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Camellia sasanqua

The American Camellia Society

ARTHUR C. BROWN¹

Camelliaitis is a disease that has a high incidence among citizens who insist upon being surrounded with interesting plants and beautiful flowers. Thousands of victims are to be encountered out of doors in the southern and Pacific Coast states, and indoors in the north. This highly infectious disease is also well established abroad. Fortunate indeed is the family where both husband and wife are affected—otherwise budgets are likely to be shattered, vacation plans spoiled, and high spite fences erected in the family garden plot. Veteran victims are convinced that immunity, even resistance, to the disease on the part of husband or wife is legitimate grounds for divorce.

No satisfactory cure of camelliaitis has been found. A palliative, however, is provided in the form of a membership in the American Camellia Society. Victims foregather at the annual meetings and discuss matters pertaining to the causal agent and its effect. They are kept informed with respect to the extent and progress of the disease through the perusal of the Society's publications.

The American Camellia Society was organized at Macon, Georgia, on September 29, 1945. The purpose of the Society is to promote interest in all phases of *Camellia* culture, out of doors and in greenhouses, scientific and lay investigations dealing with soils, fertilizers, insect and disease control, nomenclature, shows and other pertinent factors. At the organization meeting, Dr. H. Harold Hume was elected

President, and R. J. Wilmot, Secretary. On March 29, 1946, the Camellia Society of America merged with the American Camellia Society. The current officers of the American Camellia Society include Calder W. Seibels, Columbia, South Carolina, President, and Sam P. Harn, Gainesville, Florida, Secretary.

Culture of the *Camellia* was an old and honorable occupation in the Orient long before these plants found their way to Europe and the United States. There is evidence in the old literature to support the belief that early in the 15th century cultivated forms of *Camellia* were used as ornamentals around the palaces of the shoguns in Japan. Some of the plants set out in the gardens of the shogun Hideyoshi Toyotomi (1536-1588) at Kyoto are still alive. The Japanese used the leaves of what is now known as *Camellia sasanqua* to make tea. In the earlier days, Camellias in China were used primarily for utilitarian, rather than ornamental, purposes. The seed pods of *C. oleifera* were crushed and an oil extracted, while the leaves of *C. sinensis* were dried and used to make the well-known beverage—tea.

Camellias were probably introduced into Europe early in the 18th century. Attempts on the part of Europeans to import *C. sinensis* for the purpose of establishing a tea industry there, resulted in the introduction of flowering varieties which had been substituted, accidentally or otherwise, for tea plants. These varieties were *C. japonica* (the *Camellia* of or from Japan) and *C. sasanqua*. In the English literature it is stated that Camellias were intro-

¹Editor, *American Camellia Quarterly*, Gainesville, Florida.

duced into that country "before 1739." So far as the records show, the first *Camellia* in England was the one brought in by a captain of the British East India Company for Lord Petre, Thornton Hall, Essex. L'Abbé Berlèse, a recognized early authority on Camellias, whose books have become collectors' items, states that a single-flowering variety was planted in the Royal Gardens at Caserta, Italy, in 1760. Introductions into Belgium, France and other European countries were undoubtedly made early in the 18th century.

Most of these early introductions were single-flowered varieties of no great merit. Interest in, as well as the propagation of, Camellias in England received its impetus in 1792 as the result of the introduction of two good varieties, *Variiegata* and *Alba Plena*. (The last named variety is still a very popular one.) These were soon followed by other superior varieties such as *Incarnata* (Lady Hume's Blush), and *Fimbriata*.

What are believed to be the first importations of Camellias into the United States were the plants received by John Stevens, Hoboken, New York, in 1797 or 1798, and Michael Floy of New York in 1800. The latter established nurseries in Bowery Village and Hoboken, where Camellias were grown. During the period from 1830 to 1860 a number of prominent citizens of Boston brought in most of the varieties available in Europe. The names of two of these citizens, C. M. Hovey and Marshall P. Wilder, have been perpetuated through the names given to varieties originated by them and which are still popular—C. H. Hovey, C. M. Hovey, and Mrs. Abby Wilder. Philadelphia, during the early 1880's, was

the *Camellia* center of the United States. The list of growers includes the names of David Landreth who started the first seed house in the United States in 1784, and was an important early *Camellia* grower. (One of his originations, *Landrethii*, long lost to the trade, was recently rediscovered in Louisiana.) Robert Buist, a Scotchman who came to Philadelphia in 1828, became noted for his writings and the extent of his *Camellia* nursery. The Pennsylvania Horticultural Society, founded in 1827, held *Camellia* shows and sought to advance the culture of these plants in a number of ways. Between 1840 and 1850 Samuel and John Feast and Edward Kuitz propagated and developed several varieties of Camellias at Baltimore, Maryland. In 1880, Robert J. Halliday, of that city, published the first American book on Camellias, *Practical Camellia Culture*. The culture of Camellias in these northern states was carried on in greenhouses.

One of the early enthusiasts, James L. L. F. Warren, moved from Boston to Sacramento, California, and in 1852 received a shipment of Camellias from the east. This was the start of the present widespread and flourishing *Camellia* industry in the Pacific Coast states and British Columbia. Indicative of the ability of *Camellia* plants to withstand rough handling is the fact that the plants sent to Mr. Warren moved by vessel from Boston to Panama, thence overland, and on to San Francisco by ship and from that place to Sacramento by river boat.

Another interesting account of a long journey by a *Camellia* plant is related by Mrs. W. E. MacArthur, Jacksonville, Florida: Sometime before 1852 a fifteen-year-old tubbed *Camellia* plant was brought from England by a



Camellia reticulata, from *Curtis Botanical Magazine*, 1827, Plate 2784.



Simple—Single Camellia, Var. Enchantress. Many single flowers are broadly trumpet shaped.



Upper: Left, Complete Double—Incomplete Imbricated Camellia, var. *Mathotiana rosea*. Right, Complete Double—Imbricated Camellia, var. *Frau Minna Seidel*.

Lower: Left, Complete Double—Irregular Camellia, var. *Prof. C. S. Sargent*. Right, Complete Double—Tiered Camellia, var. *Candidissima*.



sea captain and presented to the six-year-old daughter of Captain John Topping of Staten Island. In due time this daughter married and in 1852, accompanied by her husband and the *Camellia*, moved to New Orleans. A few years later the family and the *Camellia* returned to New York via river boat and stage coach. In 1859 the couple, together with the *Camellia*, moved to Jacksonville. This much-traveled plant, set out in the open ground, grew and flourished until 1933 when it died after it had been moved to a new location.

Early in the 19th century *Camellia* plants were shipped from greenhouses in the north, and from Europe, into the south. Noteworthy collections were started at Magnolia Gardens and at Middleton Place Gardens on the Ashley River near Charleston. One of the earliest plantings of *Camellias* in Louisiana is at Rosedawn, near St. Francisville, which dates back more than a century. In 1838, A. B. Homer, a florist and gardener of Mobile, obtained a number of plants from England. Incidentally, today there are probably more *Camellias* propagated in the vicinity of Mobile than in any other locality in the world. Beginning in 1857, P. J. Berckmans of Fruitland Nurseries, Augusta, Georgia, started to import *Camellias* from abroad and became one of the foremost propagators and distributors in America.

There was a widespread decline in the popularity of the *Camellia* at home and abroad about 1860. The reasons for this decline are not known. Perhaps the need for a change in the fashions of *Camellias* was responsible for this attitude on the part of the greenhouse growers. It is possible that they were surfeited with the type of flowers

and plants at hand—very double, very formal, symmetrical flowers produced on formally trimmed and trained plants. Satisfactory replacements in the form of good singles, semi-doubles and incomplete doubles were not readily available, so—as Dr. Hume aptly puts it—*Camellias* went out of fashion along with poke bonnets, hoop skirts and wasp waists. The destruction and poverty that followed the Civil War could have been responsible for the decline of the *Camellia* in the south. Margaret Lawrason, Greenwood Plantation, St. Francisville, Louisiana, expressed this thought rather graphically in the following manner:

“So far I have mentioned only those *Camellias* that were planted prior to the Civil War. Then a twilight fell on the old gardens and these flowers of the Gods. People could no longer buy expensive plants, and those who first loved and tended the *Camellias* were passing from the scene. More than one handsome tree was sold for cash to swell the fund that propped a sagging roof-tree.”

The renaissance of the *Camellia* started about 1920, and today we find these plants more popular and in greater demand than ever before, both in this country and abroad. Even without the flowers, the plants are most ornamental and make welcome additions to gardens. The plants may be used in a number of ways, as specimens singly or in groups, foundation plantings, backgrounds, along walls, as hedges, and as accents for entrances, gates or steps. The blooming period ranges from September to April, depending upon the variety and locality. Thus the flowers contribute a wealth of color at times when very few other plants are in bloom.

Camellias are propagated by means

of seeds or cuttings. In the past, flowers produced by seedlings were for the most part of no particular value. In recent years, however, the concentration of superior varieties in individual plantings has increased the opportunities for cross pollination between extra fine specimens. As a result many new and exceptionally good seedlings are now appearing on the market. Varieties of great merit, brought about by mutation, or hybridizing are also available. The *Camellia* enthusiast of today has a great advantage over the old timers with respect to the range in form and color combinations. He can select singles, semi-doubles, incomplete doubles and doubles; the latter may be found in regularly imbricated, incompletely imbricated, tiered and irregular. Colors range from many shades of reds and pinks through the whites to variegated.

Present day growers who reside outside of the native home of the *Camellia* also have a wider choice with respect to species. *C. japonica* is the species best known to most growers. *C. sasanqua*, although introduced into Europe along with *C. japonica*, aroused but little interest until a few years ago. These desirable plants are hardier than *C. japonica* and the flowers come in a wide range of forms and colors. The flowering season is from September to December—too early to be injured by cold weather in the south. Because of this early blooming characteristic, *sasanquas* are rarely exhibited at *Camellia* shows. Perhaps, this, is the reason they are not so well known to growers. A third species is *C. reticulata*, a comparatively newcomer that has aroused the enthusiasm of *Camellia* fanciers. These plants, with flowers up to six inches in diameter, came to us from Kunming, China. Even the trans-

lation of their Chinese names is appealing—Peach Blossom, Great Butterfly Wings, Narrow Leaved Shot Silk, Queen of Tali, Chang's Temple and others. *C. reticulata* is less hardy than *C. japonica*.

The cultural range of *Camellias* in the United States is roughly southward from Norfolk, Virginia, to Central Florida, across the southern states into Texas, and in California northward to British Columbia. There are some parts of this range where by reason of local conditions of exposure, elevation, rainfall or humidity, *Camellias* cannot be successfully grown. The reverse may also be true there may be some localities somewhat to the north of the present range where these same factors may be favorable for *Camellia* culture.

In the 1951 *American Camellia Yearbook*, Mrs. E. L. Tolson wrote about a number of *C. japonica* plants growing outdoors in Washington, D. C., and in Alexandria and Arlington, Virginia. These plants have been exposed on a number of occasions to temperatures at or close to zero without apparent injury. They have bloomed satisfactorily over a long period of time. P. W. Zimmerman has grown *Camellia* plants in his yard in Yonkers, New York, without cover since 1928. They showed very little winter injury until 1933, when the temperature fell to -20°F . During the winter and spring of 1948 a heavy snow covered the plants. It is Dr. Zimmerman's opinion that with proper selection and crossing, hardy varieties for northern regions can be produced.

It is interesting to observe that *Camellias* growing in the southern limits of outdoor culture are frequently injured by cold weather while, at the same time, plants further north, although exposed to the same tempera-

ture, are unharmed. This is accounted for by the fact that in many parts of the south the plants seldom are entirely dormant and are, therefore, more susceptible to injury. The grower in the northern part of the out of door cultural area should make every effort to force his plants into dormancy early in the fall and of equal importance, keep them in a dormant condition until all risk of cold weather is over. This condition can be achieved through the application of certain cultural procedures. There are differences in species of *Camellias* and of varieties within species, in their resistance to cold injury under the same conditions of soil and climate. Where there is danger of winter injury, the grower should plant only the hardier species and varieties. Among the varieties of *C. japonica* only the early and late blooming varieties should be planted in the extreme northern part of the *Camellia* belt. The flowers of the single and semi-double varieties are less likely to be injured than the doubles.

