinus* and also the inner and outer wall of the pod show a "gibberellin-like" activity that increases with the growth of the fruit and during the time of maximum growth of the embryo but decreases at maturity (53). The "gibberellin-like" substance isolated from the seed of the runner bean (*Phaseolus multiflorus*) was shown to be gibberellin A_1 (38). The endosperms of *Echinocystis*, *Aesculus*, and *Persea* also gave evidence of activity (50). "Gibberellin-like" substances are not chemically identical with the known gibberellins as determined by chemical analysis.

RANGE OF PLANTS RESPONDING TO GIBBERELLIN

Gibberellin affects the growth of a large group of plants from widely separated families. The dwarf-1-biochemical maize plants respond to an application of 0.001 microgram (μg) of gibberellin (49). Normal maize plants did not respond to gibberellin until the concentration was increased to 0.01. Blue Lake pole beans respond to 0.1 μg of gibberellin (9). Most plants are not so sensitive. Bulbous crop plants and foliage plants are particularly insensitive to gib-

berellin. It is not known whether the lack of response is due to improper timing and mode of application or to an inherent lack of mechanism to respond to gibberellin.

Since there were no significant effects from less than massive doses, toxicologic studies on rates indicate that the acid may be a safe agent (48). Use of this chemical for food and feed crops depends upon the tolerances established by the U. S. Food and Drug Administration. Thus far, there has been no evidence of residues or toxicity risks. The U. S. Food and Drug Administration issued a statement (61) that "toxicity studies of the gibberellins have not shown evidence of toxicity but we are not aware of any tests which have resolved all questions of their safety, and we do not know of any tests demonstrating conclusively that they are harmless substances."

METHODS OF APPLYING GIBBERELLIN

Liquid Sprays. Liquid sprays offer simplicity of use. Gibberellic acid is soluble in water only to the extent of six thousand parts per million (ppm). A stock solution is prepared by dissolving one gram in a minimum of ninety-five per cent ethyl alcohol with a 0.1 per cent wetting agent such as Tween 20 and diluting with water to make one liter of solution. Dilutions are prepared from this stock solution. When a wider range of concentrations of gibberellin is required, potassium gibberellate, which is completely water-soluble, may be used; a wetting agent is still needed. Consideration should be given to the purity of the material so that the concentrations will be exact; gibberellic acid and potassium gibberellate contain, respectively, ninety-one and eighty-two per cent active material.

Lanolin Pastes. A small amount of the gibberellin may be applied as a paste to the stem of the plant. This is a simple way to obtain a systemic application. A one per cent paste may be prepared by placing 12.5 mgs. of the acid into a small vial, then dissolving the acid by warming it with seven drops of a spreader, and finally mixing it into one gram of melted lanolin.

Aerosols. When a limited number of plants are to be treated, use of aerosols

gives excellent control over amount applied. In contrast to the loss of activity when gibberellin is stored in contact with water, gibberellin is stable in the solvents used in aerosols. Aerosols produce a dry spray which leaves no powdery residue. Aerosols which deliver .05 mg. per second are available.

Other Methods of Application. The three methods of application discussed are the most commonly used. Under investigation is the use of gibberellin in combination with fertilizer and as a soil amendment or drench. These methods have the potential of supplying gibberellin over an extended period and of being systemic.

RESPONSES OF PLANTS TO GIBBERELLIN

Elongation of Stems. The most typical response of plants to gibberellin is stem elongation. Elongation results from increase in length of internodes, not from change in number of nodes. Usually only actively growing tissue responds, and the dry weight of the treated part increases (8). The treatment may cause changes in habit; a bush bean, for example, may become a climber or, as a result of development of more lateral shoots, it may be bushier than normal (40).

Correct timing of the application determines the maximum elongation induced by a given concentration of gibberellin. On varieties sensitive to day-lengths, the greatest sensitivity for elongation of the stems of late-October early-November flowering chrysanthemums occurred after the initiation of the flowers, but prior to the time the flower buds were visible to the eye (15). Previous to this period, five times as much gibberellin was required to obtain similar elongation on vegetative plants. Applications of gibberellin had no effect on the number of leaves formed prior to the initiation of the inflorescence and it did not affect the relation of day-length to initiation of the capitulum and the florets.

Deciduous trees are more responsive to gibberellin than conifers (unpublished). Maples and tuliptrees, which, under controlled photoperiod and temperature can make continuous growth, are extremely sensitive to gibberellin; increases in size of four to five times be-

tween treated and untreated plants can be obtained in one growing season. Pines and oaks, which grow by flushes, are less sensitive to gibberellin than trees that grow continuously. High concentrations of foliar sprays are required for even a slight response. The most effective way to treat the less sensitive plants is to slightly wound the stem and to apply a lanolin paste just prior to the period of most active growth.

Gibberellin overcomes the dwarf characteristics in plants (8). Many dwarf or slow-growing plants are difficult to propagate and to grow new plants requires an extended period. At Beltsville, gibberellin speeded up propagation of some azaleas and chrysanthemums (unpublished). It was inadvisable, however, to take cuttings during or immediately after the rapid elongation of the plant due to treatment with gibberellin, because rooting of the cuttings was suppressed. Treatment of the base of the gibberellin-treated cuttings of certain kinds of plants with a root-promoting growth regulator, such as indole butyric acid, stimulated both elongation and rooting (21). Once normal growth was resumed, normal rooting of the cuttings was obtained.

The range of effective concentrations of gibberellin on most plants is extremely wide. Excessive amounts result, however, in very weak stems or dieback of the growing point. Dieback occasionally accompanies very rapidly induced elongation. Low light intensity and high night temperature enhance sensitivity to gibberellin and increase the amount of killing of growing points.

Slow or stunted growth of plants due to viruses has been reversed by treatment with gibberellin (3). Vegetative growth was resumed on asters infected with aster yellows, sweet corn infected with corn stunt, and crimson clover infected with wound tumor. The causal viruses were not killed in the plants, since the gibberellin-treated plants retained the disease symptoms and the viruses were recovered from them.

Elongation of Leaves. In Australia, gibberellin applied at the rate of one to four ounces per acre increased the leaf growth and dry-matter yields of the first cutting of herbage, but did not appreciably increase the yield for the year. Accumulation of dry weight is due to

increased leaf and other photosynthetic areas of the plant and a better placement of the leaf to light (7). Photosynthesis has not been shown to increase as measured by the rate of carbon dioxide fixation (22). Following application of gibberellin the grass turned yellow, but this yellowing could be reduced by simultaneous application of nitrogen (forty to eighty pounds per acre). The most desirable ratio of gibberellin to nitrogen ranged from 1:320 to 1:640. Experiments in the United States have shown that bentgrass grew best when sprayed with a ten-ppm solution of gibberellin. Treatment with five hundred ppm slightly inhibited the stolon growth of Bermuda grass (27).

Gibberellin induced growth of grasses at low temperature (33). The tests were conducted at the time of year when temperatures as low as 21.2°F. stopped growth completely in the nontreated plots. A darker green color was developed in all species of *Poa* (bluegrass) and in *Cynodon dactylon* (Bermuda grass). Less responsive were *Agrostis* (bentgrass), *Festuca* (fescue), and *Lolium* (rye grass) in the order given. *Zoysia* did not respond (65). Since gibberellin promoted growth of grasses at low temperatures, it is possible that green turf may be had for a greater part of the year. These results have not been duplicated by other workers (27).

Associated with the elongation of grass leaves are the formation and growth of stolons (27). Treatment of grass "plugs" in the greenhouse increased the stolon growth of Cohansey bentgrass and V-C Bermuda grass. Since turf is formed by the growth of stolons, these experiments suggested that more rapid establishment of turf might occur if the "plugs" were dipped in solutions of gibberellin prior to planting. In the field, however, the effects were slight (27). Gibberellin retarded the vegetative growth of newly established plants of *Zoysia* (71). In the fall, the cover of the ground was less dense than in untreated areas.

Hyponasty of Leaves. Observations of various workers agree that the first indication of the effectiveness of application of gibberellin is a change in the angles of the leaves in relation to the stem. Treated chrysanthemums and African violets hold their leaves more

erect. This response is apparent with levels of gibberellin (five to ten ppm) which have little other effects. Several members of the GESNERIACEAE besides African violets respond similarly. Slightly higher levels of gibberellin hasten the development of the flower bud.

Induction of Flowering. Prior to the discovery and use of gibberellin, only a few plants had been induced to flower by chemical treatment. Pineapple is induced to flower at any time of year by foliar auxin sprays; production is thus spread throughout the year instead of being limited to one fruiting season.

Gibberellin has been shown to replace the cold requirement of some biennials and the long-day requirement for flowering of some annuals. Most species which produce rosette plants in the garden may be flowered the first year from seed by treatment with gibberellin. The list of responsive plants is extensive; columbin stock, foxglove, and larkspur are among the garden flowers reported so far (35). More than one treatment with gibberellin, however, may be necessary to make these plants flower as annuals. Since acceleration of flowering without excessive stem elongation is the aim, precise information is necessary prior to use of gibberellin in the garden.

Flowering and seed production of many biennials and long-day annual vegetables may be stimulated by gibberellin (10). The plants should be treated when they reach the size at which they normally would flower when exposed to cold or to long days. For example, carrot roots should be approximately a half inch in diameter. When the night temperature is much above normal for flowering, gibberellin induces many species to elongate more rapidly but not to flower (30, 67). Most of the reports thus far have been made on plants grown slightly above the critical temperature for flower formation.

Many vegetables that require cold or long days to flower are now known to respond to gibberellin by earlier production of seed (10). When 50 μ g of gibberellin was applied weekly for nine weeks (24), endive, a cold-requiring plant, was induced to flower earlier regardless of whether the seeds were vernalized. One treatment was not sufficient and a rosette formed on the top of the plants; but the plants eventually flowered. Seedlings grown from gib-

berellin-induced flowering plants were normal (11, 31). Since seed production of many plants is what the home owner wants to avoid, use of gibberellin will be limited to seed producers. On plants such as broccoli and cauliflower, of which the flowers and peduncles are the edible portion, hastening of flowering may benefit the home gardener. The length and thickness of the leaf petiole of celery were increased by the use of gibberellin (10).

Gibberellin promoted the flowering of Great Lakes lettuce under both short days and long days when the plants were grown at either 50-55° or 75-80°F. (11). The effects of gibberellin were additive to those of long days, high temperature, and seed vernalization. These interactions with gibberellin would extend the range where lettuce might be grown for seed production.

Delay of Dormancy. Application of gibberellin prior to the differentiation of the inflorescence of *Hydrangea macrophylla* delayed initiation and development of dormancy (60). Extreme elongation of the plants was associated with a delay on the onset of dormancy. Similar results have been found with many other woody plants including *Hydrangea arborescens* and *H. grandiflora* and *Forsythia* cv. Arnold Dwarf and *Philodendron amurense*. Plants of *Taxus cuspidata* given a similar treatment formed terminal buds earlier than untreated plants, and the terminal growing points were damaged and the leaf size reduced (41).

Breaking of Dormancy. Breaking dormancy of plants is among the desirable effects of treatment with gibberellin. Many plants of horticultural interest become dormant during the growing season; growth resumes only when the plants are subjected to a specific temperature and photo-period. Freshly harvested dormant potato tubers treated with 0.05 to 2.0 mg/l of gibberellin resumed growth five weeks earlier than untreated tubers (36). Dormancy induced by maleic hydrazide, however, was not overcome by treatment with gibberellin. Attempts to break dormancy in fruit trees thus far have been erratic. Treatment with at least 200 ppm gibberellin induced vegetative growth of peach trees which had received only a hundred and sixty-five hours of the necessary nine hundred and fifty hours below 45°F.

(20). Flower buds were not present on the plants. The response of Hexe and Sweetheart Supreme azaleas (5) and *Vanda*, *Phalaenopsis*, *Cymbidium*, and *Zygopetalum* orchids (47) to gibberellin was similar to that of peach. Seedlings from non-afterripened apple seeds form rosette plants. Tree peony seedlings also do not develop any top growth unless given cold treatments. Treatment of the apical meristem of the apple (1) and peach (46) and the epicotyl of tree peony (2) with gibberellin increased the growth rate of seedlings from non-afterripened seed over that of cold-treated plants. The number of leaves and nodes were not affected. This reversal of physiologic dwarfism by gibberellin should be useful in eliminating or reducing after-ripening procedures for the propagation of tree fruits and ornamentals.

Gibberellin was additive to the promotive action of cold in the growth stimulation and flowering of *Hydrangea macrophylla* (60). Relatively large amounts were needed to promote the growth of hydrangea plants that had not received cold treatment but had differentiated flower buds. Removal of the old leaves increased the effectiveness of gibberellin. Cool storage alone accelerated stem growth and hastened flowering and gibberellin produced similar results on non-stored as well as cool-stored plants. Less gibberellin was needed to accelerate growth of partially cold-treated plants than that of untreated plants.

Organ Size and Shape. The size of pedicels, peduncles, and petals is affected by treatment with gibberellin. Geraniums sprayed with a ten ppm of gibberellin when the flowers were showing color improved in keeping quality and petal size and pedicel length increased (34). Foliar applications increased the length of internodes and size of petioles and leaves of Olympic Red geraniums (19).

Application of gibberellin to the greenhouse hydrangea, *Hydrangea macrophylla*, after cool storage increased the size of the sepals when the plants were sprayed four times with a ten-ppm solution (59). Application of five times that amount of gibberellin damaged the leaves and sepals; the resulting plants were excessively elongated and had lanceolate leaves. Similar results were

obtained on *Hydrangea arborescens* and *H. grandiflora* (41).