Fortunately the *Camellia* enthusiasts who reside in the northern part of the country can grow these beautiful plants and flowers by duplicating the soil and climatic conditions encountered in the south. This can be accomplished through the use of glasshouses. In adaptability to greenhouse culture, either in pots or in the ground, *Camellias* are surpassed by no other woody, broad-leaf evergreens. It should be remembered that *Camellias* first won their popularity in this country as greenhouse plants. The superiority of greenhouse blooms over those produced out of doors is indicated by the fact that in *Camellia* shows, competition between garden- and greenhouse-grown flowers is avoided by setting up

separate classes for each kind. Commercial greenhouse growers are interested only in those plants whose blooms are in demand by the trade. The amateur grower is not affected by this limitation and can give wide play to his preferences and enjoy a wide range of varieties.

The many lovers of plants who cannot afford to build greenhouses will find the *Camellia* to be an excellent house plant. There is a specimen of *Alba Plena* in the Johnson Public Library at Hackensack, New Jersey, that is at least ninety-eight years old. During all these years it has been grown as a house plant. Paul Ackerman, Neponset, Long Island, has an interesting article on the *Camellia* as a house plant in the *American Camellia Yearbook* for 1947. He found that in a room that can be kept at winter temperature of about 45° to 50°F. many varieties of *C. japonica* can be brought into bloom over a period extending from late October to early April. Factors that must be watched carefully in growing *Camellias* as house plants include watering and fertilizing. Furthermore, during the summer the plants should be kept outdoors in a semi-shaded location, protected from high winds. It is his experience that the single and semi-double varieties are preferable to the double ones. When the plants are small they should be repotted yearly just prior to the active growing season. The pots should be one size larger each year. When the plants become fairly old, the repotting may be done at much longer intervals.

The *Camellia*, once the prized possession of captains and kings, is now available to gardeners everywhere—on the large estates or in small city lots, indoors or out in the open.



H. H. Hume

Camellia oleifera

New Code For The Naming Of Garden Plants

FREDERIC P. LEE

The *International Code of Nomenclature for Cultivated Plants*, published in July of this year, has as its objective the promotion of uniformity, accuracy, and fixity in the use of names for garden plants. For the most part our garden plants fall within one of the following groups: (1) a "hybrid group" of plants all sexually reproduced by crosses of the same two parents or crosses within the same group of parents, the parents being usually of different species, (2) plants of a "clone" derived by vegetative propagation (cuttings, divisions, grafts, or layers, etc.) from a single individual plant in a species or in a hybrid group, (3) a sexually reproduced group of plants of uniform appearance maintained as a "line" by selection or roguing, and (4) a sexually reproduced uniform group of plants derived by continual crossing between two or more lines.

The Executive Committee of the American Horticultural Society has adopted a resolution urging the use of the new Code by writers of horticultural articles and books, by nurserymen in preparing their price lists and catalogs, and by breeders and introducers in naming new plants. The Summary of the text of the new Code, as set forth below, is sufficient for such persons for all ordinary purposes. The complex factual situation and resulting problems of nomenclature were discussed by Dr. W. H. Camp in an article entitled *The Names of Plants in Cultivation* that appeared in the April 1948 issue of this Magazine. These problems are dealt with in the Sum-

mary by rules relatively concise and with a small amount of study understandable in most particulars even by those who are not taxonomists.

Rules governing the use of botanical (i.e., Latin) names for species, varieties, and forms of plants that occur in the wild, are to be found in the *International Code of Botanical Nomenclature* adopted in their latest form by The Seventh International Botanical Congress held in Stockholm in 1950.¹ On the other hand, the new Code governs primarily the use of horticultural (i.e., vernacular or "fancy") names for plants that originated in cultivation, technically known as "cultivars."

Following proposals by the American Society of Plant Taxonomists and the American Horticultural Council a proposed code for naming cultivated plants was formulated at joint meetings held in London in 1951 by the International Committee on Horticultural Nomenclature and Registration (London Committee) of the International Horticultural Congress and by the Committee for Nomenclature of Cultivated Plants (Stockholm Committee) of the 7th International Botanical Congress held at Stockholm in 1950. Dr. W. H. Camp of the Academy of Natural Sciences of Philadelphia was chairman of the joint meetings and the leader in the American efforts looking towards such a code.

The proposed Code was revised by

¹Regnum Vegetabile, Volume 3, *International Code of Botanical Nomenclature*, 1952, J. Lanjouw, Chief Editor, published by The Chronica Botanic Company, Waltham, Mass.

the London Committee in 1952 and submitted to the 13th International Horticultural Congress held at London in September of that year. That Congress approved the main points of the Code and charged the London Committee with preparation of the full text and its circulation for trial prior to submission to the next Congress. The final full text is approved by both the London and Stockholm Committees.

The Code is thus provisional but only in the sense that it can be modified by the next International Horticultural Congress if need for change is discovered meanwhile.

International Code of Nomenclature for Cultivated Plants

SUMMARY²

Section A: General Considerations and Guiding Principles

Art. C. 1. The aim of this Code is to promote uniformity, accuracy and fixity in the use of names with the minimum disturbance of existing nomenclature.

Art. C. 2. The principles and rules of the *International Code of Botanical Nomenclature* govern the use of botanical names (i.e. Latin names) for cultivated plants. The following regulations are designed for the naming of those cultivated plants which are not covered by provisions of the Botanical Code.

Section B: Categories and their Designations

Art. C. 3. The name of a cultivated plant usually has three parts: the

generic, the specific, and varietal designations. Thus, in the full name *Sedum spectabile* 'Brilliant', *Sedum* indicates the genus and *spectabile* a particular species; 'Brilliant' is the varietal designation (called a cultivar-name in the following Code.) For purposes of nomenclature, intergeneric hybrid groups are treated as genera, and hybrids between species are treated as species.

The Code provides that the term 'variety' (abbreviated as var. or v.) be reserved for those forms of cultivated plants which are known to occur in the wild and which have names in Latin language (the botanical varieties), and the term 'cultivar' (abbreviated as cv.) be applied to those special forms which have originated or are maintained only in cultivation.

Art. C. 4. In large and complicated groups it is sometimes necessary to supplement the three usual categories with others, such as series, subspecies and convariety.

Section C: Registration

Art. C. 5. The aim of registration is to avoid using the same name for different plants and creating unnecessary names. It is recommended that an International Registration Authority should be set up for each extensive genus or group to maintain and publish an International Register of cultivar-names, with supplements or new editions as needed. All registered names should be in accordance with this Code.

Section D: Priority and Publication

Art. C. 6. A legitimate name is one in accordance with this Code. In principle the correct name is the earliest legitimate name.

Art. C. 7. A name has no standing

²The full text of the code contains amplifying and qualifying statements and numerous explanatory notes as well as further examples. The items of the Summary are numbered to correspond with those of the full Code. Copies of the full Code may be purchased for 1 s. 3 d. from the Royal Horticultural Society, Vincent Sq., S.W. 1, London, England. The pamphlet also contains a historical introduction by W. T. Stearn.

under this Code unless validly published or officially registered (see *Art. C. 8*).

Art. C. 8 (a). Valid publication consists of the sale or distribution of printed matter giving both the name and description of the plant concerned, in any language using the Roman alphabet. Mention of a name in a catalogue or list, even with an illustration, is not considered in itself to be valid publication.

(b). Registration by an internationally recognized Registration Authority is to be considered as valid publication.

Art. C. 9. The name and description must be published in a dated catalogue, technical work or periodical.

Art. C. 10. When revival of the earliest published cultivar-name would cause confusion, it is to be listed a synonym.

Art. C. 11. When two or more cultivars are widely grown under the same cultivar-name, the official registration authority may decide for which one it is to be retained.

Art. C. 12. To establish an adequate basis of priority for the nomenclature of a group, an international register or other list of cultivars may be taken as the starting point, if approved by the International Registration Authority of the group. In the absence of an International Registration Authority, a list or work dealing with a group may be approved by the International Committee on Horticultural Nomenclature and Registration. In groups not thus provided for, the starting point of nomenclature shall be the year 1753.

Section E: Translations, Transliterations and Commercial Synonyms

Art. C. 13. When a cultivar is introduced from one country to another its name should preferably remain un-

changed. Sometimes, however, it may be desirable to translate a name, to use a transliteration, or in exceptional cases even to change the name. New names (known as "commercial synonyms") should be followed by an indication of the original name when used in catalogues, etc.

Art. C. 14. Names first published in languages not using the Roman alphabet are to be transliterated or translated.

Section F: Formation and Use of Cultivar-names

Art. C. 15. From 1 January 1954 onward no new cultivars should be named in Latin.

Art. C. 16. The cultivar-name should begin with a capital letter and should be distinguished typographically from a Latin botanical name, preferably by enclosing it in single quotation marks.

Art. C. 17. When a cultivar has been given a Latin name before 1 January 1954, this should not be rejected; however, it is desirable that such cultivar-names be typographically distinguished (e.g. by the use of single quotation marks) from the Latin words used to designate botanical varieties, e.g. *Thuja orientalis* 'elegantissima'.

Art. C. 18. The cultivar-name may be attached either to a scientific name or to one in common language, e.g. *Syringa vulgaris* 'Mont Blanc', Lilac 'Mont Blanc'.

Art. C. 19. The cultivar-name remains unchanged when a change is made in the name of the genus, unless this cultivar-name is already in use under the genus to which the plant has been transferred.

Art. C. 20. The same cultivar-name should not be used twice in the same genus.

Art. C. 21 (a). A cultivar-name

should consist of not more than two words.

(b). A cultivar-name should be distinctive, e.g. Rose 'Yellow Queen', not Rose 'Yellow'.

Art. C. 22. From 1 January 1954 onward the word 'variety' or any of its equivalents is not to be used as part of a new cultivar-name, e.g. *Crocus sieberi* 'Hubert Edelsten', not *C. sieberi* 'Edelsten's variety'.

Art. C. 23. The following should be avoided when naming a new cultivar:

(a) names likely to be confused with in the same genus, e.g. 'Warner', 'Werner' and 'Wernaer';

(b) forms of address liable to be confused, e.g. 'Mr.', 'Mrs.' and 'Miss';

(c) the scientific or vernacular name of a genus, e.g. *Rosa* 'Camellia', Plum 'Apricot';

(d) names of countries and states without a qualifying word; e.g. 'Oregon Wonder' would be legitimate, but not plain 'Oregon';

(e) numerals;

(f) names of politically conspicuous persons;

(g) exaggeration or use of superlatives; thus 'Earliest of All' may be made inaccurate by the introduction of an even earlier sort;

(h) single letters as the first part of a cultivar-name;

(j) the articles 'a' and 'the' unless required by linguistic custom; e.g. 'Colonel' would be legitimate, not 'The Colonel'—but 'La Rochelle', not 'Rochelle';

(k) abbreviations for personal and geographical names; e.g. 'William Thomas' and 'Mount Kisco' would be legitimate, but not 'Wm. Thomas' and 'Mt. Kisco';

(l) excessively long words and those

difficult to pronounce correctly; e.g. 'Diplomgartenbauinspektor'.

Section G: Names of Hybrids Originating in Cultivation

Art. C. 24. The first word in the name of a hybrid is a generic name if the parents belong to the same genus; if the parents belong to different genera the first word is the name of a hybrid genus. The last part of the name of a hybrid is a cultivar-name, applying to a single hybrid form, and is subject to the regulations of this Code.

Parentage may be indicated by a formula placed between the generic and cultivar-names, e.g. *Rubus (rusticana inermis × thyrsiger)* 'Merton Thornless'. Collective designations (in common language or in Latin) of hybrid groups also may be used; e.g. Rose (Hybrid Tea) 'Richmond', *Viburnum × bodnantense* 'Dawn'.

For brevity, or when the exact parentage is unknown, the cultivar-name may directly follow the name of the genus, e.g. *Iris* 'Ambassadeur'.

Art. C. 25. Designation of hybrid groups by means of formulae, or collective names in Latin form, is governed by the regulations of the *International Code of Botanical Nomenclature*. The following parallel regulations have been set up for use with groups designated primarily in common language.

(a) Hybrids are denoted by a formula consisting of the names of the parents in alphabetical order linked by the multiplication sign, e.g. *Rhododendron* 'Adonis' × 'Chanticleer'. Even in groups where it is customary to place the name of the female first, the sex of the parents should be clearly indicated.

(b) A collective designation may be substituted for the formula. Thus,

the collective designation *Camellia* × *williamsii* covers all the cultivars (e.g. 'Donation', 'Mary Christian', etc.) derived from *C. japonica* × *C. saluenensis*. When the collective designation is a phrase in common language it may be expedient to place it in parenthesis, e.g. *Lilium* (Bellingham Hybrids) 'Shuksan'; here 'Shuksan', the cultivar-name, belongs to only one hybrid form (clone) of the Bellingham Hybrids, which have been derived from *L. humboldtii* × *L. pardalinum*.

(c) Among orchid hybrids the word 'Grex' (or its abbreviation 'G') should be used in conjunction with a name to designate a collective group, e.g. *Cattleya* 'Fabia Grex' covers all hybrids of *C. dowiana* × *C. labiata*, of which *Cattleya* (Fabia G.) 'Prince of Wales' is a clone.

(d) When the parentage of a flask or pan of hybrid orchid seedlings is unknown the collective designation of the group is marked 'ign.', the abbreviation of the Latin word *ignota* (unknown), e.g. *Cymbidium* 'Grosvenor Grex ign.'

(e) A cultivar-name which has been used in a collective sense should be converted into a collective designation by adding a suitable word, e.g. *Rhododendron* 'Jalisco' var. 'Eclipse' is not legitimate, but should be amended to *Rhododendron* (Jalisco Hybrids) 'Eclipse' or *Rh.* (Jalisco Grex) 'Eclipse'.

(f) The use of the name of only one parent species to designate a hybrid group should be avoided. Designation such as *Rhododendron* 'Fortunei Hybrids' should be used only when the other parent is unknown or complex and the group has well-marked characters derived from the species indicated.

(g) A collective name of Latin form is subject to the rules laid down in the Botanical Code, e.g. the original description must be in the Latin language, etc.

(h) If the collective name is not of Latin form (i.e. is in common language) no Latin description is required. Publication of such names then follows the provisions of this Code regarding the naming of cultivars.

(j) A word formed from parts of the Latin names of the parental species may be used as a collective designation, but its publication must be accompanied by a description in Latin.

(k) In major hybrid complexes subsidiary 'groups' (convarieties) may sometimes be designated, e.g. the 'Cactus group' of the common garden dahlia, or the 'Darwin group' of tulips.

Section H: Names of Latin Form Applied to Hybrids in General

Art. C. 26. When names of Latin form are to be given to hybrids, procedure should follow the rules laid down in the *International Code of Botanical Nomenclature*, Appendix II.

Section J: Names of Bud-mutants ('Sports') and Re-selected and Improved Cultivars

Art. C. 27. The name of a bud-mutant ('sport') should, if possible, link it with the parent, e.g. 'Crimson Bramley' apple arose from 'Bramley's Seedling' apple.

Art. C. 28. When a cultivar, through continuous selection, becomes so distinct from the original that it can be regarded as a new cultivar, it should be given a new name. When, however, it has not become so distinct, the re-selected cultivar should keep its original name but have added to this the

name of the selector or some other convenient designation, e.g. Cabbage 'Wisconsin All Seasons' is a selection from 'All Seasons'.

Section K: Special Categories and Designations

Art. C. 29. In experimental or taxonomic work on cultivated plants it may be advisable to recognize various special categories, here noted; their nomenclature is governed by the regulations of this Code:

(a) The *hybrid group* (abbreviated as *gh.*) is a complex group of hybrids usually originating from the crossing of more than two species, e.g. the Hardy Ghent Azaleas.

(b) The *convariety* (abbreviated as *conv.*) is a group of cultivars within a species or interspecific hybrid, e.g. *Cucurbita pepo* conv. *citrullina* which includes the cultivars 'Long Cream', 'Mogongo', etc.; the 'Cactus group' of Dahlias.

(c) The *line* (abbreviated as *ln.*) is a sexually propagated and uniform group, its uniformity being maintained by selection to a standard, e.g. *Petunia* ln. 'Rosy Morn'.

(d) The *line-hybrid* (abbreviated as *lh.*) is a uniform group derived by repetitive crossing from a series of two or more parental 'lines' which are maintained either by continuous inbreeding or as clones, e.g. Onion lh. 'Granex' derived from crossing of Onion 'Excel' and Onion 'Texas Early Grano 951'.

(e) The *clone* (abbreviated as *cl.* or sometimes designated by a special symbol.) consists of genetically uniform plants derived from a single plant and propagated exclusively by vegetative means, as cuttings, divisions, or grafts, e.g. *Syringa vulgaris* cl. 'Decaisne'.

(f) The *apomict* (abbreviated as *ap.*) is a plant reproducing by means of seed, the embryos of which are produced without fertilization.

Art. C. 30. Polyploid or other cytologically differentiated groups within a species may be named or their cytological condition indicated by an appropriate symbol.

Art. C. 31. Allopolyploid or amphidiploid groups should be treated as species, e.g. *Aesculus carnea* derived from *A. hippocastanum* × *A. pavia*.

Art. C. 32. Graft-chimaeras (sometimes called 'graft hybrids') are designated by a formula employing the plus sign or, on occasion, by a name, e.g. + *Laburnocytisus adami* = *Cytisus purpureus* + *Laburnum anagyroides*.

Art. C. 33. The component materials of grafted plants may be shown by placing first the name of the scion, then a slanting line, then the name of the stock, e.g. Apple 'Jonathan'/'Doucin'.

Section L: Modification of the Code

Art. C. 34. This International Code of Nomenclature for Cultivated Plants can be modified and revised by the joint action of competent persons at an International Horticultural Congress.

The preceding Summary of the International Code of Nomenclature for Cultivated Plants was received in the Editorial Office after all manuscripts had been prepared for this issue. Consequently, the reader will find that The American Horticultural Society indorses its usage but did not conform to it in this issue. The Code will be used insofar as possible in all future issues of THE NATIONAL HORTICULTURAL MAGAZINE, commencing with Volume 33, January 1954.

Preliminary Notes On Some Old Roses

B. Y. MORRISON

To make a new garden in a new location, with soil, climate, and materials all different from the familiar, is a great privilege and experience but it presents one with a rare opportunity for premature opinions. Having moved from a country where brick and terracotta tiles are manufactured to Gulf Coast Mississippi with its sandy soil darkened by the finely powdered humus, was such a move. Even preliminary visits, some of extended duration, have not prevented some mistakes obvious enough now, as mistakes are likely to be in hindsight.

The observations that follow may be premature as they are not based on "years" of experience. They deal with Roses, one of the most controversial of all garden subjects, with wildly partisan elements, each man as convinced as any ancient religious zealot.

On the place where the garden was begun there were many bushes of Louis Philippe, a variety that in mild winters is a broad-leaved evergreen shrub, and which will produce crop after crop of its fragrant deep crimson flowers every month of the year if kept pruned and fed. In addition there were several almost as robust bushes of a Tea that proves to be Mme. Lambard, an excellent old lady in these parts. Of equal vintage, one rather poor bush of Clothilde Soupert (which in my opinion is no Polyantha—heresy number one) and a Cochet-like Tea in pale yellow that I suspect is Alexander Hill Gray. Of much later planting, there were Cecil Bruner, George Elger and Lafayette Improved.

With the effrontery of a newcomer,

I announced that when and if I ever got Roses, they should be old, really old Teas and perhaps Bourbons, eventually Noisettes and climbing odds and ends that I could not have in the north.

Only part of all this has come to pass and of course some of the older Hybrid Teas have edged in as well.

The garden beds are deeply dug to remove all bits of Bermuda grass and other perennial weed roots and then well provided with German peat that is dug in and well mixed. The planting holes are dug in this and to them are added manure—only dry sheep manure for the first lot (autumn), but ancient cow manure for the later plantings (spring). There is not too much difference in results, but cow manure will be deep-dug this autumn by the spring planted bushes.

The intent in planting was to have a flowering border along the major grass path of the garden with as continuous bloom as climate and a minimum of care would give, and never a thought for shows or garden visitors with pretentious ideals.

So far there has been wave after wave of new growth with flowers enough to scent the garden and to give away generously. As hot weather has come on, some varieties have produced as numerous but smaller flowers. Some few have not had quite enough water to keep the flowers from wilting on the second day, but in a period of no rain for six weeks (at this writing) one would be captious to ask for complete perfection. This particular year mulching has been out of the question, but

it is in the future program. No spray or dust has been used and the only victim of black spot is Mme. Jules Bouche, who is quite naked most of the time. Next season she is to be exiled.

Among the many varieties, there is a diversity of scent, for none of which the writer has an adequate vocabulary. For him, Safrano remains the yardstick for all Teas. There is a slightly pungent quality to its scent that few equal though I do not yet have Isabella Sprunt, its offspring.

The group in which Catherine Mermet, Mme. Camille, Anna Olivier, the two Cochets, Wm. R. Smith, Etoile de Lyon and some others seem related, have a slightly modified perfume of the same ilk, sweeter perhaps. When one gets to *Devoniensis*, it is sweeter still and not "peppery" at all. Old Kaiserin Auguste Viktoria, which to one has a fragrance like that of Sweet Bay Magnolia, stands alone. *Souv. de la Malmaison* has a delightful scent, that for me is something like that of old *centifolia*; *Hermosa* and *Archduke Charles* seems scentless to me, though I believe they are credited with scent in "the books." *Duchesse de Brabant* has a singular fragrance for which I find no likeness.

If there were no other beauties than this of scent, these plants have already paid their way in one season and whether I am just walking along in early morning to look and wonder or whether I am bent double in pulling the everlasting new crops of weeds (for this is a first year after fallow), the "perfumed air" is more poetic than I shall ever try to be.

There are several objections that can be offered if these varieties are considered from a "modern" point of view. Some varieties are slow "to make a

bush" but when they do it, it is a bush for all time, not one of these things that is chopped down each late winter as if it were a privet hedge. The early shoots may come at odd angles. This is true for both Cochets, Mme. Lam-bard, Mrs. B. R. Cant, Marie von Houtte, Baroness Henrietta Snoy and Bon Silene, unless it reforms with age is likely to turn into a ground cover! Corrective pruning seems the answer.

Whether or not any of this is due to rootstocks or my own lack of understanding of the ideal pruning methods, I dare not say now. A southern (Louisiana) writer in a recent *Popular Gardening*, apparently raised all her plants "from slips" so perhaps I must, for hers all seemed quite faultless.

Most of the varieties make more or less continuous growth, so that each shoot starts from a shoot, smaller than the one that bore it. It is only the new shoot from ground level that is large and stout. Their diminuendo in twig size often brings about diminution in flowers size. Possibly my feeding is inadequate.

No matter what they may do elsewhere, some of these varieties do hang their heads—here. *Duchesse de Brabant* is one such. Some of the others, however, are actually weighted down by the number of petals, roses so double that I am too lazy as yet to count the petals. A good Catherine Mermet or Mrs. B. R. Cant, must have a hundred or more, though Safrano is rarely over twenty, if that many.

Among them are interesting color variations. To most persons, one expects the deepest color in the inner petals, where the shadows of the folded peals make it seem even deeper. There are Teas, however, that show deep color on the outer petals, color that

grows darker with age. Maman Cochet and her white spots usually have the outer petals flushed with pink by this sun. Rosette de Lizy, which is basically a peachy-yellow rose, has outer petals that are deep rose and this color invades the whole flower as it ages. The variety Archduke Charles, that looks and behaves like a Bourbon, opens a little darker than Hermosa, with one or two sundarkened outer petals, but by the second day the whole flower is light crimson.