Application of gibberellin prior to or during the initiation of flowers in chrysanthemums reduced the number of lateral inflorescences and had little effect on peduncle length (15). Similar treatments at the time the flowers became visible lengthened the peduncles in proportion to the concentration of gibberellin but had little effect on the number of lateral inflorescences.

Vines of vinifera grape varieties treated with gibberellin (5-20 ppm) at or after bloom produced larger berries than girdled vines, vines sprayed with 4-chlorophenoxyacetic acid, and untreated ones (63). The pedicels were one and a half to two times as long as those of untreated vines. Open clusters were especially noticeable on the Zinfandel grape when it was sprayed with ten ppm of gibberellin (64).

Treatment with gibberellin has been reported to alter leaf shape of a large number of species (41, 52, 60). Reduction in leaf size was often associated with marked chlorosis, drooping of leaves and browning of the main branches. Evergreens exhibit this type of response when over-treated with gibberellin.

Some mature branches of ivy (*Hedera canariensis variegata* var. *arborescens*) became completely juvenile when the plants were treated with gibberellin (54). Reversion from juvenility to the mature type of growth is a constant problem in the maintenance of certain plant characteristics. Many ornamental plants are most desirable when they are in juvenile growth. The evidence from ivy (54) indicates a possibility that gibberellin, when used properly, may aid in maintaining this type of growth. Such treatment of many woody plants, however, would be undesirable because juvenile growth is a long and unproductive phase in their growth.

Fruit and Seed Formation. Certain species of plants cannot be crossed because of the failure of pollen to germinate or the slow growth of pollen tubes. Pollen-tube growth of *Lilium speciosum* has been enhanced by the addition of gibberellin to the sugar-agar medium (16). Pollens of seven other species of plants showed increased germination due to treatment with gibberellin. On the other hand, sprays of gibberellin applied to inbred lines of fieldcorn (*Zea*

mays indentata) suppressed microgametogenesis and resulted in partial or completely sterile tassels (45).

Induction of parthenocarpic fruit by gibberellin has been reported for many different species. Application of concentrated sprays of gibberellin to mandarins (56), navel oranges, and limes (25) increased the fruit set. The fruit necks of the mandarins were more elongate than those of untreated fruits, but there was no change in rind color and thickness. Associated with these treatments were twice as many tiny undeveloped seeds. The soluble solids, acids, juice, and ascorbic acid of the fruits were not altered. Fruit setting and growth in tomatoes, figs, and eggplant have been reported to be promoted by the use of gibberellin in the absence of pollination (68). Although there was a consistent increase in the number of nodes and a reduced number of flowers in an inflorescence prior to the formation of a flower, the plants flowered earlier due to the accelerated growth (13). Normal and parthenocarpic fruits were increased by repeated floral sprays at a concentration of one to five hundred μgm per ml. These treatments did not affect fruit size.

Under special environmental conditions development of fruits may be arrested by far-red. The fruit of Marglobe tomatoes grown in the field under high light and temperature conditions of summer grew at the most to 0.5 to 2.0 mm in size. This suppression of growth has been shown to be caused by exposing the plants to the far-red portion of the spectrum. Cool temperatures and exposures to red irradiation reversed this action. Application of gibberellin to the arrested fruit induced their development (37).

Delay or Reduction of Flowering. Application of gibberellin to some plants does not always accelerate flowering and fruiting. A single treatment with as little as 0.005 mg. per plant delayed fruiting of several varieties of peppers up to several weeks (40). High dosages, especially at a time that the plants were extremely sensitive to gibberellin, delayed flowering and reduced the set of berries by grapes (63) and the number of lateral flowers on chrysanthemums (15).

A reduction in number of flowers was also observed in *Kalanchoe blossfeldi-*

ana, regardless of whether gibberellin was applied to plants grown under long or short days (23). Thus, the action of gibberellin is not identical with the flower-promoting or flower-inhibiting processes associated with the photocontrol found in the leaves.

Promotion of Seed Germination. Treatment with gibberellin at the time a slurry-seed protectant was applied promoted earlier emergence of pea, bean (64), and cotton (26) at a given temperature. Height of plant, length of hypocotyl and internodes were directly related to concentration. Gibberellin was especially effective in accelerating germination in cold soils. Some other seeds, such as bluegrass, are slow to germinate even under ideal conditions. Potassium nitrate was found to be equal or superior to gibberellin in promoting germination (3). Certain seeds, such as lettuce, require light for germination. Lettuce seed soaked in a thirty-six-ppm solution of gibberellin were promoted to germinate without light (28).

Relation to Photocontrol. The lengthening action of gibberellin is not always similar to the effects of long days. Induction of flower formation in biennial *Hyoscyamus* by treatment with gibberellin was effective only when the plants were grown on long days (30). Plants grown throughout at high temperature on short days did not respond to gibberellin until extensive elongation preceded flower formation. The photoperiodic requirements for flowering of biennials must be satisfied prior to the promotion by gibberellin.

Lengthening of stems and flowering of *Hyoscyamus niger* (annual strain) has been shown to occur under long days in red and green light. Plants grown under long days composed of blue and far-red plus red light failed to flower. Applications of gibberellin hastened the flowering of plants grown under long days of red and green, as well as blue and far-red plus red light (17). An insufficient number of long days to promote elongation in combination with gibberellin promoted the flowering of *Adonis* and *Rudbeckia* (14). Separately, neither gibberellin nor long days promoted flowering.

Cytological Effects. On the cellular level, gibberellin has not been shown to induce polyploidy or to stimulate resting cells to initiate mitosis (4). Slowly

dividing cells in the stems of *Hyoscyamus* (55) and the anthers of *Allium cepa* (62) were induced to divide more rapidly and to elongate by treatment with gibberellin. In the stems of apricot (*Prunus armeniaca*) spur shoots, the radial diameter and number of cells along the radius of the xylem cylinder showed indirectly that gibberellin stimulated considerable cell division in the cambial zone (6). These promotive actions were concerned primarily with the rate of growth, not with the re-direction of a growth phenomena.

HORTICULTURAL UTILITY OF GIBBERELLIN

Little information is available on the most effective time and concentration of gibberellin to be used on a specific crop. In the 1957 and 1958 growing season, sufficient gibberellin was available for extensive experimentation on a wide range of plants. Several growing seasons will be needed, however, before recommendations as to its use can be made.

Gibberellin produces some effects which cannot be induced by any other chemical means. Some of the more striking potentials follow:

1. Induction of cell elongation and division under many environmental conditions.
2. Induction of flowering of long-day or biennial plants.
3. Increasing the size of particular organs of the plant such as flower, peduncle, pedicel, or fruit.
4. Breaking the dormancy of many plants.
5. Overcoming genetic and physiologic dwarfism.
6. Stimulation of accumulation of dry matter.
7. Broadening the environment (temperature, photoperiod) in which a plant may be successfully grown.

Utilization of gibberellin in the growing of horticultural crops depends upon the sorting of desired plant responses and timing the application or applications of gibberellin to enhance their activity. For example, growth of trees and shrubs occurs for a limited number of weeks during the year and often ceases before temperature becomes low in the fall. With the proper timing of applica-

tion of gibberellin, accelerated growth of seedlings and newly planted trees and shrubs for screening or shading purposes may be obtained. Responses vary considerably; mimosa and maples are very responsive, whereas bald cypress is killed by similar applications of gibberellin.

Another potential use of gibberellin in horticulture is the acceleration of breeding programs. Many plants require special treatments for overcoming dormancy or dwarfism (either physiological or genetical); these treatments are time consuming and often delay the resumption of growth until the whole growing season is lost. Reduction by use of gibberellin, of the time required to bring a seedling to flower will be valuable in speeding up a breeding program.

At Beltsville work is underway on certain aspects of the acceleration of the growth cycle of chrysanthemums. Gibberellin can induce the elongation of chrysanthemum plants at any time during growth, but response to a given concentration of the substance depends upon the time of application. The period of greatest elongation of an early-November flowering variety was found to be at the time flower buds were visible in the plant, but before appreciable flower development (in the third week after the start of short days). Previous to this discovery, five times as much gibberellin was required to obtain similar elongation. It was apparent that during long days or at the start of short days, the plants contained an abundance of a natural gibberellin-like substances and relatively large amounts of gibberellin were required to increase elongation.

Similar results were obtained for the elongation of the peduncles of chrysanthemum in which the greatest sensitivity was found to occur ten days after flower buds were visible in the plant (in the fourth week after the start of short days). The flower peduncles elongated similarly to those on plants subjected to a period (twelve days) of short days, returned to long days (ten days), and then put on short days until anthesis. Much later, at the time color was developing on the outer florets (in the seventh week of short days), application of a concentrated solution of potassium gibberellate (one per cent) accelerated the development of the florets.

Certain varieties of chrysanthemums cannot be flowered year round unless

both temperature and daylength are controlled. During the summer many varieties never develop flower buds until the night temperature is near 60°F. During the winter many varieties never flower when the night temperature is below 60°. Weekly applications of as little as ten ppm of gibberellin acid from the time the flower buds were visible overcame the unfavorable night temperatures. The plants flowered in approximately the same number of days as plants grown with a night temperature of 60 degrees.

A limited number of chrysanthemum varieties produce rosette plants during growth. The plants must be given a period of cold (three to four weeks at 40 degrees F.) to start them to elongate and to form flowers on short days. As little as ten ppm spray of gibberellin is sufficient to replace the cold requirement. Rosette formation is a serious problem with many English and Japanese varieties; few American varieties produce rosette plants.

Gibberellin cannot do everything a horticulturist dreams of in making plants to order. Instead of making plants taller, he may, for example, want to make them shorter, and chemicals that do just that to a wide range of plants may be found. Meanwhile, although the full use of gibberellin is not yet known, it must be looked upon as a valuable tool of great potential value to horticulturists.

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H. M. CATHEY

Growth inhibition of Taxodium distichum

The bald cypress plant on the left was untreated; the center plant was treated with 250 ppm gibberellin sprayed one time; the dying plant to the right was treated with 250 ppm gibberellin sprayed for four consecutive weeks.



H. M. CATHEY

Increase in size of Albizzia julibrissin

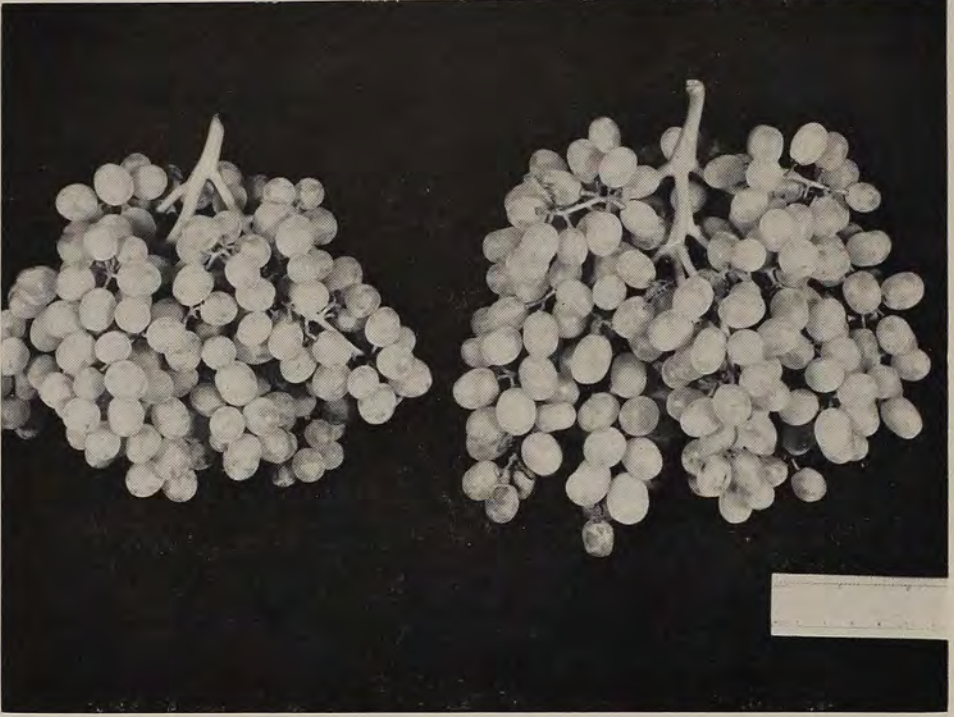
The mimosa plant on the left was untreated; the plant shown at right four months after treatment with 200 ppm gibberellin sprayed one time.