Among those collected so far, there is no great color range. One thinks chiefly of pale colors washed over whites or fleshy whites. The pinks are—so far—never purpled. Princesse de Sagan, which is crimson, does purple a little, but its flowers are so loosely put together that there are no purple shadows. So far there are no varieties with darker color or the reverse of the petals, such as one finds in the grand old Madam Leon Pain or the newer Mabel Turner. Yellow is the transitory yellow of the pre-Pernet-Ducher Era, a yellow that strengthens all other pigments. It is wonderful in old Mme. Melanie Soupert that is full of delightful colors such as one finds in the heart of a good melon or peach!

This last is a grand Rose at her best, but the petals are easily damaged when we have heavy dews followed by bright sun—and hot sun it is in June. (In reading through *Modern Roses IV* it is interesting to note that this variety served as seed parent for many roses, now not listed in this country as far as I can discover). But nothing spoils the fragrance or the fine foliage.

Of the older Roses that must be called Hybrid Teas, are some that in visual aspect come closer to Teas than to the Hybrid Teas. Snowbird is de-

lightful, a white with a faint touch of flesh in the heart, sometimes. Mrs. Herbert Stevens too is fine, but both these have light green leaves and all plants here, Roses or not, with light green leaves fare less than those with dark green pigmentation.

Lady Hillingdon has long been forgotten in many places but here it makes a good four foot bush of erect shoots crowned with many flower heads of its lovely deep but soft yellow blooms that fade slowly in hue before falling. Mrs. Dudley Cross is another yellow, a greenish yellow of delightful hue in its early flowering. Later, in our strong sun, it is blushed over with pink. Old Gold also has been passed by, but here it is again a dependable and vigorous bush with the same sort of flower hues one gets in Mrs. Dunlop Best but several degrees darker.

Two much paler pink to blush white varieties also should be singled out for mention, Anna Olivier and Mme. Camille. They are much alike in some ways but are distinct enough so that one would be put to it to choose between them. My own choice wavers and so I keep them both happily.

Freiherr von Marschall has not grown as riotously as most of the others nor flowered as freely but it is deep rose red and therefore important. Possibly with another season of growth it will seem more at home. For a final note, there is Hofgartner Kalb, which makes one think of Dr. Van Fleet's, Mary Wallace, in a sturdy bush form. The foliage is dark green, the growth erect and the flowering prolific. Its waves of growth, unlike those of the Teas, are more definite so that there are intervals with no flowering.

No argument here advanced is intended to suggest that these are the only Roses for this area.

Dwarf Fruit Trees For The Serious Amateur

KARL D. BRASE¹

Dwarf apple and pear trees, extensively grown in Western Europe in the past, are not newcomers to the United States. Interest in such trees has existed in this country for many years and as early as 1906 a book on dwarf fruit trees was written by F. A. Waugh, then Professor of Horticulture at Massachusetts State College. Attempts were also made during the early part of the 20th century to plant dwarf trees in commercial orchards. These attempts, however, failed because rootstocks used at that time for dwarfing purposes were often mixtures of various stocks and thus failed to give the hoped for uniformity of tree size. In other cases the dwarf trees were handled and trained as the standard trees of that day; in such instances they failed because of faulty cultural practices.

New interest is being stimulated as urban dwellers turn to the home planting as a source of recreation. The interest of amateurs was further increased by rootstock research carried on at the East Malling Research Station in England. There the numerous and varied rootstocks that could be multiplied by vegetative means were standardized. Out of the standardization studies came distinct rootstock varieties or clones, propagated from one single, selected mother plant. To simplify the often varied nomenclature of different apple rootstock clones, a numerical system rather than names was adopted. Today, each apple clone or rootstock variety is identified by the letters EM

(for East Malling) followed by a Roman numeral, replacing such designations as Paradise and Doucin of the earlier nomenclature. In all sixteen different apple clones were standardized but only three are of interest for home garden planting.

Dwarfing rootstocks for fruit trees then are not an entirely new development. The so-called Paradise apple stocks were known and used very early in Eastern Mediterranean Countries and notwithstanding the allegation of short life, they have remained under cultivation for many hundreds of years.

A dwarf fruit tree is simply one which is much smaller than a standard tree of the same variety and age. In horticultural practice it is produced by grafting a desired fruit variety to a closely related rootstock that inherently makes small growth and in a corresponding manner restricts the growth of the variety grafted on it. Such trees, because they are small, require less space, can more easily be pruned, sprayed or dusted to control the ever-present fungus diseases and insect pests, and start bearing fruit at a much earlier age than conventional standard trees. In addition there is evidence that the size and quality of fruit, and time of ripening may be influenced by a dwarfing rootstock.

But dwarf trees have disadvantages, too. Foremost is the brittle root system of the more severely dwarfing apple rootstocks EM. VIII and EM. IX. Whenever these two are used, the trees must be securely supported by tying them to stakes or by growing them on a supporting trellis. Nevertheless, this

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fault can be overcome by making use of certain facts established through rootstock research. It has been found that, if, between the rootstock and cion variety, a short stem piece of some other stock is interposed, shoot growth of the cion is controlled by that stock which is less vigorous. Use is made of this principle by grafting a 3 to 5 inch cion of a dwarfing stock such as EM. VIII or IX onto a readily available stock of the type used for standard trees. The final desired variety is then grafted to the interstock. Trees developed in this way are slightly less dwarfed than when grown directly on the dwarfing rootstock, but they have a strong root system and can be grown without any support.

What rootstocks are used to dwarf fruit trees? Two apple stocks already have been mentioned, namely EM. VIII recommended to be used as interstock only and EM. IX. A third one EM. VII produces a more moderate dwarfing effect and is used for trees of so-called semi-dwarf size, or varieties which are restricted too severely on EM. IX. There are others, EM. I and II, but in the home garden apple trees on these two stocks may become too large. They are more advantageously used for size-control in the commercial apple orchard.

Pear trees are dwarfed by growing them on a quince rootstock. Three selected quince stocks, namely Angers quince (EM. type A) and common quince (EM types B and C) are recommended for use. The last named gives greatest growth restriction and for that reason might best be used for pear varieties which are inherently vigorous growers. A few pear varieties like Bartlett, Bosc, and Clapp's Favorite are not too satisfactory when bud

grafted on quince. The variety Bosc, for example, may fail to produce a tree. Frequently, these varieties may grow and bear normally for a few years, only to break off at the graft union. Incompatible varieties, however, can be grown as dwarf trees by double working them as illustrated on Page 215.

Since peach and plum trees do not reach the size of a standard apple or pear tree, tree size can be controlled by careful annual pruning without seriously disrupting bearing habits of the trees. Where miniature sized trees are desired it is possible to produce them by bud grafting the peach or plum variety to seedlings or preferably to selected clones of the western sand cherry, botanically known as *Prunus Besseyi*. The Nanking cherry, *Prunus tomentosa* has also been suggested as a possible dwarfing rootstock for peach and plum.

It is thus apparent that the rootstock used in producing dwarf trees is as important as the variety itself. When buying such trees it is, therefore, advisable to contact a *reliable* nursery and specify not only the variety but also the rootstock desired.

Unscrupulous nursery firms are causing considerable disappointment among novice fruit growers. Large ads which appeared recently in leading newspapers advertised the "complete home dwarf orchard" to trusting prospects. This "orchard" ostensibly consists of a dwarf apple, cherry, pear, plum, and apricot tree. The writer examined one such upon receipt and found it to consist of below grade one-year apple and *Prunus Besseyi* seedlings and three so-called June-budded peach seedlings, one being labeled as plum. These June-budded peach seedlings were dried beyond viability. Not



Northern Spy/EM. IX 5 years after planting. So far pruning has consisted of thinning out shoot growth rather than cutting back new terminal growth.

a single usable plant, regardless of variety or rootstock was sent, for the same price, two real dwarf trees could have been bought from a reliable nursery. No doubt, many a home gardener has become a victim of such frauds.

Dwarf trees require a fertile, well drained soil and a sunny location. The space required for each tree depends

on the size the tree will reach and the shape to which it will be trained. Apple, pear, peach, and plum on the dwarfing rootstocks previously mentioned and when grown as bush trees can be space 10 to 12 feet apart. Correct planting is also important with apple and pear trees. The union between the variety and the rootstock—that is, the place where the varietal bud

was grafted to the rootstock—must not be planted below the ground. If placed below ground, the variety may grow its own roots and free itself of the growth-restricting influence of the rootstock. A cion-rooted tree becomes large; size control and precociousness are lost.

Dwarf trees grown as so-called bush trees, having a low trunk and natural branching as typical for a given variety, are easily maintained. Starting with a 2-year old nursery-grown tree at planting, two to three well spaced lateral branches and a leader are selected and all other shoots are removed. Each remaining branch is cut back to two-thirds of its length. Weaker lateral branches are cut back to a lesser degree or not at all. If a one-year old tree is planted it is best cut back to the height where the future head is desired, that is 12 to 18 inches above ground level.

Heavy annual pruning will delay bearing, therefore pruning should consist of thinning out the shoot growth rather than a systematic cutting back of the new terminal growth. After a tree has been bearing 3 to 4 crops it is advisable to prune in early spring more severely to give the tree a better shape. In this case the main lateral branches and the leader are cut back to older fruiting wood. Weak branches are eliminated. Such pruning practices will reduce the crop for one or two years, but new shoot growth to bear future crops is stimulated and the tree will become more sturdy and better shaped.

Training a Dwarf Tree to Special Forms

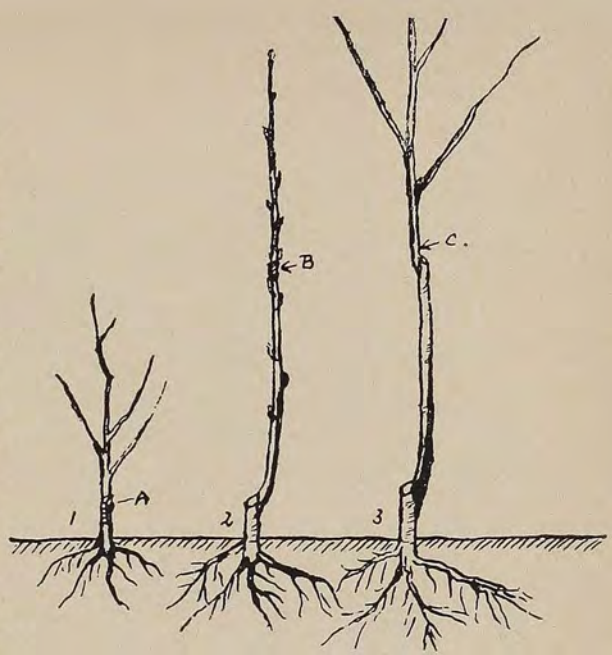
In addition to the bush form, dwarf trees can be grown in other sym-

metrical forms such as vertical and horizontal cordons, pyramids, and espaliers of various shapes. An espalier tree is one symmetrically trained on a supporting trellis, it is an unnatural form and therefore is more difficult to obtain and, if bought "ready made" from the nursery, is more expensive. The home gardener who really likes to work with plants can train dwarf trees to many different forms of which some will be discussed. But a word of caution might be in order—trained espalier trees need constant care, lest they revert to the natural habit of growth. Under climatic conditions prevailing in the fruit growing areas of this country they may also not perform as well as in the cooler regions of Europe. In North America they will do better if grown on free standing trellises than when planted against a wall or building. When placed against a building an eastern exposure might be more desirable.

The simplest form is the vertical cordon consisting of a central leader with many short lateral branches bearing the fruiting spurs. In contrast with the pruning applied to the bush type tree at planting a vertical cordon can be made from a 2-year old nursery grown tree by cutting all lateral growth back to short stubs having 3 to 4 buds. The leader is cut back correspondingly leaving 5 to 8 buds. Such pruning will result in a spindle-shaped, narrow, upright tree that can be planted at intervals as close as 2 feet. Vertical cordons, however, must be supported and kept tied to a long stake. When used in this way they may serve to screen out areas or divide a garden into separate sections. Cordons can also be grown in an oblique and in a horizontal position.