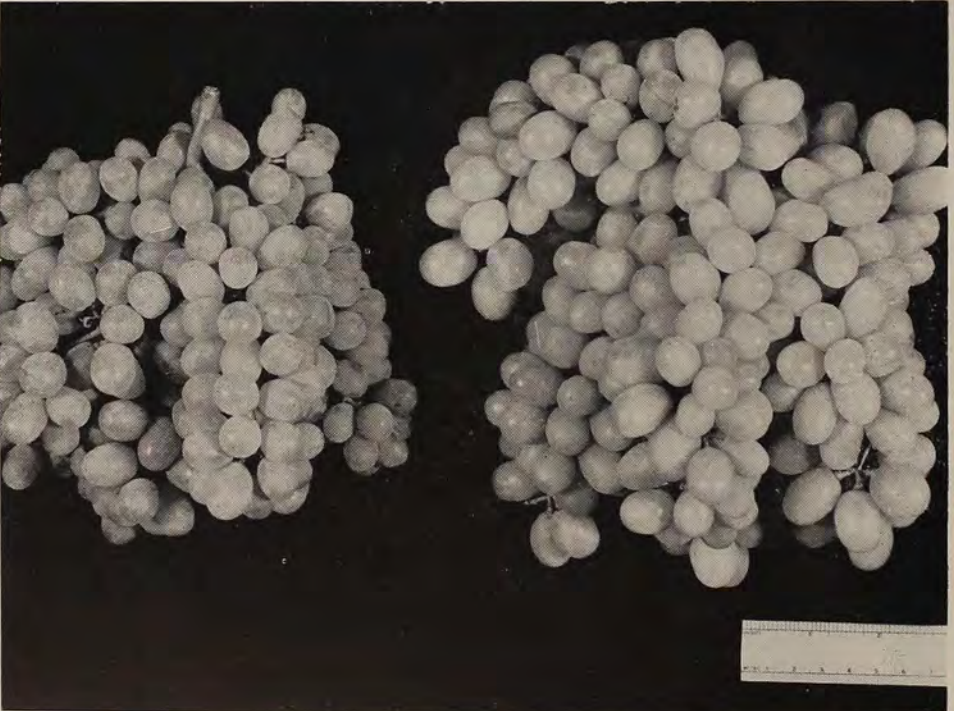
Typical effects of gibberellin (15 grams per acre) on Utah 10-B celery (shown in the bottom row, no treatment in the top row) when applied three weeks before the anticipated harvest. Note the difference in thickness as well as in length of stalks.

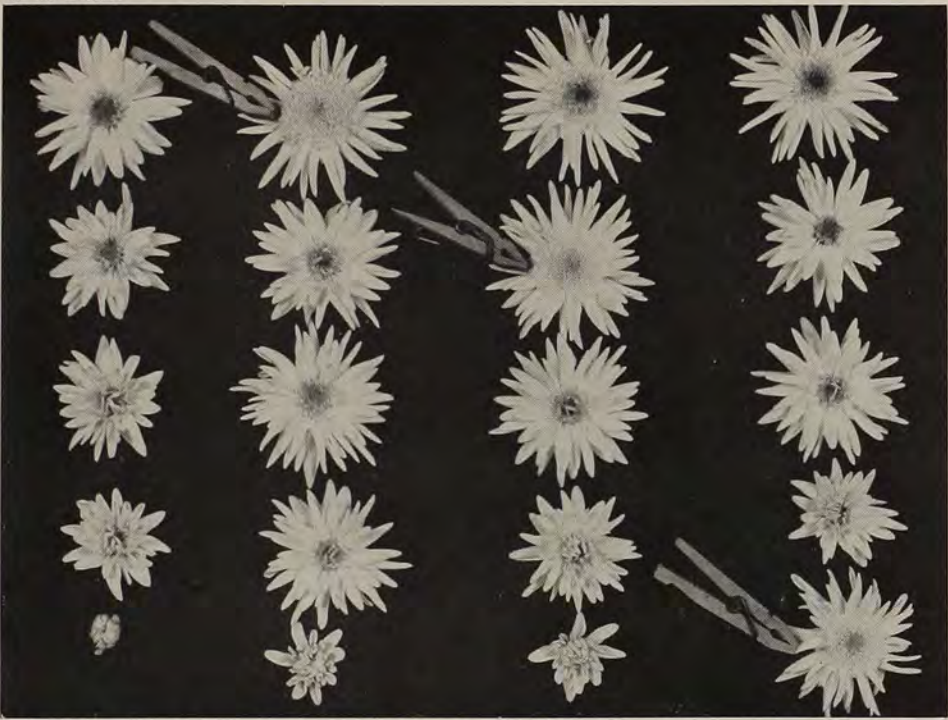
Earlier sprouting and emergence of potato plants results from a five-minute seed piece dip in gibberellic acid. Left: seed piece dipped in water. Center: seed piece dipped in 10 ppm gibberellic acid. Right: seed piece dipped in 100 ppm gibberellic acid. Note the excessive stem elongation, multiple sprouts and abnormal leaves of plants at right.





Thompson seedless grapes at harvest, sprayed with gibberellin after berry set. Top, Left: No treatment. Right: 5 ppm. Bottom, Left: 20 ppm. Right: 50 ppm.





Accelerated development of the inflorescences of Shasta chrysanthemums. From bottom to top of a row, flowers represent the first through the fifth flower on a spray. The plants were treated when the outer florets on the inflorescences were showing color and the photographs were made two weeks later. Rows, from left to right: Untreated, first, second, and fifth inflorescence treated with 0.5 mg. of potassium gibberellate.

Induction of flowering of column stock grown at a night temperature of 65°F. Left to Right: untreated plant; plant sprayed on 9 consecutive days with 1000 ppm gibberellin; plant kept for 1 month at 40° and returned to 65° greenhouse; plant kept for 1 month at 40°, returned to 65° greenhouse, sprayed on three consecutive days with 1000 ppm gibberellin.





Flower induction of Shinmisona chrysanthemums grown at 60°F. on short days. Cuttings taken from basal shoots. Left to right: Untreated plant; plant sprayed 3 times with 100 ppm gibberellin, 2 months after planting; plant sprayed 3 times with 100 ppm gibberellin, 2 weeks later than the second plant.

Flowering of Vibrant chrysanthemums grown on short days and with high night temperatures of summer. Left: untreated plants. Right: plants sprayed with 10 ppm gibberellin from 10 days after the flower buds were visible.





Increased stem length and acceleration of flowering of Sainte Therese hydrangea. (40°F. from November 26, 1957 to January 7, 1958) Plants were sprayed with 1cc per plant of a 10 ppm gibberellin solution. Left to Right: Not sprayed; sprayed once; sprayed twice, 3 days apart; sprayed 3 times, 3 days apart; sprayed 4 times, 3 days apart.

Leaves of treated African violet are more erect. Left: untreated plant. Right: plant sprayed with 10 ppm gibberellin.





A general view of the Saratoga Horticultural Foundation's grounds

1959 Seed Distribution Program

The September 1959 issue of *The AHS Gardeners Forum* offers a free selection of thirty-three kinds of seeds to the Members of the Society. The deadline for receipt of requests has now been extended to the end of December, to allow new Members to participate in the program and to allow the present membership, who received the Forum after the first deadline, to request its share. *All orders* will be filled at the end of the year and *one mailing* will be made in early January.

The Saratoga Horticultural Foundation

ELIZABETH McCLINTOCK*

The selection of the most suitable and useful forms of plants for agricultural purposes has been carried out for centuries. In fact, some of the best known of our agricultural crop plants were selected so long ago that their origins are not known today. The use and selection of plants for ornamental purposes came after agricultural and utilitarian crops were well established. Selection in ornamentals has been carried out only within the past two or three centuries in Europe and in this country but with the greater emphasis on non-woody plants so that even the potentialities of selection have hardly been touched in woody ornamentals.

On the Pacific Coast this is particularly true of trees for street plantings and for small home gardens. In this region there has been a great influx of population since World War II which has resulted in new community developments and with this a real need for having the most suitable plants not only for streetside and home garden use but for landscaping highways and freeways, and commercial and industrial establishments. For these latter uses the demands are in the hundreds and thousands of specimens. In order to meet such demands the selected plants must be propagated by the most efficient methods possible.

The idea occurred to two far sighted Californians, Raymond D. Hartman and Maunsell Van Rensselaer, that there was a need for a place where selections could be made and their values demonstrated, and different methods of propagation tried out. The Saratoga Horticultural Foundation was the result of their idea. Mr. Van Rensselaer became the Foundation's director and Mr. Hartman its first president. Mr. Van Rensselaer had been for 16 years the director of the Santa Barbara Botanic Garden, a garden devoted to growing California natives. This experience had made him realize that through selection and more efficient methods of propagation many California shrubs could be made into useful garden ornamentals.

The Saratoga Horticultural Foundation at Saratoga, California, was established in 1951 as a non-profit corporation dedicated to horticultural investigation of shade trees and certain native California shrubs. The primary purpose of the organization is to put into production for the benefit of garden enthusiasts, landscape architects, city park officials, nurserymen, and others, (1) new species and selected types of shade trees adaptable to the Pacific Coast, and, (2) selected forms of native California shrubs. Since the establishment of the Foundation there have been assembled and evaluated many species and forms of plants in both of these categories. Promising selections are grown in large quantities and subsequently sold whole-

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Liquidambar styraciflua 'Palo Alto'

All leaves of this form of the eastern American Sweet Gum simultaneously turn to a bright orange-red in the autumn.

sale to nurseries. The proceeds are used to further the work of the Foundation.

Several factors are important in the selection of shade trees. Some of these are (1) size and conformation of the trees, (2) colors in flowers, fruits, and leaves, (3) low maintenance. With due consideration to these factors the Foundation's work on shade trees involves the selection and propagation of (1) species of trees known and grown for many years, and, (2) new species not grown here before.

In order that the desirable qualities of the individuals selected will be uniformly carried in their progeny, propagation is by vegetative means. It is often necessary to find out the most efficient method for reproducing a particular plant in a large enough quantity to meet the demands for it once it is offered for distribution. Since most of the plants distributed by the Foundation are vegetatively reproduced, the plants disseminated for each particular introduction actually represents a clone. (Clone is a term used for the "vegetatively produced progeny of a single individual.")

Ginkgo biloba, the maiden-hair tree from eastern Asia, is an example of a tree grown as an ornamental for many years, and was one of the first trees to be grown and tested by the Foundation. Most of the trees of this species have been grown from seeds, and have a spreading, somewhat asymmetrical habit. Such trees, however, are often unsuitable as streetside trees because the amount of variation produced among seedlings makes them unpredictable as to habit and symmetry. A study has been made by the Foundation in this country and abroad of individual ginkgo trees with desirable qualities. From these have been selected several particularly good forms which may be described as (1) upright and narrow pyramidal, (2) upright and broad oval, (3) columnar, (4) umbrella-like. Ginkgo trees are dioecious (that is, they are either male or female), and because the fruits which are produced by female trees contain a considerable amount of oil which develops a very rancid smell, only male trees are selected for streetside or shade use. *Ginkgo biloba* 'Autumn Gold' is one of the introductions of the Foundation. It is a clone which belongs to the form mentioned above as having an upright broad oval shape.

Magnolia grandiflora is another well known and frequently grown species of tree with a variable habit. Variation in cultivated trees of this magnolia was mentioned in horticultural and botanical literature as early as the beginning of the last century. John Sims in 1828 writing in *Curtis's Botanical Magazine* mentions several variants being grown in English nurseries at that time. The Foundation has selected three forms of this tree all of which when grown vegetatively produce flowers when young. One is now being distributed under the name 'Margarita.' The parent tree of this clone was grown as a "dwarf" form. Now twenty years old, it is 18 feet tall and has a spread of 20 feet and shows evidence of remaining a relatively small tree of good proportions. The remaining two selections of this magnolia are as yet unnamed and in the testing stage. The parent tree of one has an upright habit of growth, is now 35 years old, 49 feet tall with a branch spread of 26 feet at the base, tapering slightly to the summit. It shows promise of being suitable for streetside planting.

Several forms of *Liquidambar styraciflua*, the eastern American liquidambar or sweet gum, are being grown to determine the time of production and the amount of coloring in autumn. One of these, which has been named 'Palo Alto,' was developed by the Foundation and is now being distributed. Its glossy, 5-lobed leaves turn simultaneously on all plants to a bright orange-red in the autumn when grown in the test plots at the Foundation in contrast to the seedlings grown next to them which vary widely in time of coloration. It has not been determined whether this condition of simultaneous and uniform coloration will prevail under varying environmental conditions. *Liquidambar orientalis*, a small tree from Asia Minor with 5-lobed deeply cut leaves resembling those of Japanese maple, was not grown here previous to its testing by the Foundation. Two distinct forms have been tested and are now available.

The American tulip tree, *Liriodendron tulipifera*, is a handsome and important timber tree of the eastern United States. It is occasionally cultivated as a specimen tree. Its broad lobed leaves which look cut off at their apices are deciduous. The Foundation has a fastigiate form of this tree in the test plot

which appears medium sized, narrow and upright and may prove of value. The Foundation is also growing the Chinese tulip tree, *L. chinense*, which appears to be a smaller tree than the American but its leaves are larger and glaucous on their lower surfaces. This latter character is quite pronounced when the leaves, moving in a late afternoon breeze, expose their lower surfaces toward the sun. It is probably under conditions of partial shade and ample moisture that these picturesque leaves develop. This tree shows promise of being useful in areas where these conditions prevail.

Cryptocarya rubra, a member of the Laurel Family from Chile, with evergreen leaves and small inconspicuous flowers, has been grown infrequently in California for a number of years. It shows promise of having desirable qualities and is being tested. Another evergreen tree being tested is *Ceratonia siliqua*, the carob tree from the eastern Mediterranean region, a member of the Legume Family. Because of the large pods, rich in protein and sugar, it has been cultivated for centuries in all parts of the Mediterranean region. As a street tree, however, the pods are objectionable but by selecting male trees (the species is sometimes dioecious) having a desirable shape and size and with qualities of cold and drought resistance it may be possible to develop a fruitless form of this tree suitable for hot and dry areas.

Of native shrubs, the Foundation has probably given the most attention to *Ceanothus* and *Arctostaphylos*. A plant of *Arctostaphylos uva-ursi* with unusually large bright red fruits was exhibited several years ago by Mrs. Hillyer Brown at a meeting of the California Horticultural Society. Mr. Van Rensselaer, recognizing its potential value, was given cuttings of it by Mrs. Brown. It was named 'Radiant' and is now available. A well formed attractive plant of *Arctostaphylos bakeri* with deep colored flowers was discovered several years ago by Louis Edmunds who propagated a few

plants from cuttings in his nursery at Danville, California. This clone, named 'Louis Edmunds' for its discoverer, is also now available. It is interesting to note that the original plants in the wild from which this clone was selected have been bulldozed out of existence.