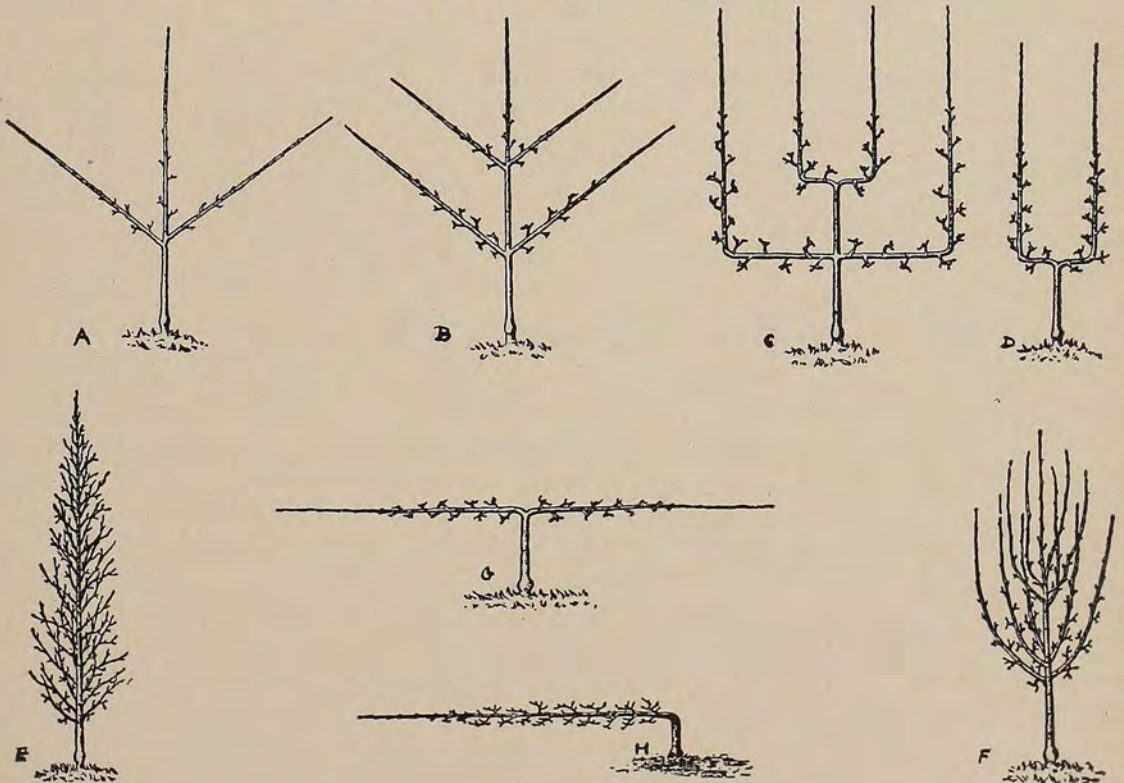
The pyramid is similar to the vertical cordon but has longer and uniformly spaced lateral branches. Pear trees, because of their somewhat more natural pyramidal growth, are better adapted to this form than are apple trees.

One and two-year old trees budded to a severely dwarfing rootstock are best suited for training. For such a purpose a trellis consisting of at least two wires tied securely is necessary. The lowest wire is strung 16 inches above the ground and others at a uniform spacing at least 24 inches above the lower one. A one-year old tree, consisting of a straight whip, must be cut back so that only three well



Top: Diagram showing steps in double working a pear variety incompatible with the quince dwarfing rootstock. 1A: compatible variety budded to quince rootstock; 2B: the summer following budding at 1A, incompatible variety is budded into whip of compatible sort at B; 3C: double worked 2-year tree.

Bottom: Typical forms of trained dwarf fruit trees. A: fan-shape with one series of branches; B: with two tiers of branches; C: Verrier Palmette; D: U-form; E: vertical cordon trained to spindle form; F: Pyramid; G: horizontal cordon with two arms; and H: horizontal cordon with one arm.



developed buds are left just above the lowest wire. (See illustration). These three buds will form the main skeleton from which either a fan-shaped tree or other form can be trained. Buds selected should be in such a position that the uppermost, forming the leader, faces to the front and the others to the right and left if possible. All other buds remaining along the trunk below the wire are best removed by rubbing them off. As soon as new growth from each remaining bud has reached 10 to 12 inches, each is tied in place, the leader to a vertical lath fastened to the wire and the two laterals to laths placed on the wire at a 45° angle. If shoot growth varies, the longest shoot is pinched back slightly thus checking its growth until the other two have reached the same length. The same procedure is followed the next growing season when a second series of lateral branches is formed. There is no limit to the number of tiers of branches, however, trees with 3 to 4 tiers are preferred.

When starting with a two-year old tree, lateral branches are already present and two equal ones spaced in opposite directions, and a leader or terminal shoot are left, all others are removed.

The fan-shaped tree is the basic form for others such as the so-called Verrier Palmette. To obtain this form a uniformly fan-shaped tree with two laterals and a terminal shoot is selected, cutting the terminal leader back to 18 inches measured from the laterals. All buds are removed but the two uppermost from the leader. The lateral shoots are tied to a horizontal position followed by a vertical one when they have reached the right length. After new growth from the two

buds remaining on the leader has started, a similar procedure is followed as with the lower laterals.

For the gardener who might wish to bud his own trees a third form, the U-form, is not difficult to train. Training should start in July when the young shoot growth from the bud inserted at the base of the rootstock plant during the previous late summer has reached a height of 18 inches. The new growth, not yet woody, is bent near the tip to the left by twisting the shoot until a right angle is formed and tied to the previously strung wire. The tip is pinched back and only one bud is left beyond the place where it was bent. This pinching forces the bud on the opposite side just below the place where it was bent to grow to form the new growth to the right. If one side makes more growth than the other, pinching back the longer one will benefit the other. After the horizontally tied shoots on both sides have reached a length of 10 inches they are again bent in an upright position by gently twisting the tender shoots. Distances between the two vertical shoots should not be less than 18 inches. Since bruises and slight breaks are unavoidable it is a good safety measure to cover the places where bending and twisting were necessary with grafting wax. When covered by wax any slight break will heal quickly, new shoot growth will not be checked and a perfect right angle can be obtained. Twisting and bending will induce fruit bud formation, and once trained in this fashion, the tree will start bearing a year or two after training was begun.

Proper pollination conditions are as important in the dwarf planting as they are in the commercial fruit orchard. If the different varieties bloom at the

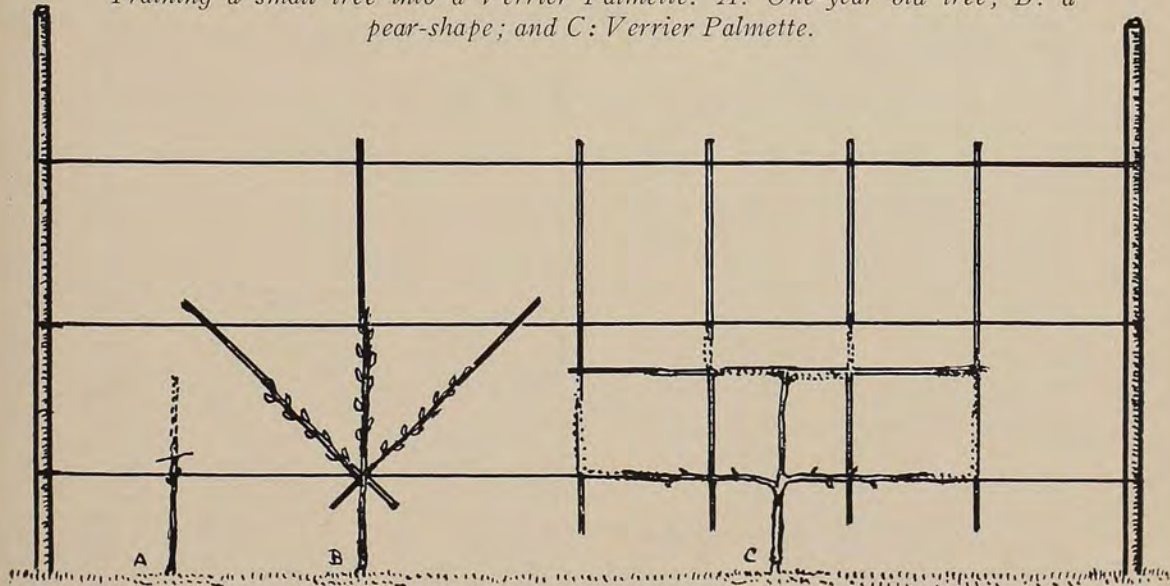
same time, fruit-set can occur. Where only one tree is present, hand pollination with pollen from another variety can quickly and easily be done on a dwarf tree. Where a heavier fruit-set has taken place than can be nourished by the leaves of the tree, thinning out the fruit is advisable. Thinning must be done when the fruit is small and not later than early June. Only one fruit per spur should be left. It may even be necessary to reduce the crop further by removing all of the fruits from some of the spurs. Overbearing will reduce fruit size and imperil the next year's crop.

To produce clean, good-sized fruits from dwarf trees the already mentioned, fertile, well drained soil, and a sunny location, plus the necessary insect and disease control, must be provided. Selection of the right varieties, namely those that are not too susceptible to certain fungus disease is helpful. Among apple varieties Baldwin, Cox's

Orange Reinette, Grafenstein, Grimes Golden, Golden Delicious, Jonathan and Lodi are well adapted to the home garden.

There is no reason to believe that dwarf trees are short lived. The age such trees may attain depends to a large extent on the care they get. These trees require essentially the same care as standard trees. A mulch of hay, lawn clippings, or composted leaves and similar materials, placed around newly planted trees and replenished each year, will help to maintain good vigor. Where trees are mulched with hay, field mice may cause severe damage. Protecting the trunk with hardware cloth will prevent mice from feeding on the bark and girdling the trunk near ground level. Also rabbits, particularly in winter when there is a heavy snow cover, may find dwarf apple trees a very desirable dish. Erecting a temporary wire fence under such conditions will be good insurance against damage.

Training a small tree into a Verrier Palmette. A: One-year old tree; B: a pear-shape; and C: Verrier Palmette.



Propagation Of Alpines

JAMES S. WELLS¹

It should not be necessary for me to attempt to justify the growing of Alpines by the keen amateur gardener, yet because of the apparent apathy in Alpine gardening at the present time, some introduction to this form of horticulture seems necessary.

Alpine gardening has been a most active and important part of European horticulture for many years. The grace and charm of these plants is not to be found in a blatant display of color, nor in any outstanding focal feature of line and form. If you are a person who has to have "a riot of color" then do not bother to read any further because Alpines are not for you. However, if you are a true connoisseur of floral beauty then you will at once appreciate the quiet, subdued, yet exquisite delicacy of almost any of the Alpines. The true lover of Alpines is a person who can appreciate this delicate intimate beauty and is comparable to the artist who appreciates the fine technique and infinite detail of a Canaletto picture, as opposed to the vigorous and even gaudy colors of some modern paintings. These remarks should not be construed to mean that Alpines cannot provide brilliant splashes of colors at the proper seasons. Exactly the reverse is true because a well planned Alpine garden or Scree should provide a continuity of color and interest throughout the larger part of the year. Even in the dead of winter some plants can be found which will show the first approaches of spring. A fallacy which has developed of recent years is that Alpines are difficult, when, of course,

exactly the converse is true. There are, of course, difficult Alpines, such as *Eritrichium nanum*, but we are not concerned with plants of this kind.

Nor is it true that all Alpines require a specially constructed Alpine garden in which they can grow. It is most satisfactory to grow Alpine plants in an Alpine garden, but it is not essential and many of the more easily grown plants are just as happy in the front of a border where they do not have to compete too actively with more vigorous subjects growing as a background. A complete perennial border in miniature can be had by the use of suitable dwarf plants of semi-Alpine nature, and such a border can be a never ending source of interest. If you aspire to grow some of the more temperamental plants, such as the Androsaces, then you can quite simply construct a Scree or moraine border in which these and similar plants will live quite happily.