Garrya elliptica, the silk tassel bush, a native California evergreen shrub which is dioecious, produces male flowers in long catkins. A selected male form, given the name 'James Roof' and which produces catkins or tassels about 12 to 14 inches long, is being distributed. Plants of *Photinia arbutifolia*, the toyon or California holly, growing on Catalina Island have consistently larger berries than those on the California mainland. The Foundation is growing some of these, hoping that it will be possible to develop a good large berried form for horticultural use.

From *Ceanothus griseus*, a variable species in the wild, the Foundation has obtained several good forms. *C. griseus* 'Louis Edmunds' has a dense upright habit of growth, flowers early in gallon containers. *C. griseus horizontalis* 'Hurricane Point,' widely used now, is not too satisfactory because it has light blue flowers and is fast growing and short lived. It is hoped that another clone of this species called 'Yankee Point' will prove to have the more desirable qualities of dark blue flowers, slower growth, and a longer life. As time goes on, the Foundation will through its continued selection of better forms eliminate those less useful.

These examples show that although the Foundation was founded less than ten years ago it is already making valuable contributions to horticulture through its search for desirable forms of a wide number of species, its testing and evaluation of these, and its endeavor to find the most efficient means of propagating them vegetatively. The production of its selections in large quantities insures their distribution to the gardening public and provides for the continuation of the Foundation's development of new selections.

A Book or Two

(Books available **for loan** to the Membership are designated: (Library). Those not so designated are in private collections and are not available for loan. Books available **for sale** to the Membership are designated with the special reduced price and are subject to the usual change of price without notice. Orders must be sent through the American Horticultural Society accompanied by the proper payment. Please allow two to three weeks for delivery. Those not designated for sale to the Membership at reduced prices can be purchased through the Society, however, at the retail prices given. In these instances the full profit is received by the Society to be used for increased services and benefits of the Membership.)

Old Roses for Modern Gardens.

Richard Thomson. D. Van Nostrand Company, Inc., 120 Alexander Street, Princeton, New Jersey. 1959. 154 pages. Illustrated in color and black and white. \$7.50. (Library). AHS Members' Price \$6.38.

No matter whether one is interested in old roses or not, this book will be read with pleasure, thanks to the author's pleasant style, his wit, and his knowledge. If one has to quibble about him it would only be that he has not written still other chapters in this same volume.

He concerns himself with the background of the several groups of roses commonly acknowledged and appears to have brought to his diagrams a concise idea of the lineage of the several groups, definitely from records where that is possible, or as a workable hypothesis when there are no data, only inferences. Since he writes from his own garden and years of experience, one may listen with more assurance than if one looked only at the bibliography which has more books of secondary value than otherwise. The references in the text to other sources are not mentioned in foot notes, but are properly credited otherwise.

The color photographs are charming, though any one who has labored in that field will note some colors that are dubious, for example, the color of La France is rarely, (if ever) as shown. One wonders about some of the others. The black and white prints are all from California, and one can only wonder if the many varieties with obviously cup and bowl shaped blooms would not all "ball" in our Eastern weather. The reviewer knows that some do in Mississippi with our drenching summer dews.

Aside from the discussions that have to do with lineage, the text concerns itself primarily with discussions of the roses themselves. The descriptions are clear, inviting and are never written to spare the occasional comment that indicates a limitation of value. There are notes as to rootstocks in some cases, particularly in the sections where the own root plant would normally sucker. This is very valuable and one only regrets that there was no further discussion of stocks, for the reviewer's experience with California plants on Ragged Robin stock has been more successful than Georgia stock on multiflora. No plants have been received on odorata which might be better than either here.

There is valuable record of perfumes, which to the reviewer are fundamental. Unfortunately the comments are not as precise as they might be, in differentiating the scents of the several sections treated. True there is no wide vocabulary in English, but when there is such a difference in the scents of say, Marechal Neil, Safrano, Louis Philippe d'Angers, Souv. de la Malmaison, to name four that grow well here, one only wishes for more. The scents in the other sections not included above, all have their own distinctions.

There is no discussion of pruning as such, but advice is given in the discussion of varieties, and one notes with a chuckle that Mme. Cochet must make a large bush before it does well. She is not alone among the teas in this, and the best garden use is difficult to determine of these huge and often awkwardly shaped teas, in the South.

All reports are based on the author's experiences near Philadelphia, save for some comments on roses seen in Bermuda. Only a few roses are mentioned that do not fall within the time limits of "old" as used in this text. Possibly the most interesting thing of all, is that the total list of varieties includes not only plants that succeed primarily where there are winters, but a fair number of the less cold resistant varieties, with notations as to the possible limits, of low temperatures. Most books read so far have been written either by northerners who did not really know the South, or southerners who didn't bother to know the northern problems, and who in many cases were drenched in the sentiment that Dr. Allen rails against in his very brief preface. Southerners should study this book, for those parts of it that treat of roses that do well here, should be followed rather than the constant attempts to grow roses bred for more northern consumption.

B. Y. M., *Pass Christian, Miss.*

A Guide to the Beautiful Free-Flowering Trees Growing in Durban and Costal Natal.

J. E. A. Carver, 60 Margaret Maytom Avenue, Durban, Natal. 1958. Mimeographed, paper bound. 85 pages. \$2.00 (Library).

It is unfortunate that this excellent compendium of the flowering habits of a lot of beautiful trees of South Africa should have been produced in such an awkward shape (sideways on 8 x 13-inch sheets), because it has considerable merit and it contains a wealth of material not elsewhere available. The author has grown the trees of which he writes.

In the printed book, the author has printed the descriptive data for the purple, mauve, lilac, and blue flowering trees on blue paper; the yellow, orange, gold, etc., on yellow paper; the white or cream on white; and the red, pink, etc., flowers on red paper! This is something no other publisher has ever attempted—it makes a very good visual index.

The book, sub-titled: Their easy recognition and landscaping—showing also which of these kinds will succeed at higher altitudes, is recommended to those interested in the unusual flowering trees.

E. A. MENNINGER

Ornamental Crab Apples.

Arie F. den Boer. The American Association of Nurserymen, 635 Southern Building, Washington 5, D. C., 1959. 226 pages, 4 color plates, upwards of 250 line drawings, sketches and tables. \$4.95. (Library). AHS Members' Price \$4.20.

While assembling one of the finest crab apple collections of this country at the Des Moines Water Works, it has been known that the author of this book has also been recording detailed crab apple information over a period of many years. It was hoped that this information would eventually become accessible to the many of us who grow these widely adapted and useful trees, and it is to the credit of the American Association of Nurserymen that this hope is now fulfilled.

Ornamental Crab Apples supplies just about everything that the home gardener, nurseryman or park superintendent needs to know concerning the best hundred or so species and varieties of crab apples of today's nursery listings. It does not contain all the technically descriptive material of the author's earlier manuscripts, nor quite all of his many drawings, but for the intended purpose of the present book this does not matter. So far as the average gardener is concerned the information is there, well indexed and easily findable. With a Foreword by Donald Wyman (*Crabapples for America*) there are chapters on usefulness, charm, variety of form, foliage, flowers, fruit, crab apples as pot plants, planting, pruning, propagation and, pertaining to order of bloom, fruit color, flower form and a great deal of miscellaneous information—all in addition to the main body of the book with its helpful and very readable descriptions of the many varieties. Most of these descriptions are accompanied by natural-size line drawings of two or three leaves while, grouped together, are as many drawings each of typical flower and fruits. Name usage bears the stamp of approval of G. H. M. Lawrence and the Bailey Hortorium.

We welcome an excellent guide to the culture of an especially useful plant group.

HENRY T. SKINNER

American Rose Annual, 1959.

Frank H. Abrahamson, Editor. American Rose Society, 4048 Roselea Place, Columbus, 14 Ohio. [Distributed to book stores and published by Doubleday & Company, 575 Madison Avenue, New York 22, New York.] 1959. 266 Pages. Illustrated. \$4.50 (Library).

Presenting the admixture usual to rose annuals of both the ephemeral and the scientific in the chronology of the rose, the current edition of the *American Rose Annual* follows its well established pattern. In the category of perhaps ephemeral but of more than passing interest are two accounts of experience with rose culture in our newest states, Alaska and Hawaii. And one notes with surprise that Louise

Marx's account of how Roses respond to the Midnight Sun makes rose culture at Anchorage, Alaska, seem a bit less arduous a task than Amy Greenwell finds it to be at Captain Cook, Hawaii, though the compulsion to grow roses and the delights of success are no less than equal. To continue the exotic motif, there is also an anecdote relating to roses at Kabul, Afghanistan, but any difficulties one encounters in this pursuit there have to do with one's servitors rather than the roses *per se*. There are the familiar appraisals of rose performance in various parts of more traditional rose growing sections; especially noteworthy is Helene Schoen's experienced resume of the selection of roses for different garden objectives.

Among the technical contributions to rose lore mention must be made of a new report in the series of rose fungicide and insecticide tests at Cornell University; an account of rootstock selection for rose propagation by A. N. Roberts of Oregon State College; diagrams of rose chromosome configurations emphasizing satellites by E. B. Risley, of the University of New Hampshire; observations on low temperature endurance of roses at Iowa State College by G. J. Buck (the January 1957 record of a temperature drop from 40 above zero to 30 below in the course of two days gave roses a drastic test); Observations on the Genetics of Doubleness in Roses by Dennison Morley; and the Cytology of Two Fertile Triploid Roses by H. D. Wulff.

F. W.

Designs for Outdoor Living.

John Burton Brimer. American Garden Guild and Doubleday & Company, Inc., 575 Madison Avenue, New York 22, New York. 1959. 420 pages. Illustrated. \$3.95. (Library).

The propaganda reports: "Here is a practical book crammed with valuable information on building outdoor projects that will enhance the appearance, augment the living pleasure, and increase the value of your home." There is no doubt but that the book will do all these things, and, if you like to piddle around with small projects or pretend to be the week end contractors, there are thousands of ideas, all interestingly explained and illustrated, that you could construct in great glory—fences, pools, trellises, steps, bird houses, walls, walks, gates, driveways, terraces, ad infinitum.

American Standard for Nursery Stock.

Committee on Horticultural Standards, American Association of Nurserymen, Inc., 635 Southern Building, Washington 5, D. C. 1959 Revision. 29 pages. Illustrated. \$.50. (Library).

The *American Standard for Nursery Stock* has been developed to its present accepted status since its initiation at the 1923 annual meeting of the AAN, keeping abreast of required revisions and expansions to be a current standard of nursery plants for all users.

The Scientific Principles of Crop Protection. Fourth Edition.

Hubert Martin. St. Martin's Press, Inc., 103 Park Avenue, New York 17, New York. 1959. 359 pages. \$12.50. (Library).

During the years that have elapsed since the writing of the Third Edition (1940), the search for synthetic pesticides by the chemical manufacturer has met astounding success and the range of chemicals available for crop protection has been vastly extended. Fortunately their technical data are available elsewhere and attention can be turned to their biochemistry and toxicology. The present edition follows the plan of the third edition except that the expansion of knowledge of the mechanisms of toxic action now permits a co-ordinated treatment and a discussion of the general principles prior to their specific application to the several groups of pesticides.

The Grafter's Handbook.

R. J. Garner. Oxford University Press, 417 Fifth Avenue, New York 16, New York. 1958. 260 pages. Illustrated. \$5.75. (Library).

Setting out in detail almost every known method of grafting and giving information on all points involved, this Second Edition of the standard work on grafting brings the subject up to date and appraises the major advances of the last decade, as practised and taught by the East Malling Research Station in England.

Plants and Environment. A Textbook of Autecology. Second Edition.

R. F. Daubenmire. John Wiley & Sons, Inc., 440 Fourth Avenue, New York 16, New York. 1959. 422 pages. Illustrated. \$6.95. (Library).

Such up-to-date topics as: evaluation of stoniness of the soil; significance of dew for plants; new concepts of evapotranspiration; shielding of precipitation gauges; urban microclimate; frost churning of soil; and atmospheric pollution by smog and hydrogen fluoride, revive the first book on plant ecology to give special consideration to adaptation and ecologic evolution and to the complexity of environment.

The Orchids. A Scientific Survey.

Carl L. Withner, Editor. The Ronald Press Company, 15 East 26th Street, New York 10, New York. 1959. 648 pages. Illustrated. \$14.00. (Library).

This is not a handbook for amateurs nor even for beginning orchid growers. It is, however, a book that all of them can read with profit and parts certainly with great pleasure.

There is an outstanding list of 15 contributors, and all have written with not only the clarity that one expects from the trained mind, but with a kindness that extends to the less trained, without condescension. The sort of writing that leads one on.

Very briefly it may be characterized as an assembling of all the basic knowledge of orchids as of today, with references to the important sources of the past, and indications of fields in which advances are imminent, reprints of some papers that make a valued addition to the whole, excellent bibliographic listing after each paper, an index and a valuable appendix in which Dr. Schweinfurth gives a Key to the Orchids (taxonomic), a long discussion and recording of chromosome numbers (artificial hybrids included). These are followed by two additions by Dr. Withner, one on Culture Media, and one on Smear Technique for Chromosome Counts in Orchids.

A reference work that will be essential for any and all serious workers, and a delight to the non-professional who aspires!