Finally, it is most emphatically not necessary to be the owner of a large estate before you attempt to grow Alpines. Because of the nature of the plants they are eminently suited for the small town garden, where more interest can be packed into a square yard of ground than in any other way. Even for the person without a garden at all, Alpines are most suitable because given a cool room with reasonable light from a window, certain Alpine plants can be grown to perfection in pans. There is, therefore, no reasonable argument for delaying your half made plans any longer. Start now to grow some Alpine plants.

¹Koster Nursery, Bridgeton, New Jersey.

Propagation By Seed

Where should you begin? Well, the easiest way to start is with varieties which will come reasonably true from seed. There are a number of reputable firms in this country from which seed can be purchased, and if you are unable to obtain varieties which you want from these sources, then there are excellent nurserymen in England who can supply seed of thousands of different plants. Most Alpines come very readily from seed and usually with a high percentage of plants true to type. There are two or three problems, however, in this type of propagation which have to be considered. The first is that seed must be as fresh as possible. The ideal is to collect your own seed from plants known to you which perhaps are growing in a neighbor's garden. Failing this, try to obtain fresh crop seed from the suppliers and sow as rapidly as possible. Most Alpines require a rather gritty soil which gives first class drainage and therefore, a compost for sowing seeds must be especially made.

A good standard mixture would be the following: six parts of sandy loam; four parts of sifted leaf mold, two parts sharp sand, one part crushed tufa, and one part of crushed flower pots. Such a mixture is excellent for all plants other than those known to dislike lime. If crushed tufa is not available then sifted mortar rubble from an old building can be substituted and for certain types of lime loving plants such as most of the Saxifrages, two additional parts of sifted mortar rubble will be necessary. For lime-hating plants the following mixture can be used: four parts of acid loam, four parts of sifted leaf mold, one part of acid peat, four parts of sharp sand and two parts of

crushed flower pot. Mortar rubble should not be used. If possible the loam and leaf mold in these mixtures should be steam sterilized to be sure that no moss spores are in the mixture.

Earthenware pans are the most suitable containers to use for sowing Alpine seeds and these should be provided with a good layer of drainage crocks at the bottom and can then be filled with the correct medium. The pan should be gently firmed, leveled and watered, after which it is left to stand for some hours before the seed is sown. Fine seed should be bulked up with an equal quantity of fine sand to insure even and thin sowing. More plants are lost by over crowding than from any other cause. If the seed is extremely fine, it should be just pressed in the top surface of the pan, gently watered with a very fine spray and placed in a shaded closed frame. Where the seeds are somewhat larger they can be covered with a fine sifted layer of compost to a depth equal to the size of the seed. Moderate shade and regular daily syringing should be provided in the frame until germination is complete. Additional air and light should be given as the seedlings develop until they are large enough to handle, when they should at once be potted on into suitable small pots. A very similar mixture is used for potting as for seed sowing, the only difference being that the proportion of loam is increased, and for those plants which require feeding, a light dusting of bone meal and dry blood may be added. During the early stages of development of these seedlings in the pots, shade should be maintained and sufficient water provided. Under such conditions development should be reasonably rapid. Once the plants are well established in the pots, they can, with

advantage, be moved out to their permanent quarters. One point of interest and warning should be added here regarding the germination of some Alpine seeds. Alpines in general are notoriously capricious and cannot be relied upon to always do the right thing at the right time. Some of them also seem to require a definite cycle of warm period followed by a cold one before germination can take place. This is to be expected because in the high Alpine mountains, seed has to be produced rapidly in a relatively short growing season. The seed is ripened toward the end of summer and before it has a chance to germinate, the plants are often covered in with snow until the following spring. If you have a pan of seeds which have not germinated, it may be that subjecting it to a period of cold, either naturally or artificially, will induce germination.

I would like to give a personal illustration. Some years ago I collected seeds of *Gentiana verna*, and sowed them as soon as they were ripe. The pan was kept in a cool greenhouse for 18 months without result and at the end of that time I became disgusted and threw the pan out the door. As is often the case, the pan was not cleared away as it should have been, but was left outside the greenhouse through the following winter, and during this time it was frozen solid. Early the next spring in mid-March, I was astonished one day to notice that the seedlings were coming up in the pan almost like mustard. It was just that the seed needed that period of cold weather to break their dormancy. Do not be disheartened, therefore, if germination of your seeds is slow. As a rule no seed pan should be thrown away until it has completed two full growing seasons and being subjected during this time to

at least one good freeze.

Propagation By Division

Most Alpine plants lend themselves readily to propagation by division. The only point to consider is timing, because if the work is done at the right time the young plants will take hold rapidly and develop without interruption into good flowering stock. Although it is not possible to work by rule of thumb, a general basis for division of Alpines is to do the work very soon after flowering is complete. Most Alpine plants should be trimmed back once they have flowered, so that new growth can be sent up from the crown of the plant. Once this new growth is coming vigorously, the plant can be usually lifted and divided with success. Most forms of *Dianthus* for instance, would come into this category. However, if hot, dry, summer weather might make the operation hazardous, then delay division until cool, autumn weather comes. It is best not to divide most Alpine plants early in the spring, because they are then preparing to flower and it would disturb and in part, destroy the show of blossoms which they may produce.

Propagation By Cuttings

Practically all Alpines can be propagated in this way and again the critical factor is timing. In most instances young growth produced from plants which have been cut back after flowering, is ideally suited to be taken as cuttings, and if these cuttings are inserted in earthenware pans filled with a similar medium to that given for seed sowing, but with the addition of four extra parts of sharp sand, good results should follow. Cuttings of many Alpines will be extremely small and in some instances special attention

may have to be given to the stock plants in order to obtain a cutting large enough to handle. Many of the *Kabschia Saxifrages* come into this category and plants have to be brought into a greenhouse late in the fall or early in the winter, and grown in gentle heat and rather poor light to draw the terminal shoots up. Once these have grown to a length of an inch or an inch and a half, they can be removed with a sharp pair of scissors and without further treatment, carefully inserted into the cutting pans.

Once the cuttings have been inserted they should be carefully watered in, and the cuttings then held into a cool frame until rooting commences. Bear in mind that most Alpine plants do not like excessively high temperatures. They come from the cool high mountain regions of the world, where relatively high light intensity and low temperatures are to be found. They propagate best if somewhat similar conditions can be provided for them.

Root Cuttings

Some Alpine plants grow in such a manner that normal stem cuttings are not produced nor do they spread laterally so that the plants can be divided. A typical example would be the Corsican Cress, *Morisia hypogea*. This delightful maritime plant produces a single tight rosette of leaves which acts as a natural foil for the brilliant group of yellow flowers which follow later. Seed is not usually set and therefore, propagation could present quite a problem. The answer is root cuttings. Many Alpines, because of the conditions under which they grow, are naturally saxatile, and we propagators can take advantage of this characteristic to help us in our work. Plants of *Morisia* for instance, should be

potted in a fairly good mixture, in a three or four inch pot and this in turn should be plunged in a bed of sandy soil or weathered ashes. The plant will thrust down a tap root through the bottom of the pot, out into this sandy plunging medium and later in the summer the plants can be carefully lifted and the roots so produced can be cut off and this without harm or disturbance of the main root structure of the plant. These relatively thick tap roots can now be cut into small pieces about an inch in length, starting from the point nearest the stem of the plant.

This first cut is made straight across the stem and is the natural top of the cutting. An inch below this a second cut is made at an angle of 45 degrees and in this way we can readily tell which is the top and which is the bottom of these root cuttings. This is important because if a cutting is inadvertently inserted upside down it will not grow. After removing this first cutting the top of the root remaining is leveled off and the second cutting severed at an angle of 45 degrees in the same way as the first. In this way we cut up the tap root into small inch sections, the top of each section being level and the bottom cut at an angle. These cuttings are then inserted in pans in plain, sharp sand, so that the top of the cutting is just below the level of the sand. They are watered in and kept in a cool shaded frame until growth commences. Once a good rosette of leaves has been produced at the top of each cutting, they can be lifted and treated as you would a well established seedling. Many Alpines can be propagated in this way. Some of the *Primulas* in particular, such as *Primula denticulata* and the clonal varieties of this plant readily propagate

from root cuttings, as do all the Alpine geraniums.

Layering

This is a method not generally applied to Alpines but a variation of the procedure is often used. In this an established plant may be partially buried by filling in the whole of the center of the plant with a suitable sandy soil mixture. Only the top inch or so of each growing shoot is retained above the mound, and if the plant is left undisturbed from 9 to 12 months, the plant can then be lifted and each shoot divided, because all will be well rooted.

The methods here described are the most usual ones for the propagation of Alpines. There are others which are of more value to the specialist grower and commercial producer.

If you are particularly interested there are two books which I suggest you should have for reference. The first is one entitled *The Propagation of Alpines* by Lawrence D. Hills. It is published by Faber & Faber in England and is one of the most comprehensive and valuable books available, more especially because it has been recently published. A second book which any Alpine enthusiast should have is the published record of the conference held by the Royal Horticultural Society in England, in conjunction with the Alpine Garden Society, in May, 1936. This book gives a complete resume of all the papers presented at the conference and is, I understand, still available from the Royal Horticultural Society, Vincent Square, London.

American Daffodil Year Books

The Society has on hand a number of copies of the 1935, 1936, 1937, and 1938 American Daffodil Year Books, which are offered for twenty-five cents each. Each issue contains articles of lasting interest and numerous full-page illustrations. Partial contents are as follows:

1938: *Some Notes on the Jonquil Section*, by Alfred Bates (7 illus.); *Notes on Triandrus Hybrids*, by B. Y. Morrison (8 illus.); *More Daffodils to Enjoy and Study* (Park planting in Plainfield, New Jersey), by Harriette Rice Hallaway; *Two species Narcissus*, by Drew Sherrard (2 illus.)

1937: *Some Species and Varieties of the Smaller Narcissus*, by Alfred Bates (7 illus.); *Naturalizing Narcissi in Delaware*, by Henry F. du Pont; *Narcissi in Old French Gardens*, by Helen M. Fox; *Some Modern Daffodils for*

Garden Decoration, by Guy L. Wilson; *Breeding and Raising the Small Daffodils*, by Edwin C. Powell; several articles on Daffodil plantings in public parks; *Observations on Daffodils in arrangements*, by B. Y. Morrison.

1936: *Why I Grow Daffodils—and How*, by Sydney B. Mitchell; *Garden Schemes for Daffodils*, by Mary Judson Averett; *Development of the Narcissus During the 19th Century, a Review*, by Violet Niles Walker.

1935: *How Long is the Daffodil Season?* by John C. Wister; *Breeding Daffodils for American Needs*, by Edwin C. Powell; *Some Daffodils from an Old Garden*, by Ella Porter McKinney; *In Praise of Old Daffodils*, by Alfred Bates; *Daffodil Literature*, compiled by Alice C. Atwood.

Orders should be sent to the Secretary at the Society's headquarters.
R. C. W.

The Arboretum At Westtown School

A. L. BAILY, *Curator*

Westtown School, founded in 1799, lies some twenty miles west of Philadelphia, about four miles east of West Chester. Its campus of six hundred acres includes forest, lake, farm, lawns, and a dozen or so acres given over to a collection of trees.

The Westtown Arboretum is not an ancient arboretum though some of the trees on the school grounds were planted over a century ago. Interest in botany was strong then in Chester and Delaware Counties and a number of well known natural scientists were connected with Westtown School. The earliest of these was Humphrey Marshall whose garden at Marshallton was not far from the school.

The earliest record of any trees planted at the school mentions several White Pines brought in a wagon from South Jersey in 1835. Numerous other trees were planted as the years went by but the first attempt to make any systematic collection of trees was in 1896. A row of Oaks, including all the available local species, was planted along one side of a road bordering the farm, while opposite the Oaks there were planted some Birches, Magnolias, Catalpas, and Pawpaws. The Oak collection has since been added to and now contains about twenty-five species. The same year a group of Pines of six or seven species was planted in the corner of a field that later was made into a soccer field. These Pines are now large trees; some are already in their declining years.

Several years passed without any more planting being done, largely because no room was available. But in 1902, a good sized piece of virgin timber was cut to make up a serious school

deficit. The alumni, who had always had a very deep love for the school, were deeply shocked by the loss of the East Woods, and expressed themselves volubly. In 1904, partly to stem the criticism, and partly from their love of trees, a teacher at the school and some of the alumni planted ten each of sixty-five species of trees among the sprouting stumps of the newly cut over ground. The small trees had to compete with the native growth and constant battle was waged by the teacher assisted by a crew of boys. After the fifth year, the sudden death of the teacher ended the resistance and the woodland returned to power. That was in 1909 and before any attempt was made to repair the damage, twelve years had gone by.

In 1921-1922 a new attempt was launched. The ground was cleared of native growth; the stumps were blasted out; the area was sowed to grass seed and systematic mowing was begun. Then the whole area of the arboretum was marked out in squares and family plots were laid out. Trees were purchased mostly in small sizes and planting was again undertaken. About ninety per cent of the 1906 planting had been choked out, but what remained was liberated and some of these trees are today beautiful specimens. Those trees, particularly the conifers, planted between the years of 1922 and 1924, are most vigorous and beautiful.

It is hardly proper in an article of this kind to enumerate the species in the Westtown Arboretum, but perhaps the following list of the more impressive conifers would be worth giving, together with their estimated present

heights, planting dates and sources of supply:

- Taxus chinensis*, 3'
1948, Morris Arboretum
- Taxus cuspidata*, 21' (spread)
1923, Moon's Nurseries
- Torreya nucifera*, 8'
1930, Hicks Nurseries
- Cephalotaxus drupacea sinensis*, 6'
1933, Arnold Arboretum
- Cephalotaxus Fortunei*, 6'
1933, Hoopes Brothers
- Abies koreana*, 7'
1937, Princeton Nurseries
- Abies sutchuenensis*, 4'
1940, Harvard Forest
- Abies recurvata*, 5'
1935, H. P. Kelsey Nurseries
- Abies holophylla*, 12'
1935, H. P. Kelsey Nurseries
- Abies pindrow*, 18"
1944, Arnold Arboretum
- Abies numidica*, 3'
1943, Princeton Nurseries
- Abies pinsapo*, 8'
1952, Myers Nurseries
- Abies amabilis*, 6'
1932, Long Bell Lumber Company
- Abies venusta*, 2'
1943, Eddy, Monterey
(30 species of firs in all)
- Tsuga chinensis*, 7'
1938, Arnold Arboretum
(6 hemlocks in all)
- Picea Smithiana*, 3'
1940, USDA
- Picea Wilsonii* 10'
1937, H. P. Kelsey Nurseries
- Picea Maximowiczii*, 15'
1938, Hillier, England
- Picea asperata*, 12'
1924, Farquahr
- Picea asperata notabilis*, 12'
1924, Farquahr
- Picea asperata ponderosa*, 11'
1924, Farquahr
- Picea retroflexa*, 10'
1924, Farquahr
- Picea obovata*, 5'
1938, Fairview Nurseries
- Picea purpurea*, 10'
1937, H. P. Kelsey Nurseries
- Picea montigena*, 16'
1924, Farquahr
- Picea jezoensis hondoensis*, 11'
1937, Princeton Nurseries
- Picea sitchensis*, 3'
1948, Kohankie Nurseries
(29 species of spruce in all)
- Pseudolarix amabilis*, 44'
1923, Elm City Nurseries
- Cedrus atlantica*, 17'
1937, Princeton Nurseries
- Cedrus Libani*, 35'
1922, Fairmount Park
- Cedrus deodara*, 30'
1927, Penna. Dept. F. & W.
- Pinus punila*, 18"
1948, Hillier, England
- Pinus Armandi*, 24'
1934, Müllers Nurseries
- Pinus Lambertiana*, 12"
1949, Collected
- Pinus ayacahuite*, 40'
1924, Moon's Nurseries,
- Pinus peuce*, 18'
1938, Fairview Nurseries
- Pinus aristata*, 18"
1949, Cripple Creek, Collected
- Pinus arizonica*, 3'
1948, Chiricahua Mountains
- Pinus latifolia*, 3'
1948, Chiricahua Mountains
- Pinus leiophylla*, 3'
1948, Chiricahua Mountains
- Pinus Sabiniana*, 10'
1945, Malmborg
(39 pines in all)
- Sequoiadendron giganteum*, 18"
1951, Rare Plant Club
- Metasequoia glyptostroboides*, 18"
1950, USDA
- Glyptostrobus pensilis*, 12'
1947, Meehan's Nursery



Illustrations prepared from photographs made at The Westtown Arboretum by the author
 Top: Left, Tulip Tree, White Birch and Colorado Spruce. Right, *Phellodendron amurense* (and the Author).

Bottom: Left, *Pinus ayacahuite*. Right, three species of *Picea*, *jezoensis* *hondoensis* in foreground, *Omorika* to the left and *orientalis* right.

Cunninghamia lanceolata, 28'
 1932, Outdoor Arts Nursery

Cupressus arizonica, 5'
 1945, Arnold Arboretum

Westtown Arboretum is always glad to receive visitors. If we know in advance when to expect guests, we can be sure to have someone on hand to take them around the plantings.

The Importance Of Microclimatic Problems In Garden Design

R. B. DEERING¹

To design a garden for maximum comfort throughout the year, it is first essential to have a broad understanding of the relationship of human physiology to the environmental conditions of temperature, wind, and humidity. It is necessary to know the major climatic zones and the important variables occurring within them. A careful analysis of orientation, sun positions, topography, and site factors is also required. Finally, one must have the knowledge and ability to make the best possible use of plant and architectural materials as well as other devices to improve the comfort conditions of home and garden.

The primary objective in trying to control the climate in a small area is to produce a more comfortable atmosphere in which a family can live.

A general understanding of the processes of heat loss from the body is necessary as a starting point for improving the climatic conditions of a specific environment.

During the periods of warm weather, in order to remain comfortable, the body must lose heat through sweating. In cool or cold weather the retention of body heat is necessary in order to keep warm.

Heat is lost from the body by radiation, conduction, convection, and evaporation. At body surface temperatures above 85°F most heat is carried away from the body by the evaporation of perspiration, but if the air temperature

is higher than the skin temperature, heat is transferred to the clothing and the exposed skin by convection even though it is being carried from the skin by evaporation. If the surfaces (of walls and paving) are above skin temperature, heat will also be transferred to the clothing and exposed skin surface by radiation.²

At air temperatures below 78°F the temperature of the skin is below that of the interior body, the secretion of perspiration is at a minimum, and the loss of heat is due largely to radiation and convection.³

Heat is also carried away from the body by the moisture that evaporates into the exhaled air from the surfaces of the respiratory tract.

Comfort is not a constant factor among individuals, but may vary widely between people of different age groups, health, activity, and adaptation².

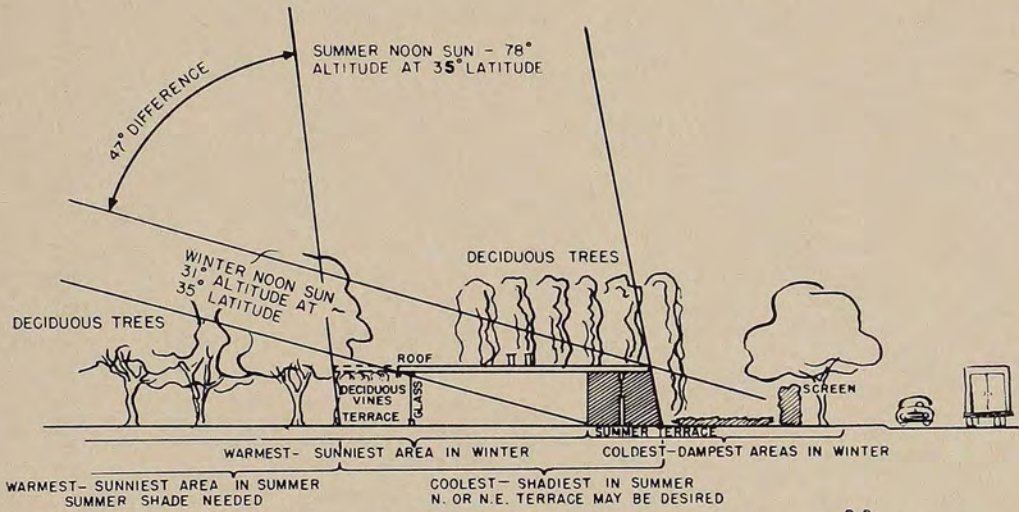
Some will feel comfortable at lower temperatures, others at higher temperatures. An increase in the velocity of air movement permits comfort at a higher temperature because the convective and evaporative heat loss from the body will be increased for a given temperature difference.⁴ A decrease in the velocity of air movement permits comfort at a lower temperature because

²Gordon, Hayden S., and Perry, R. L. Air conditioning for houses in California. *University of California Agricultural Experiment Station Circular 351*. May, 1942.

³Dubois, Eugene F. Heat loss from the human body. *New York Academy of Medicine Bulletin 15* (3): 143-73. March, 1939.

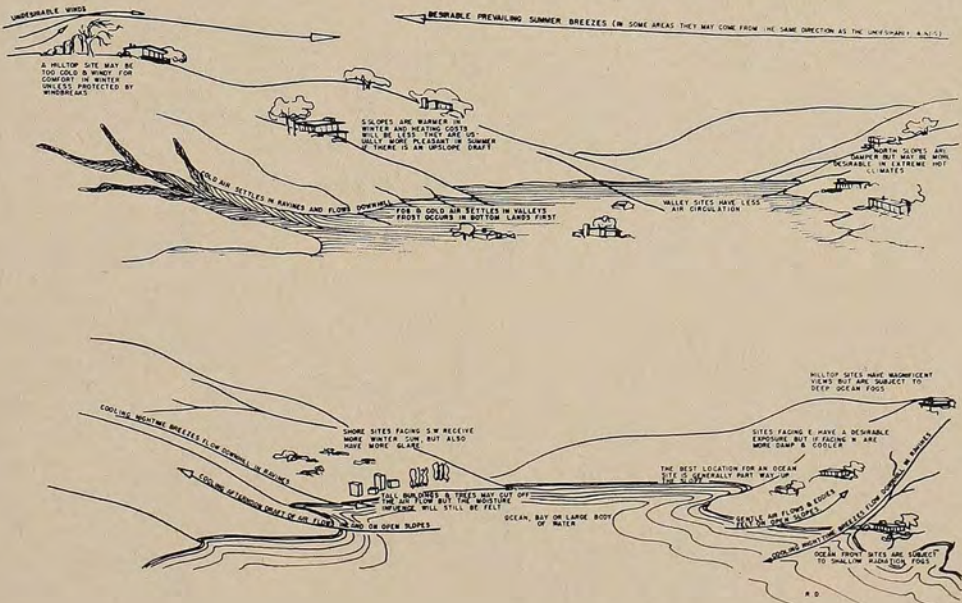
⁴American Society of Heating and Ventilating Engineers. *Heating, Ventilating And Air Conditioning Guide*. 19th Edition: 53-60. New York, 1941.

¹Chairman, Department of Landscape Management, University of California, Davis, California.



Illustrations accompanying this article were prepared from line drawings made by the author
 Top: Proper orientation and planning produces warmer livable areas in winter and cool ones in summer. (Cool living areas may be desired in both summer and winter in extreme hot regions.)

Bottom: Upper, The best location for an inland homesite is generally part way up a slope depending upon wind, breezes, sunshine, and views. Lower, Breezes from large bodies of water regulate the climate. They make shore sites and surrounding land cooler in summer and warmer in winter. Distance of cooling or warming influence depends upon the topography back from the shore.



the convective and evaporative heat loss is decreased for the given temperature differences.

The above two examples show the importance of the relationship of air movement to body comfort.