The Ronald Press purchased the in-print stocks of the *Chronica Botanica* books when their general editor, Frans Verdoorn, relinquished his excellent press to return to The Netherlands. They have published several in the now famous *Chronica Botanica* series, with Dr. Verdoorn as Consulting Editor. *The Orchids* being the latest and No. 32 in the Series of Plant Science Books and *The Genus Datura*, reviewed below, is the latest and No. 20 in An International Biological and Agricultural Series. Available titles in both these series may be purchased through AHS at discount prices to be announced later.

B. Y. M.

The Families of Flowering Plants.

J. Hutchinson. Oxford University Press, 417 Fifth Avenue, New York 16, New York. Second Edition. Vol. I Dicotyledons. 510 p., Vol. II Monocotyledons 280 p. Large octavo. \$23.55.

The dust jacket says the author recognizes more than four hundred families of flowering plants "arranged according to a new system based on their probable phylogeny" (race history).

An opportunity for a horticulturist who pretends no more than a superficial knowledge of botany, to review a book like this, is a real joy because here at last is an internationally famous botanist who writes about plants from a knowledge of them as they grow in field and forest and not from the viewpoint of one who examines dried herbarium specimens under a microscope. Indeed Dr. Hutchinson's extended collecting efforts and experiences as set forth in his *A Botanist in Southern Africa*, his *Flora of West Tropical Africa* (with J. M. Dalziel) which is now appearing in extensively revised form, and several books on the British wild flowers, obviously awakened in him a completely new concept of plant relationships. In this new work Dr. Hutchinson has broken away from everything that Bentham & Hooker and Engler & Prantl held dear, and has come up with an evolutionary and revolutionary arrangement of plant families that really makes sense, even to non-botanists. Gone are all the artificial classifications and keys based on them. In their place is an explanation of obvious kinships based on similarities. Most keys operate on an elaboration of how this differs from that (the laboratory method), but Dr. Hutchinson proceeds from the viewpoint that this must be

related to that because they have such-and-such in common (the field method).

The author begins (with his predecessors) by dividing all plants into Monocots (orchids, lilies, bromeliads, palms aroids, grasses, etc.) and Dicots (the rest of the true flowering plants). Here he leaves the well trodden paths and comes up with the classification of all dicots into two groups: trees (which he calls Lignosae, fundamentally woody phylum) that proceed from the Magnolias to the Verbenas in an ascending series of complexity; and herbs (fundamentally herbaceous phylum) from the Ranunculaceae to the Mints, in a similar ascending series. These two series, the author sets out to prove, are parallel and co-existent without being intertwined by supposed relationships. The result is a truly natural system that is easy to understand and it does away with a lot of fancied kinships that strain the credulity of field observers who do not want to be botanists. Dr. Hutchinson is revolutionary too in concluding that the flowering plants came first and that the monocots derived from them.

Each of the four hundred families of plants is illustrated with a line drawing of a characteristic species accentuating the differentiating features, and these are excellent. Equally interesting are the scores of world maps indicating the restricted distribution of scores of families.

One particular thing is wrong with this new book. Dr. Hutchinson is weak on indexes. His failure to index *A Botanist in Southern Africa* was a continental calamity. In the present two-volume book, he has put the index at the end of the second volume which is a colossal injustice to the reader. If one wants to look up a genus or an order, he has to take up the second volume first, then often put it back and hunt in the first volume. Life is too short for such extra work.

EDWIN A. MENNINGER

Common Edible Mushrooms.

Clyde M. Christensen, Charles T. Branford Company, 69 Union Street, Newton Centre 59, Massachusetts. 1959. 124 pages. Illustrated. \$3.50. (Library). AHS Members' Price \$2.97.

The *Third Printing* of this standard paper provides data on the wild mushrooms, replete with their habitat, identification, harvesting, history, and recipes.

Garden Plants in Color.

Henry T. Skinner, Editor. Sweeney, Krist and Dimm, Publishers, 535 Northwest Sixteenth Avenue, Portland 9, Oregon. 1958. 236 pages. 438 color illustrations. Illustrated. \$42.50.

For many years there has been a need within the nursery industry for an authoritative publication devoted to a presentation of color plates of ornamental plants generally available in the commercial nurseries of the country.

Several of the larger wholesale nurseries have made valuable contributions in the past to horticultural literature in publishing books on their specialties in which color has been used extensively. Others have issued collections of color

plates devoted to specific groups of plants such as roses and shrubs. Some publishers have entered this field with popular publications on garden plants in which color is used primarily to make the publication attractive to the amateur gardener.

Garden Plants in Color on the contrary, has as its objective the presentation of concise descriptions of over four hundred nursery items, generally available in the trade, each of which is illustrated in full color. The accuracy of the descriptions is attested to by the fact they have been edited in detail by Henry T. Skinner, Director of the United States National Arboretum. The color work is the result of excellent original photographs plus a superb and painstaking job of production. The combination of the best of raw materials and the expert craftsmanship in production has produced a classic and valuable contribution to horticultural literature.

Each of the eight sections is introduced by a brief description of the group, written by recognized plantmen, six of which were drawn from the nursery industry itself, one from an arboretum, and one from an outstanding public park. This in itself is unique, and is indicative of the publisher's insistence to make this presentation of the greatest practical value possible.

Garden Plants in Color is the first attempt to cover the horticultural industry of the United States in such a comprehensive manner and the publishers are to be commended for the effort. Due to practical limitations, however, complete coverage between the covers of a single book could not be accomplished. The omission of Roses will be questioned. Due to the popularity of the Rose, the comparative rapidity of change now going on from many of the older sorts to the newer improved varieties, the decision to omit the class entirely at this time was well taken. A Supplement to *Garden Plants in Color* should be devoted to this one popular plant. On the other hand, the decision to include Rhododendrons, Azaleas and Camellias was a sound decision, as here will be found in one place and for the first time, full color illustrations of a hundred and fifty popular varieties of these plants.

RICHARD P. WHITE

Flower Arranging for Fun.

Hazel Peckinpugh Dunlop. The Viking Press, Inc., 625 Madison Avenue, New York 22, New York. 1959. 119 pages. 4 color and 78 black and white illustrations. \$4.95. (Library).

"Flower arranging is meant to be fun. If we think of principles rather than rules, it can be fun and at the same time, more interesting arrangements are likely to result." This comforting comment comes from the author who, in the early days of serious flower arranging by struggling potential "blue ribbon winners," gave them real help and encouragement in her book *Let's Arrange Flowers* (1943). From her long experience as author and lecturer on arrangements, her directing of large and small flower shows and her prominence as a show judge, Mrs. Dunlop now helps the home arranger as well as the expert with new information (to this reviewer, greatly improved) on design, color, and instructions.

Once the study of flower arranging was con-

financed largely to garden clubs but today flower shop workers, horticultural groups, artists and decorators, and schools of art and design are all working with flowers in pattern. As a result, more study and thought are being given to this pleasurable art. Although confronted with frustrating "rules" by instructors, the student of flower arranging today is more and more concerned with a study of underlying esthetic principles. A basic understanding of *good design* always leads to freer and more creative work.

The arranger who exhibits in flower shows must follow requirements for pattern, balance, rhythm, and whatnot set forth in her Handbook of Instructions and in a show's schedule; otherwise, no blue ribbon! But not so for the home arranger. She can relax and really enjoy her efforts. The author's first suggestions are on the selection of plant materials not the exotic, forced plants from the florist or faraway, but things found in a home garden or nearby fields in all seasons and in all stages of development—seed pods, buds, full-blown flowers, evergreens, fruits, forced branches of flowering trees and shrubs, and even the luscious pink rhubarb stalks! Cultivating the "art of observing" makes the way to successful design a far easier road.

Mrs. Dunlop recommends a study of nature first; then the practical suggestions of acquiring holders and suitable containers; then a study of the principle, balance; and continuous practice with a minimum of material. The ten "projects"—or illustrated arrangements explained—should help the arranger to cope with another principle, the intriguing study of color harmony.

A long chapter with many fine illustrations points up the need for more experienced and perceptive flower show judges; and the few final paragraphs explain necessary treatment for preservation of the six general classifications of plant stems.

The author's style and text are clear and concise, with stress on simplicity and beauty and the use of familiar material.

MARGARET C. LANCASTER

American Tomato Yearbook, 1959.

John W. Carncross, Editor. C. Stedman Macfarland, Jr., Publisher, 8 Elm Street, Westfield, New Jersey, 1959. 40 pages. Illustrated. \$2.00. (Library).

The usual statistical data are given for production, consumption, and the like, in this year's edition, but for the first time the reviewer recalls, there are added lists giving the research workers in U. S. and Canada—over three hundred of them!—mostly at universities, state and federal agricultural experimental stations. Think what could be produced if some agent could persuade similar research money to be spent on the beautiful—say zinnias, for instance. . . .

How To Make Money From Your Home Greenhouse.

Peggie Schulz. D. Van Nostrand Company, Inc., 120 Alexander Street, Princeton, New Jersey, 1959. 324 pages. Illustrated. \$5.95. (Library). AHS Members' Price \$5.00.

The reviewer can think of no one with a great liking for growing garden plants who has not

wanted a greenhouse of some kind or other. When he was twelve years old, with no books on greenhouses, or even money, but filled with desire and energy, he persuaded the local merchant to sell him four windows on credit (about \$9 in those days) and promptly converted an old country sawdust-insulated milkhouse into loads of fun and education (and he soon repaid the \$9 from rooted geranium sales).

To bring the story up to date, Mrs. Schulz, with much more experience, money, and even the energy of a Trojan, has duplicated the idea. But she is capitalizing on her plants and now will reach even greater fame with the book royalties, describing her first love.

Mrs. Schulz writes from her recent experiences giving you the very latest data on greenhouse specifications, telling you just what to grow for a quick market—even how to create a market. She gives the complete details on how to grow the plants and also the complete instructions on how to operate the greenhouse proper. Her recent project started with a 12-foot attached-to-greenhouse costing about \$900. There are thousands of trade secrets you will find in this very interesting and exciting book. And you will probably go ahead with your "can not afford plans" to build your greenhouse right after you finish reading her book.

JOHN MARSHALL

A Treasury of Rose Arrangements.

Julia Clements. Hearthside Press, Inc., 118 East Twenty-eighth Street, New York 16, New York, 1959. 88 pages. Illustrated. \$3.50. (Library). AHS Members' Price \$2.97.

This American edition of Julia Clements *My Roses* is indeed a welcome addition to our books on arranging flowers. The text is interesting and instructive. A note to the reader gives the American product names for the English trade names used.

The chapters on How to Arrange Roses includes paragraphs on containers, table decorations, and many hints on conditioning before and caring for the roses after arranging. Although the text is beamed to English readers the chapters on Show Work should be helpful to all Garden Clubbers. The illustrations are profuse, quite clear, and should give the reader many ideas not only for roses but for substituting other flowers.

As an added bonus there is a section on Rose Recipes, old and new, including jams, jellies, conserves, and several formulas for pot-pourri.

The author says that she wrote this book to widen our interest in roses, and it certainly should do that for every rose lover, arranger, and homemaker.

G. P. W.

Japanese Gardens for Today.

David H. Engel. (Foreword by Richard Neutra, architect, exponent of the integration of house and garden). Charles E. Tuttle Company, Rutland, Vermont, and Tokyo, Japan, 1959. 270 pages. Illustrated. \$15.00. (Library). AHS Members' Price \$12.75.

It is quite likely that the present reviewer is the worst possible choice for the task. Many years ago, longer in fact than he likes to recall,

he walked in many of the places pictured and was moved by many of the same things that have stirred the heart of the author. To open the book and see the familiar scenes again, and recall the dictum of a member of the Embassy staff, that he "would never be the same again" is a wonderful experience.

Mr. Engel acknowledges many helpful friends but if he had not had an open mind and heart, they would have given him nothing.

The book falls into the usual divisions found in most books treating of Japanese garden styles, and one can look upon it, if he must, as a source book for details that may be "lifted" precisely and used without further thought. Familiar terms such as grading, plant materials, paving, fences, walls, and all the like are here. The relation of public areas to private areas, focal points, long views, succession of effects in plant materials, perspectives, uses of water, all are here.

But the essential points from the reviewer's prejudiced point of view, are those which relate to Japaneseness of every element, the qualities that have been born of the history and culture of the race, the nature of the land, with its attendant climate and soils, not forgetting the terrific precipitation common on many parts of the islands. These have all been developed with a singular perception, thanks to the fact, one may venture to surmise, that some of the original designers were not only religious men, but painters as well—persons who saw with a sort of double vision which has nothing to do with "specifications" but with the flow of life forces.

The author sets out in his text precisely what he had in mind in writing the book and for this reader he succeeds splendidly. The illustrations have been chosen with great care, although one could wish, sometimes, that the captions had been even more full than they are.

For the reader, the gardener who is concerned with what we sometimes fatuously call "production" and "effects," there may be moments of irritation. No matter, the book was not for him at all.

For the other reader who can and will come to the study of the book, there will be opened a door to keener perceptions and to a philosophical viewpoint that may cast doubt on some of his presently cherished beliefs and desires. This is always a most salutary experience, even if painful at the moment. Probably he will not want to make a Japanese garden of his own; which is well. There are so few places in this country that combine all the elements from which the Japanese style has been born. But he can bring to his gardening a new vision, and if he is willing to submit himself to the disciplines of maintenance which are vital to the success of the style, he will find a new source of delight and a new field of enjoyment which has no relation whatever to the usual horticultural achievements here.

B. Y. M.

Blakeslee: The Genus Datura.

Amos G. Avery, Sophie Satina, Jacob Rietsema. The Ronald Press Company, 15 East Twenty-sixth Street, New York 10, New York. 1959. 289 pages. Illustrated. \$8.75. (Library).

Foreword and Biographical Sketch by Edmund W. Sinnott of Yale University.

This book, No. 20 of *Chronica Botanica: An International Biological and Agricultural Series*, is a complete account of the genetic investigations which Albert Francis Blakeslee and his associates carried on for over forty years with several species of the plant genus *Datura*.

The research program was one of the most complete experimental studies ever made of a single group of plants. Experiments and investigations were carried out on the breeding, cytology, morphology, anatomy, physiology, embryology, geographical distribution, and evolutionary history of ten species in this genus, with *Datura stramonium* the most extensively studied. Fundamental research of development and growth processes of sporophytes and gametophytes as well as the embryo and seed of *Datura stramonium* is reported.

The result of this work elucidate many basic aspects of genetic variation of importance to all experimental genetic studies. The volume is more than just a compilation of accumulated data or abstracts of over two hundred papers; it is a synthesis of a life work, with each advance described against the background of those preceding it. A comprehensive historical review of the *Datura* taxonomy and the only known summary of the *Datura* nomenclature from 1753 to date enhance the value of the volume as an indispensable reference on this genus.

The Arboretums and Botanical Gardens of North America.

Donald Wyman, Editor. The Arnold Arboretum of Harvard University, Jamaica Plain 30, Massachusetts. 1959. 69 pages (paper-bound). Illustrated. \$1.50. (Library).

Longwood Gardens at Kennett Square, Pennsylvania, receives the distinction of having the oldest horticultural display for the benefit, enjoyment, and education of the public, having 1800 as its established date; while The W. C. Paul Arboretum in Memphis, Tennessee, may claim to be the youngest, with 1957 as its opening date. The chief functions, features, number of species and varieties, ownership, directorship, and even the operating budget of these two important institutions are also given, as well as the same statistics for some other 107 like places in the United States, Canada, Cuba, and Mexico. The alphabetical arrangement of arboretums and botanical gardens is by states, and then cities within the state.

The record is a very valuable reference for anyone interested in having all this sort of data at his hand, or for anyone wishing to visit such institutions during his travels. It certainly helps your office force answer any number of questions from the Membership. If only Dr. Wyman would now compile the same data on a world-wide basis, no one would be able to stump us.

Wild Flowers of Santa Barbara.

Katherine K. Muller (Text) and Campbell Grant (Photographs). Santa Barbara Botanic Garden, Inc., Santa Barbara, California. 1958. 36 pages. Illustrated. \$1.10. (Library).

This is a very attractive little booklet of the native plants around Santa Barbara, California, having 48 colored plates expertly prepared from color slides—3 to a right hand page, following the three corresponding texts on the left.

The Gardeners' Pocketbook

Chamaedoreas Are Tough

Many species of the genus *Chamaedorea* (miniature palms) have been described and named by botanists, but until recently very few of them were in cultivation. Now that growers are realizing the great ornamental qualities of these slender, seemingly delicate palms, they are in ever greater demand.

Chamaedorea erumpens has been justifiably popular with florists, nurserymen and the general public for the past several years. It was named and described by Dr. H. E. Moore, Jr., of the Bailey Hortorium, Cornell University, in *Gentes Herbarum* in 1951. In his discussion of this elegant little clump palm, he explains its specific name thus: "The name given here refers to the manner in which the very short spadices of at least the staminate plants burst through the leaf sheaths, but might equally refer to the manner in which it has suddenly come into prominence as a cultivated palm."

A lover of part shade, *Chamaedorea* (kam-ee-DO-re-a) *erumpens* sends up many thin, cane-like stalks of different heights, each cane bearing about four pinnate leaves of a pleasing darkish green—lighter green if exposed to much light, or even ranging to a sickly yellow. It was found that from the same batch of seeds, collected in the wild, plants sprouted with two different types of leaves. One set of plants had regular pinnae, all more or less the same width, while the other group had regular pinnae until the tip of the leaf, where two or more seemed to have joined, forming a pair of much wider pinnae. The latter type was designated *Chamaedorea erumpens* Fairchild in honor of Dr. David Fairchild, the famous plant explorer.

Most chamaedoreas, if not all, are divided into staminate and pistillate, or male and female plants. The male or staminate plants produce along the canes, from the ground up, inflorescences which push or erupt right through the dried leaf sheaths, and expand into slender finger-like spadices, green in

color, bearing tiny bright yellow flowers with an odd but rather pleasant fragrance. After the flowers have opened and the pollen is shed, these inflorescences dry up. The female or pistillate plants produce very similar "hands" of bloom, but in the presence of pollen-bearing plants, the flowers develop into tiny (pea-sized) round fruits in late summer and fall. As these grow and begin to mature, the "fingers" on which they are borne thicken and turn a bright dark orange or flame color; the fruits ripen to a blue-black color, adding much to the beauty of the plant. Understandably, the grower will wish to have both female and male plants, but more of the former because of their added attractiveness.

In 1954 the writer set out a young clump of *C. erumpens* on the north side of her home in southern Florida. The plant is in shade during most of the year. In summer the hot sun bears down on it and the top leaves become yellow; however, they shade the lower leaves and new growth sufficiently for the plant to withstand the three hot months. A location under a large tree or other cover would provide more even light conditions.

This plant bloomed the following spring and was found to be a staminate or male plant. After five years, this plant has thirty-five to forty canes, the tallest about ten feet. At its widest point, the clump measures about five feet across.

About a year later a young pistillate plant was set out a few feet away at the north-west corner of the house. This plant has grown remarkably well and has borne good crops of seed.

On October 3, 1958, the writer was preparing a talk on palms, and, rather reluctantly, cut a cane from her female plant to show her audience the attractive green stalk, graceful leaves, and colorful fruiting stems. After the talk, the palm was brought home and thrown on a shady trash pile. At intervals it was noted that the cane retained its bright green color and that the leaves at the tip were green and fresh. On Feb-



GATTI

Chamaedorea erumpens

ruary 10, 1959, the cane was retrieved and examined. One leaf at the tip of the cane was still green. The fruiting stalks had dropped their seeds and dried up. However, three new inflorescences were forcing their way through the dried leaf sheaths! At this writing (March 31, 1959) the tip leaf has not entirely dried up. The three inflorescences have produced small yellow flowers, dropped them, and are now drying up. This is in spite of the fact that this cane has never been placed in water or stimulated in any way. In the writer's experience, this six-month survival seems remarkably long.

Chamaedorea erumpens, along with *C. seifrizi*, performed very well during the unusually severe winter of 1958-9, when strong cold winds buffered and burned other palms. They have withstood freezes of relatively long duration for Florida with slight to no damage and *C. seifrizi* remains green and flourishing in full sun.

It has been reported that growers of cut foliage for use in the florist trade are now shipping *C. erumpens* leaves to florists in the north-east for use with cut flowers.

It goes without saying that these palms make excellent potted plants for house, patio, and other shaded locations, as well as for landscaping in the warmer parts of the world.—LUCIFA H. WAIT, *The Palm Society*, 7229 S. W. 54th Avenue, Miami 43, Florida.

More on Spray Mist Propagation

A brief note as to the further experiences with germination under spray as previously described in the July 1959 issue of the Magazine will bring the story up to date as of May 10, 1959. The plants listed have all germinated well under the treatment described but I am not yet ready to list the failures, as every time I examine the seed boxes, new germination is noted. These plants were mostly placed under the spray about March 1, 1959. A fact noted in the above report still stands, namely, the percentage of germination appears to be above average when most of the seeds appear above the surface. Those that have germinated well are:

Alonsoa mutisi, *Aethionema grandiflora*, *Arabis blepharophylla*, *Alstro-*

emeria pulchella, *Albuca bainesi*, *Abutilon* "Maximum," *Amblogyne polygonoides*, *Aristea capitata*, *Bellis* "Monstera," *Bulbine semibarbata*, *caulescens*, and *aloides*, *Calceolaria rugosa* hybrids, and *C.* "Monarch Strains," *Cistus palhinhai*, *Cypella herberti*, *Calochortus luteus*, *Cyclamen persicum* (the wild species), *Dipidax triquetrum*, *Dianthus deltoides*, *Dierama pulcherrimum*, *Euphorbia heterophylla*, *Eccremocarpus scaber* var. *aurea*, *Freesia* hybrids, *Franseria ramosa*, *Gazania* hybrids, *Gladiolus palustris*, *Hakea platysperma*, *Impatiens*, *Kniphofia macowani* and *K. rufa*, *Leucojum trichophyllum*, *Libertia grandiflora* (two lots of seed, one a year older than the other and germinating more slowly and less freely), *Nolana lanceolata* and *N. paradoxa*, *Narcissus triandrus*, *Potentilla warreni*, *Penstemon* hybrids, *Romulea rosea*, *Roscoeia purpurea*, *Tricyrtus macropoda* and *Torenia fourieri*.

I have still to overcome my surprise that any plant would germinate in so unappetizing a mess. The above list of plants does not make sense to me. The point of origin of the species involved varies from moist climates to semi-dry ones. This would point again to the need of further experiment with the method. I am convinced that germination would in many cases be earlier were an intermittent mist used over a soil heating cable. Since writing the first report I have been informed that some of the wholesale nurseries in Southern California are using the method quite extensively; also from another report, that it is being used in the commercial germination of cyclamen. My results to date would seem to point to its becoming a frequently used method.—L. T. PEERY, M.D., *Hayward, California*.

Two Good Conifers—Notes on Southern Taxaceae

A few years ago the writer had the rare good fortune to get two plants and some seeds of *Torreya taxifolia* and a single specimen, four inches tall, of *Taxus floridana*.

Today the *Torreya*s have grown into four-to-six-foot, container-grown plants, and the single *Taxus* into a six-foot

plant. These historical notes would not be of much horticultural interest except for the rarity of the species themselves—particularly the Florida Yew—and the fact that one practically never finds either one of them mentioned in trade magazines, popular magazines, or even horticultural journals. Both of these species occur in scattered stands along portions of the Apalachicola River bluffs of northwest Florida and a few other isolated nearby stations. It is extremely interesting from a plant geography standpoint to conjecture how they got where they are, separated by so many miles from their near relative of the north—*Taxus canadensis*. This is a matter for more trained people than I to work out, but the river itself is suspect as an agent in their movement and the habitat of rich ravines and cool glades is certainly unusual for a place so close to the Gulf of Mexico.

At any rate, my *Taxus* (which incidentally died very recently) had been trained to a central leader and was extremely attractive, resembling the Hemlock. This was a staminate plant and I secured many young cutting-grown progeny from this original plant. The foliage is lighter green than *Taxus baccata* or *T. cuspidata* and the plant naturally more prostrate in habit. *Taxus floridana* is one of the world's rare plants and has a future perhaps as a parent for hybrids resulting from crosses with the exotic *Taxus*. It also has ornamental value in its own right and extends the culture of the genus further south.

The *Torreya* is a bigger tree and less rare. It can easily be distinguished from *Taxus* on the needle characters. The underside of its needles has two parallel white bands running their length—*Taxus* does not. This is a beautiful, shiny, stiff-branched tree that grows into a pyramidal form. The rate of growth seems very slow, but perhaps not when compared with the spruces, firs, and hemlocks. Propagation of *Torreya* from cuttage has not been as easy for me as *Taxus*, but there has been some success. Since none of the *Torreya*s in my collection had produced strobili, I don't know whether I have staminate, pistillate, or both sexes in the specimens. I hope, of course, that it will be the latter so that I can propagate them by seedage.—EDWARD HORDER, *Mobile, Alabama*.

Littonia modesta

Neither *Hortus II* nor *Bailey's Cyclopedia* give very much information in regard to this tuberous rooted South African relative of the gloriosa. Since all the gloriosas we have been able to collect seem quite at home here, curiosity prompted buying this *littonia*, which is described as the one climbing species of the genus.

As the tuberous roots looked rather small, they were planted in a pot. Each sprouted, much as gloriosas do, and started up as if to climb, so a slender bamboo was put in place, but one plant appeared to succumb at once to a soft rot, and the other gradually withered after the whole had been transferred to an outside location that suited gloriosas. This spring (1959) both roots sent up vigorous shoots, about the same time that *Gloriosa rothschildiana* appeared, climbing rapidly so that the first slender bamboo has been replaced by a taller stake. Now, in late May, the plants top six feet and show every indication of continuing growth, with flowering in the upper part of the stalk, then a break, and flowering again toward the top. Although both texts cited speak of the flowers as "solitary in the axils," this is not always so, as we have several instances where two flowers appear from one axil. As yet, no branching has appeared.

The nodding flowers are bell-shaped, hanging down prettily and suggesting some of the fritillaries rather than gloriosa, with its petals turned inside out and the stamens and pistils curiously poised. In this *littonia*, all the stamens and the pistil are inclosed within the one and one half inch perianth segments. Our plants show the pure Orange of Ridgeway, fading a little as the flowers age. Seed is setting on some of the blooms but it is far too soon to tell if the seeds will be as described, brown or reddish in the pod. No fragrance is noticeable, and the flowers last as long as do those of gloriosa, though they will not be spectacular for picking.

As compared to gloriosa in general the plant is far less showy. It has a delicate grace, however, that the far more flamboyant gloriosas never show, and it will undoubtedly make less of a mass of vine if allowed to clamber over the tall

azaleas as we like it, clinging by the tips of the leaves that curl about whatever they touch if they can encircle it.

No protection was given the roots left in the open ground over winter.—BYM, *Pass Christian, Miss.*

More on the Clark Dwarf Applestock

As I read the April '59 issue of your magazine, I was particularly attracted by the short article on page 116, entitled "Extremely Dwarf Apple Trees," by Dr. Frederick W. Coe, San Anselmo, California. In his second paragraph Dr. Coe described the origin of a dwarf apple stock as having come from a Mr. H. Walton Clark who found the stock "while hiking" during a visit to "his old home in Indiana." Now it happens that this same Mr. H. Walton Clark was the man for whom the Clark Dwarf apple was named. The origin of the Clark Dwarf was described by Dr. Maney (Trans. Iowa State Hort. Soc. 78:127-134) as follows:

"About 1924 we acquired an interesting hardy dwarf stock which was introduced to us by H. Walton Clark, a biologist, who was connected with the United States Bureau of Fisheries Biological Station at Fairport, Iowa. Mr. Clark was an ardent amateur horticulturist and he had discovered a dwarf type of tree growing in the garden of an old lady living in Muscatine, Iowa. The tree at the time, was probably 20 to 25 years old and during its life had experienced temperatures as low as -25°F . without showing any signs of injury. The history of the variety as given by the lady was that her son was a sailor and he had brought the stock back from South America. The characteristics of the leaves and type of growth indicate that it undoubtedly is a type which might have originated as a seedling from the original Paradise, but it is distinct in its characteristics from the new standardized English stocks."

The Clark Dwarf has been shown to be identical with the Malling VIII rootstocks of the so called English rootstocks.

This was reported by Professor Karl D. Brase in the Proc. Amer. Soc. for Hort. Sci. 61:95-98, 1953.

The somewhat obscure description of the origin of the Clark Dwarf by Maney and the equally nebulous origin of the stock described by Dr. Coe suggest the strong possibility that these stocks are one and the same and that properly they should both be placed in their proper classification, Malling VIII.—MALCOLM N. DANA, *Assistant Professor of Horticulture, The University of Wisconsin, Madison, Wisconsin.*

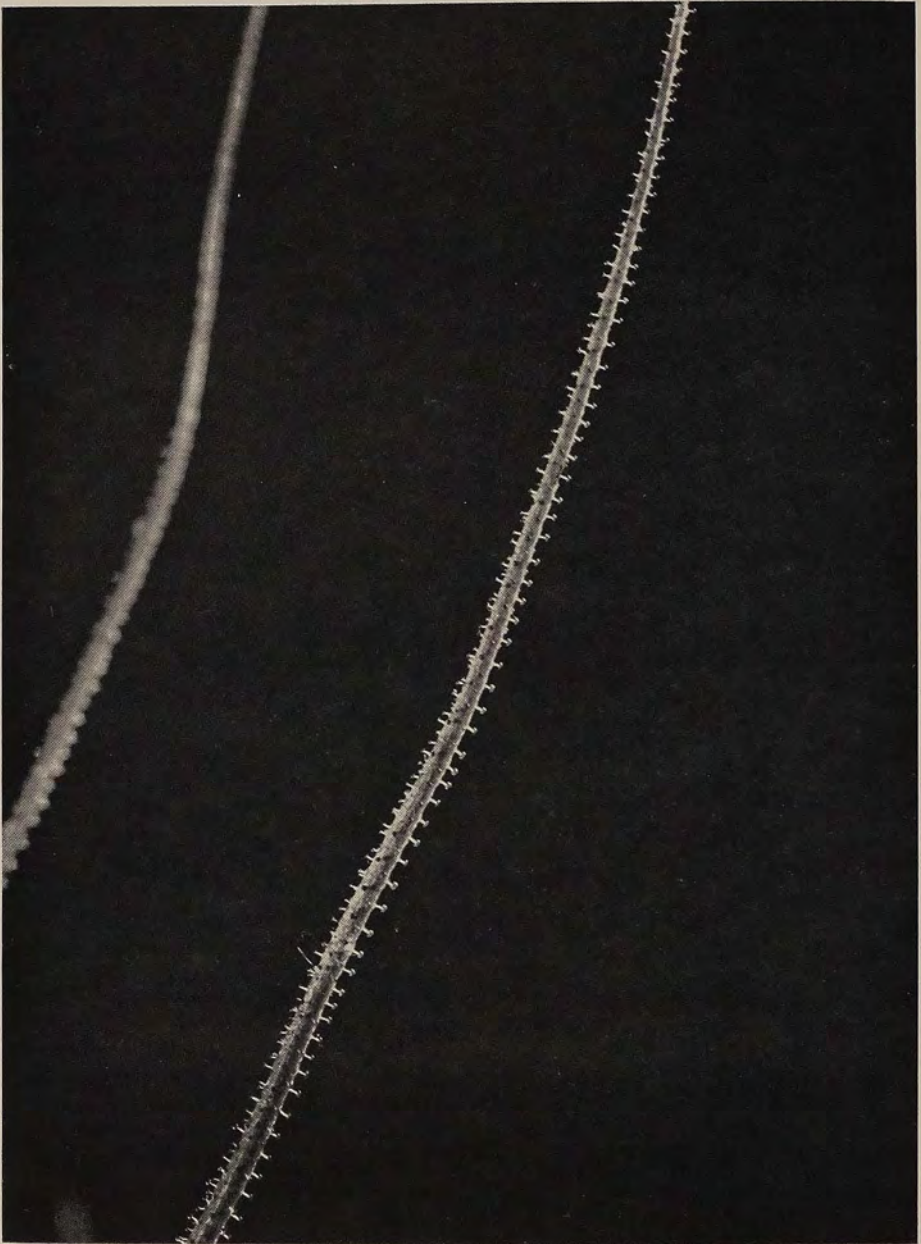
The Portuguese Sundew

An insectivorous plant little known to horticulturists and plantsmen generally is the Portuguese sundew (*Drosophyllum lusitanicum* Link) (P. I. 241897). This unique plant of the sundew family (DROSERACEAE) is a native of the heath uplands of coastal Portugal. It is recorded also as occurring in southern Spain and Morocco. But it is rarely cultivated.

Seeds of this interesting plant were collected in 1957 on an exploration trip to Portugal and the Mediterranean area under joint auspices of the Plant Introduction Section of the U. S. Department of Agriculture and the Longwood Gardens, Kennett Square, Pennsylvania.

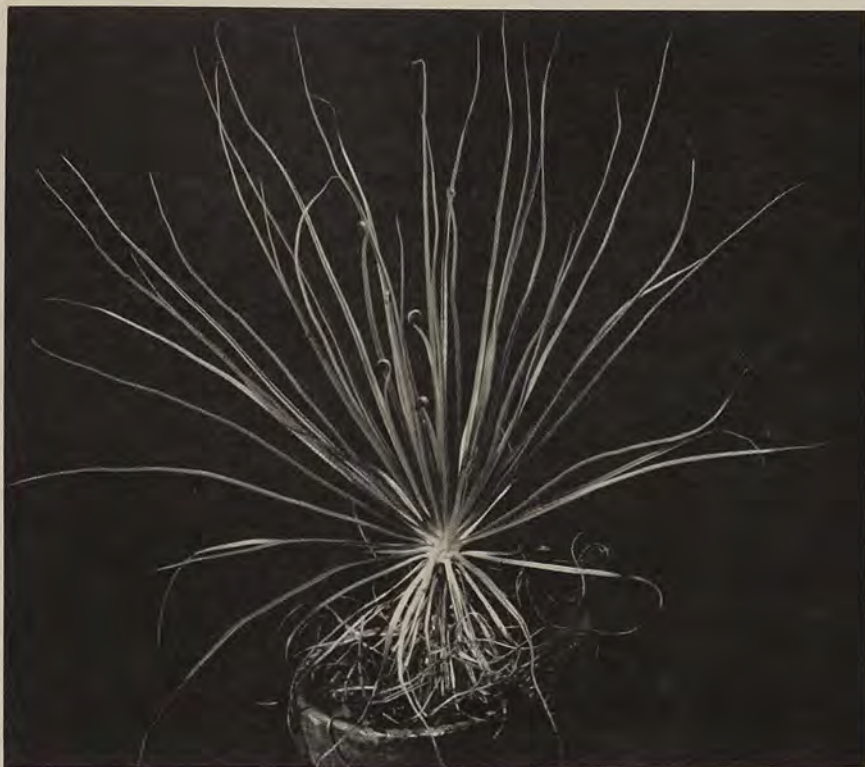
Plants were found growing among heather (*Erica umbellata*) in rocky acid soil on the outskirts of Coimbra, the old Portuguese university town and site of a famous old bontanic garden.

Drosophyllum is most closely related to the common sundew (*Drosera*) but differs from it in several important respects. *Drosophyllum* is a much larger more robust plant than any of the sundews native of the United States. Plants seen in the wild grow to about twelve inches tall, and old specimens become rather woody at the base. The narrow linear leaves, six to eight inches long, are crowded and form a rosette below the loose flower panicles. The bright yellow flowers are the size of quarters. Flowering occurs in April and May. The unfurling of the leaves is of particular interest. Sundews are perhaps the only



Drosophyllum lusitanicum

Enlarged leaf showing the mucilaginous glands



A two year old plant of the Portuguese Sundew grown from seed

flowering plants with circinnate veneration of the expanding leaves, a trait common among ferns.

Unlike the bog-loving Venus flytrap, common sundew, and pitcher plants, the Portuguese sundew withstands long periods of drought. The mucilaginous glands that cover the leaves of *Drosophyllum* imbibe water from the frequent night dews along coastal Portugal, and thus permit the leaves to remain green throughout the long rainless summers.

Plants grown in pure sphagnum moss from the Portuguese introduction have developed rapidly under normal greenhouse conditions at the Plant Introduction Station, Glenn Dale, Md. Growing conditions have been about the same as for pelargoniums. Flowering began in June 1959, the second year from seed.

Seeds are usually available from the Botanical Garden, Coimbra, Portugal.—FREDERICK G. MEYER, *Crops Research Division, Agricultural Research Service, U. S. Department of Agriculture, Beltsville, Maryland.*

Hydrangea otaksa

Elizabeth McClintock's article on Hydrangeas in the July 1957 issue of THE NATIONAL HORTICULTURAL MAGAZINE inspired Siro Kitamura of Kyoto University, Kyoto, Japan, to tell her the diverting story of the naming of *Hydrangea otaksa*. This name for the species was established by Philipp Franz von Siebold (1796-1866) in the *Flora Japonica* that he and Joseph Gerhard Zuccarini wrote in the 1830's and 40s. Kitamura's letter to Miss McClintock, reprinted with his consent, reads:

"I have received your valuable monograph on *Hydrangea* and the reprints. I thank you very much for your kindness. I want to inform you regarding the name of *Hydrangea otaksa* Sieb, et Zucc.

"Siebold wrote in his *Flora Japonica* p. 105, vol. 1 (sect. 1) that it is cultivated under the name *otaksa*.

"*Otaksa* is not a native name, but was the name of his Japanese wife in

Nagasaki. Siebold had a Japanese wife, and a wise daughter between them. The name of his wife was Taki Minamimoto. He called her Otaksan. (O is a prefix, San is a suffix; properly in Japanese, Otaksan is O-Taki-San.)

"Siebold wanted to commemorate his wife in Japan by the name Otaksa. Perhaps he hesitated, because he remarried in Europe and Otakistan had been a Geisha girl of Maruyama in Nagasaki before she married Siebold. Since, in Japanese, ksa means an herb, he changed Otaksan to Otaksa, and thus it seemed to Zuccarini to be the native name for *Hydrangea macrophylla*. Dr. E. H. Wilson made the same assumption.

"It is very interesting to suppose that Siebold's wife, Otaksan, was as beautiful as the flowers of *H. macrophylla*, and as charming and so on, but not sterile!

"His daughter left in Japan became an honorable female doctor. Her descendants are now living.

"Otakistan remarried—an honest Japanese merchant. In 1861, Siebold came again to Nagasaki. He was then 63 years old. He met again with his former wife, Otaksan, and her Japanese husband."

Today the plant is usually treated not as a separate species but as a variety (or sterile clone) from *H. macrophylla*.—F. P. LEE, *Bethesda, Maryland*.

About Color Changes

Few things irk a woman more than to be told she is mistaken about something she knows—such as that her hardy phlox didn't revert, that her tulips didn't change color after a year or two, and that her blue flag iris didn't bloom white. It may be possible to fluster her about the hardy phlox. After all, she cannot prove that there was no seed entangled in the roots of the plant she set out, or that no seed later lodged in the clump. It is harder to shake her confidence about her tulip observations. It is downright impossible to change her conviction about her iris after she or her friends have moved the same plant back and forth for several years and have watched it bloom blue in one soil and white in another.

The matter of blue to white in iris first came to my attention in Charleston, South Carolina. At a garden club meeting there a member spoke of moving blue flags from her plantation garden to her shoreside garden only to have them bloom white. When she returned the plants to her inland garden they again bloomed blue. After that I brought the matter up before many southern garden clubs. I had similar accounts from Carolina southward along the coast and around the Gulf well into Texas. For the most part the alleged color change was accepted as on a par with the change in color of blue hydrangeas when changed from an acid to an alkaline soil. Everywhere there was considerable exasperation about horticultural authorities who had told this or that one that she did not know what she was talking about.

There is an obvious difference between the loss of blue in hydrangeas and in iris. With hydrangeas it seems almost entirely a matter of soil. With blue flags the matter of temperature also enters in. At least I never heard the claim of color change except in localities of higher temperatures—localities where blue is normally a scarce color in flowers.—MAUD R. JACOBS, *South Carrollton, Kentucky*.

Helleborus in Louisiana

About six years ago, while visiting gardens in New Orleans, I saw two large clumps of *Helleborus orientalis*, commonly called the Lenten Rose. I was more than surprised as I had always thought that *Helleborus* were not for the deep south. When I inquired about these plants, the owner of the garden told me they were divisions from an old clump that her mother had grown in her New Orleans garden.

I came home and ordered, from a nursery in Oregon, the four varieties of *Helleborus* that they list along with the different color variations in the *H. orientalis* group.

Helleborus corsicus struggled to keep alive for one year, it never bloomed and finally passed out. *Helleborus niger* (Christmas rose) stayed with me for two years and on one Christmas it put up one

stalk of blossoms. *Helleborus foetidus* grew into a large clump with many stalks of exotic green flowers with edges of maroon. Last summer (the plant was four years old) we had three weeks of rain with no intermittent sunshine and this plant went out with crown rot. However I have many seedlings and they took the weather and are blooming this winter.

Helleborus orientalis (Lenten rose) is by far the most satisfactory of all of these plants. These have now grown into large clumps and both the red and white forms give me many blossoms. They self sow their seed and we now have many two and three year old plants.

Helleborus want protection from the hot summer sun. They want good drainage but enough moisture to keep them thriving. In the summer we put rotted barnlot fertilizer around the plants and they are kept mulched at all times. About once a year I put a light feeding of fertilizer 8-8-8 around these plants.—JO N. EVANS, *Ferriday, Louisiana.*

An Extra from "Dried Blooms" of Cape Chinkerichees

This Christmas the editor was presented with a package of blooms of the South African Chinkerichees—directions and all. These were dutifully followed and the living blooms developed precisely as indicated, and then, they lasted and lasted and lasted and lasted, until it was forgotten to add water. When the moment for removing the vase came, we noted that along the scapes there were what looked like green sprouts, and further investigation disclosed that sitting along the stems were neat little bulbs all sprouting just as onion sets might do if left too long unplanted. They came in all sizes from those with a diameter of about one half inch to much smaller, and all seemed somewhat difficult to remove from the scape, not falling off as do bulbils of tiger lily and others. . . .

Duly planted in what we hoped might be a fair soil, well drained and all, the green tops ripened off as if the plants were mature and now we watch a pot with no sign of activity.

Has any of this happened to others? And if so, how long will one wait until

the southern bulbs are fooled into thinking it is their spring and sprout again? I am told by Dr. Peery that the bulbs themselves soon adjust to the reversed seasons in his Hayward, California garden.

The common name is sometimes spelled Chincerichee. It is *Ornithogalum thyrsoides*.—BYM, *Pass Christian, Miss.*

Rex Begonia Culture

The large types of Rex Begonias are truly the "Kings of the Begonia World," and the Rex Miniatures "The Little Queens." On the whole Rex Begonias are most lavish in producing their foliage, for which they are grown, but, of course, as in any other group of plants there are the temperamental ones. One of these is Comtesse Louise Erdoedy the first of the spiraled-leaf varieties from a cross of two unknown Rex hybrids made in Hungary in 1884. This variety spiraling from each side of the sinus is basically a greenish-gray veined darker, with pink tints around the edges and to add to its beauty has pinkish leaf hairs overall. This Rex seems to be very thirsty and demands constant dampness at all times. Too, being hairy, it cannot take any strength of sun. Very bright light is a requisite to sustain the color-tones but full sun burns and fades the leaves. Both Fireflush and Curly Fireflush are rather too temperamental at times it seems, for they will be gorgeous today and drooping and fading away tomorrow for no apparent reason, age having nothing to do with it. They too have light requirements similar to Comtesse Louise Erdoedy. Perle de Paris, one of the most beautiful of the Rex varieties has large metallic jade leaves somewhat veined and edged with tints of rose. This Rex seems most content in a northeast window, along with the lovely Mikado whose leaves are burgundy-wine toned center and edges illuminated by the greenish silver area between the center and edges. Both varieties seem to appre-

ciate constant humidity about their leaves, and extra watering but not wet "feet."

Ranee, Kathlyana, Purple Glow, Fairy, King Edward, Can Can, and Merry Christmas are among the list of the sturdy strong growers. These varieties each has its own lush exotic beauty, and will take gracefully early or late sun and seldom burn, and too, will have deeper, more lustrous colorings for being in the sun. Ranee and Purple Glow are similar in type and color, and also Cardoze Gardens a sport, of Ranee. To describe one, could be for all three, as all have rainbow toned leaves, large and lush. Ranee and Purple Glow are exceptionally strong growers. Kathlyana, a heavily silver speckled pointed large leaf variety is of easy culture too, as is Fairy which has a good sized green veined pointed silver leaf. King Edward is another easy to grow kind with large dark, greenish red-black leaves. Can Can has a good sized deeply pointed and ruffled silvery pink leaf, reminding one of a dancing skirt. Last but not least in this list is Merry Christmas very gay in its Christmas "dress," silver, red, and green.

On the whole, the silvery leaved kinds seem to appreciate bright light and very little sun to retain their delicate tones, whereas those Rex varieties having deep color tones require some sun to keep and intensify their depth of color. In winter these varieties can take full sun, except from a large west window where the light can be suffused by a cheese-cloth covering.

For Rex Begonias leafmold is most essential and vital, it provides the food of begonias in the tropics where they are found on the jungle floor or hanging from cliffs. No matter where they are found, the tropical zone attests to the need of leafmold, humidity and moisture for their well being.

I have had my "success" with Rexes by using four parts leafmold, one part sifted sand (never sea sand) one fourth part of very old rotted cow manure, a handful of bonemeal, and a handful of charcoal as a potting medium. It has to be kept in mind that any Rex, or any begonia for that matter, highly resents any fertilizer in quantity around its roots. So it is that the potting medium must be thoroughly mixed and nothing does this better than the hand over hand

method. When potting, the medium should be dampened well for it then can be gently pressed about the roots and will accept the watering down process without washing away, or leaving air spaces.

For Rex Begonias as houseplants the water should not be drawn directly from the tap and used on the plants' roots or as a spray for usually it is too cold. The water is better used just tepid. Watering only the top-soil lightly is a fine way to have disastrous results, for Rex Begonias must be watered thoroughly so the water drains through the soil. Only water again when the soil is somewhat crumbly to the touch.

Another requisite of Rex Begonias is fresh air and such can be given to them in a home as easily as in a greenhouse, I find. No matter what the weather in late fall, winter, and early spring I open my windows on the sheltered side of the house four or five times a day from the top about four inches down for about ten minutes each time. During the cold months November through March, I allow my Rex Begonias any and all sun, with the exception of the silvery ones, but with April through September and October the sun in the south and west windows is too strong and will burn the leaves badly, so I remove these to the breezeway which is enclosed by screened windows so that I can protect them from wind and rain. My entire house is almost like a tent during the warm months as all the windows are open wide night and day unless rainy, and it is interesting to note that all the various varieties of begonias that I have thrive under these conditions even to the temperamental Calla Leaf variety.

The time to repot a Rex Begonia may be difficult to determine. By observation it is time when the roots show through the hole in the pot, or when one notes that the plant has ceased growing and the leaves have that "hungry" look. It is wise to use a pot one size larger than the root system but if the root system is extra heavy and the plant large then a pot two sizes larger will insure moisture being absorbed by all of the roots. There are some varieties that will go dormant and rest for a period of a few weeks. This action usually causes great consternation to anyone who isn't acquainted with the habits of certain varieties. In disappoint-

ment he throws out the plant. Instead put the "sleeping beauty" back where it isn't too hot, water once in a while and, when active growth appears, bring the plant out and treat as before. Among some of the varieties that take a "nap" are Fireflush, Mikado, Perle de Paris, Black Night and Chretien.

Rex Begonias are versatile in their reproduction—such can be done by stem cuttings or leaf-cuttings, and the method is quite simple. I personally prefer making wedges (leaf-cuttings) of the leaves, but one has to be very sure there is a section of the sinus to each wedge, for it is from the section of sinus that the roots form. Leafmold with some sand added, I find makes an ideal rooting medium as well as one in which the young plants can start to grow. Usually there will be a clump of several plants at the sinus and it is best to wait until they are an inch or more in height before separating. They should be watered well before disturbing. The wet roots and soil will then separate with a minimum of injury. These young plants will not tolerate over-fertile soil so it is safest to pot them in small pots in pure leafmold. After potting, water thoroughly and put into a shaded area for a couple of days and then give them bright light but no sun. At no time must they be allowed to dry out. This spells disaster to young plants as quickly as letting cuttings dry out.

In making stem cuttings of the upright type Rex one will usually have better results if the cut is made at a node and the cutting set a node or two down into the rooting medium. Personally, I prefer pots for stem cuttings instead of a pan or tray. Thus the cutting remains undisturbed until it becomes a

well established plant. I never cover the leaves of any of my cuttings but allow the fresh air to circulate freely about them which dispels the danger of damping off to a great extent.

In some instances, there are synonyms of names of varieties, and possibly here is cause for some confusion and doubt, especially when purchasing Rex Begonias sight unseen. Abel Carriere an upright type can be found under the name of Argenta Erecta and Black Night as Midnight. But I have in my collection of about fifty varieties a Black Knight and a Midnight which are most unlike in leaf pattern. Fireflush can be found listed as Bettina Rothschild, also Furst von Rothschild, and I have found another reference to it as Fireflame and Scotland 1950. Miss Agatha is the English synonym for Comtesse Louise Erdoedy according to *The Bessie Buxton Check List of Begonias*. I have known King Edward called Vesuvius.

For anyone interested in starting a collection of Rexes, I suggest the following varieties, as these are of easy culture and also, very beautiful. Some of the following are pictured and described in *The National Horticultural Magazine* of October 1952.* King Edward, Merry Christmas (also called Christmas Cheer), Kathlyana, Fairy, Lavender Glow, Dew Drop, Robin, Crimson Glow, Inimitable, Sea Nymph, Bearded, Mt. Haze, Rancee, Midnight, Purple Glow, Helen Tupples, Emperor, and Can Can.—VIRGINIA I. WITHEE, *Hill Farm Road, Coventry Centre, Rhode Island. President of the R. I. Branch of the American Begonia Society.*

(*now out of print. Ed.)

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^aThe first four volumes of *The National Horticultural Magazine*, consisting of four pages in tabloid form, were issued by The National Horticultural Society in Henning, Minnesota. This Society was incorporated on July 1, 1922. The American Horticultural Society, Washington, D. C., came into being in September 1922. On June 15, 1926 the two organizations joined forces as the present American Horticultural Society in order to further the best interests of American horticulture. Volume 5 was the first publication of the united organizations and this was issued in Washington, D. C.

^bVolume III and IV were published in one issue and its release date corrected to read: January 1924-December 1925.

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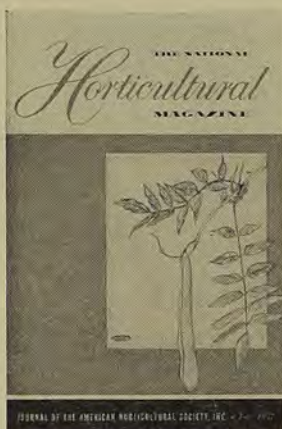
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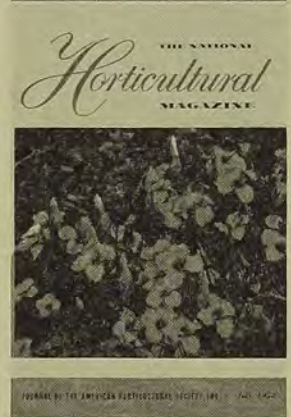
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AMERICAN HORTICULTURAL SOCIETY
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To Fellow Members of A. H. S.

May I send a copy of THE NATIONAL HORTICULTURAL MAGAZINE, with *your* compliments—to a personal friend of yours who might be interested in some of the articles in this present issue?

Depending on your point of view, you may agree that my reasons for wanting to do this are in some degree valid. Or—you may suspect that I am touched in the head, cracked, balmy! In either event, the person you name will receive a *free* copy of the attractive, interesting, and very fine NATIONAL HORTICULTURAL MAGAZINE.

Here is my theory . . . according to Dr. Wendell A. L. Johnson, the noted student of Semantics, and author of books on this science concerning the reactions of people to *words*: "To a mouse, cheese is cheese. That's why mousetraps work."

Now presumably, we humans have greater capacities to differentiate and discriminate than do mice. To many intelligent, estimable people, however, cheese is cheese; music is music; pictures are pictures—and a rose is a rose. Some people are denied full enjoyment of good music, good painting—and even good roses—*much* that is fine and beautiful. But NOT because they lack capacity for appreciation. Almost everyone has the *capacity* to perceive and appreciate that which is better than "just average." Many are limited, however, by lack of information and understanding. To them, a rose is a rose, and a tree is just a tree—perhaps because they never had occasion specifically to observe the wondrous variations in growth habits of plants. Perhaps, they were not ever invited to marvel at the range of color and form and texture provided by flowers and foliage.

Therefore, *you*, as a Member of the American Horticultural Society may gain real personal satisfaction by "exposing" some personal friend, a neighbor, or an acquaintance — to information such as is provided by this Society. Your action may help that person to new horizons of interests and enjoyment . . . by arousing the desire to gain more information about trees, shrubs, vines, grasses, and so on and on.

For then will come *understanding* . . . of the economic and aesthetic values of plants . . . critical appreciation of the better varieties of plants—used properly—grown well. And forevermore, a "rose" no longer will be just a red, pink, yellow, or white flower. It has become one of the many terms or symbols which stimulate infinite patterns of pleasant, informed reactions.

I could not ask you to pronounce judgment upon the theory I have attempted to set forth. But I do hope you will fill out and mail, real soon—the form immediately below.

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