Before deciding upon a site, the home owner should make a thorough study of the specific microclimatic problems of the land being considered and how they will affect the design and orientation of both house and garden.

Seldom does one consider the climate in selecting a site; yet, if considerable forethought were given to this factor, outdoor living conditions could be greatly improved.

Topography has an important influence on the local climate because of exposure and the fact that cold air flows downhill at night. Sites exposed to the winter winds and valley bottom sites are usually less desirable because of the extra coldness at night. Frost will occur at lower elevations first, and fog is most frequent in the lowest points. In summer the bottom land may be the warmest because it may be cut off from cooling breezes.

The best location is probably part way up a slope, but the site at the top of the hill may be desirable in warm areas. The lee side of the hill, well below the crest, is out of the area where the winds are strongest and usually will be much more comfortable.

South or southeast exposures on slopes generally make the most desirable sites. The south-facing site offers the best possibility for taking advantage of the winter sun's natural heating qualities. In climates where cool living areas are desired in winter as well as in summer, it may be more desirable to have a north or northeast exposure.

Soil conditions and the natural plant

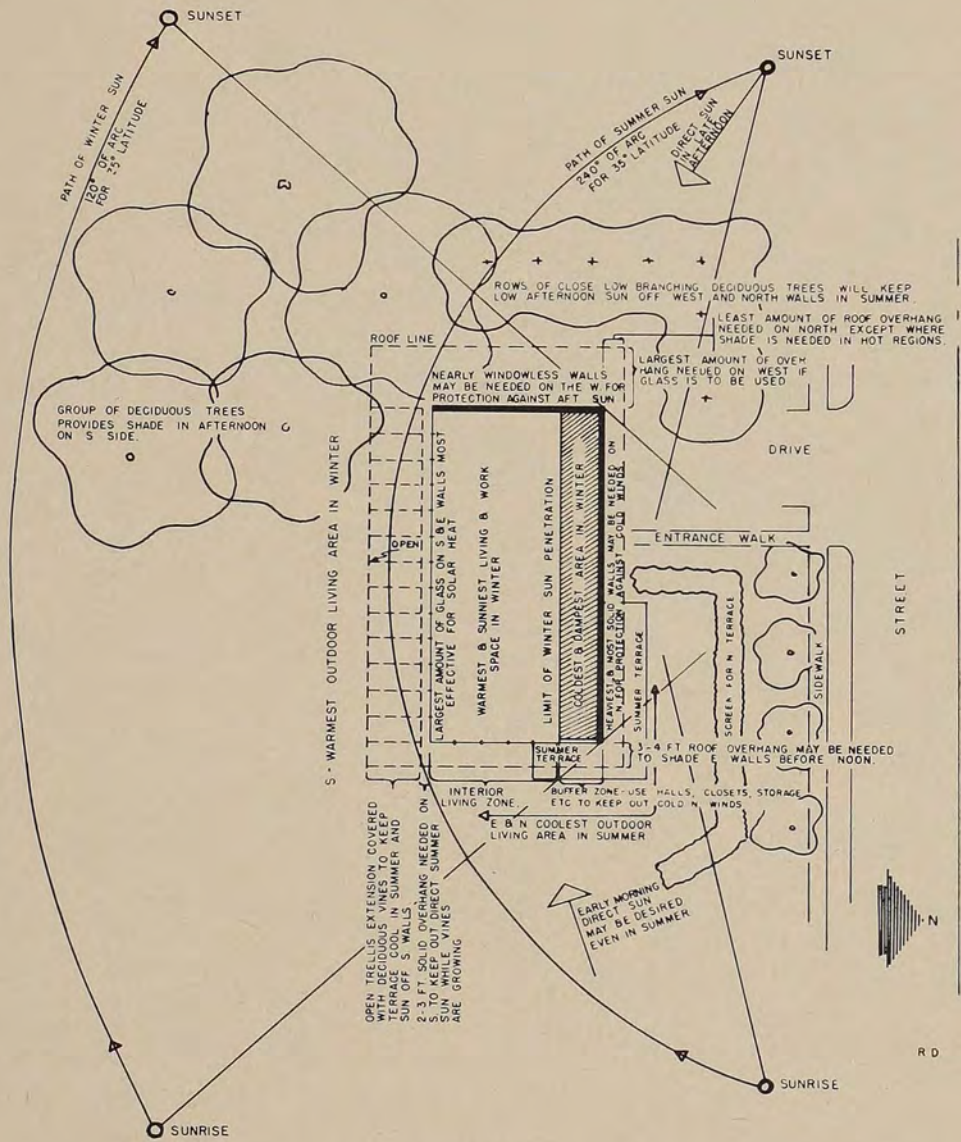
cover generally have a great effect on the total climate of the site. Soils of different textures, colors, and composition have varying effects. Moist soils have lower temperatures than do dry sandy or gravel soils.

Nearness to bodies of water is also important. The winter climate near bodies of water is always more mild than in other areas. They raise the winter temperature, lower the summer temperature, and always raise the humidity. The change is more marked near the larger and less near the smaller ones. The lee side has a less extreme climate than the windward side. Offshore breezes have been known to lower the temperature more than ten degrees. Lake breezes seldom reach more than three-fourths of a mile inland, whereas the influence of the ocean may extend inland many miles. The topography, buildings, and trees along the shore front may be limiting factors, depending upon their size and extent.

The solution for achieving more outdoor comfort lies mostly with the control of wind and sun. In the summer the primary concern may be control of the sun. At once, one can see that proper orientation of house and garden is of major importance.

It is known that wind flows nearly the same as water and therefore should be handled in much the same manner. Wind can be very troublesome in open country and along coastal regions. This can be partially overcome by the proper design and use of hedges, screens, and windbreaks. Hedges and other plant materials may be more effective against the wind than a wall or fence, since the foliage tends to diffuse the wind rather than to push it over the top.

Lawns, shrubs, and trees are all ef-



Plan shows how proper orientation dictates how house and garden should be planned. Houses located in extreme hot regions may require that their major glass areas be placed on the north or northeast with solid walls to the west and south.

fective in controlling the heat in the garden and house.

It is important to understand how the control of the sun can effect living conditions and the relation of plant materials on the atmosphere.

It is known that east or west walls may receive twice as much heat in summer as in winter. In the morning during the summer months heat from the sun is usually desired because the soil and air temperatures outside and the air temperature inside are lower. In the late afternoon, however, less heat is generally desired since the soil and air temperatures have been previously warmed. Therefore any additional heat would be undesirable. This fact should be carefully considered in planning the house and the amount of glass used on the west exposure. In very warm regions, even the morning sun may be objectionable. Plant materials in conjunction with sufficient roof overhang can produce effective control.

Houses located in cool climates are more comfortable in winter if their living sides face toward the south. Terraces and outdoor living areas on the north or east side are usually cooler in summer.

Deciduous trees and vines can be used to cover walls, on trellises over

windows, terraces, and porches, and to produce cool summer living areas. Because of the fall foliage drop, they allow absorption and re-radiation of the winter sun's heat from paving materials when it is most desired.

Plants, in addition to their shading effect, absorb and re-radiate far less heat than inorganic materials, such as walks, drives, terraces, walls, and buildings.

Summer temperatures have been recorded 25 to 30 degrees lower than over the surface of moist grass than over black asphalt. Surfaces light in color reflect heat but also produce more glare. Large paved areas should be designed with large openings left in them for trees and other plants to produce shade, relieve the glare, and reduce the amount of heat absorption.

The number, location, size, and density of the surrounding buildings, the amount of paved area together with the total number of trees, shrubs, vines, and grass areas, and how they are used, all have a significant effect upon the climate of the site.

It is evident that many factors should affect any ultimate garden design and that the climatic factors should receive very serious consideration by home owners and communities in most sections of the United States.

The following article, Nut Growing In The Northeastern States, is reprinted from Arnoldia, Bulletin of Popular Information of the Arnold Arboretum, Volume 12, Numbers 2-4, by permission of Dr. Donald Wyman, Arnold Arboretum, and the author, Dr. L. H. MacDaniels, Cornell University.

Nut Growing In The Northeastern States

LAWRENCE H. MACDANIELS¹

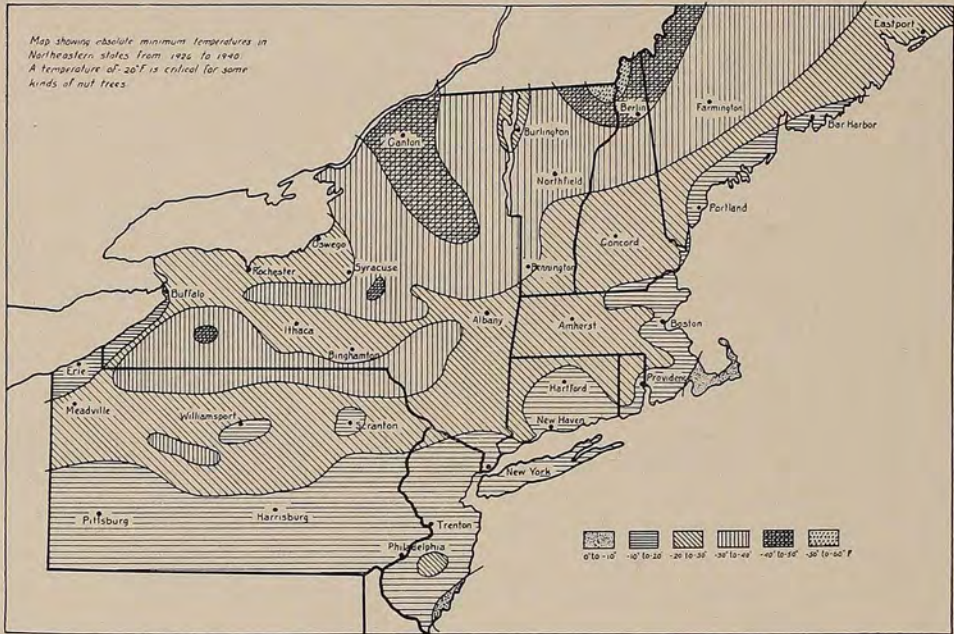
The northeastern states (Referring specifically to New England, New York and Pennsylvania. Of course the information would also apply to other regions with similar climate) have a rich heritage of native nut trees. Among the species occurring in the fields and woodlands are six hickories, the black walnut, the butternut, two species of filberts, the beechnut, and formerly the chestnut. At the present time, however, the species have not been developed in the horticultural sense and so do not form any commercial industry, nor have they been improved by selection and breeding in a way comparable to the Persian walnut or the pecan. The nuts that are grown commercially in America such as the Persian walnut, the pecan, the European filbert, and the almond have all originated either in foreign countries or in the region of the south and west where the climate is better suited for their growth.

The planting of improved nut trees in the northeastern states is thus a comparatively recent development. To be sure nut trees have been given a sort of culture in that they have been left in the fence rows and in the fields that were cleared of other species, and seedling trees have been planted around the home grounds from which nuts have been harvested from time to time. Except with the chestnut it is only within the last quarter century that there has been any attempt to improve

the nuts grown and to encourage nut culture in any real sense. Such improvements as have taken place have been the discovery of varieties that bear superior nuts and their propagation and testing. In the northeast this process is still in the exploratory stage and there is yet much to learn as to the adaptation of the various kinds of nut trees to this region.

As the work has progressed it has become evident that the successful production of improved nuts in the northeast is largely dependent upon the discovery of varieties that are adapted to this region. Most of the varieties of nuts which have been selected, named and propagated have originated to the south and west and when brought into the northeastern states have not produced good crops mostly because the climate is not warm enough and the growing season long enough for the normal development of the variety. It seems obvious that for the most part in this region nut culture must be developed from varieties which have originated in the north or in parts of other countries which have a similar climate. The search for varieties adapted to the north has been going on for some time and a considerable number have been named. The time is now ripe for more extended planting of nut trees to determine their adaptability to growth in northern locations. Planting nut trees for shade and as a hobby is to be greatly encouraged because not only are trees of assured hardiness and landscape value available but the grower by testing varieties is con-

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Absolute minimum temperatures in northeastern states from 1926 to 1940.

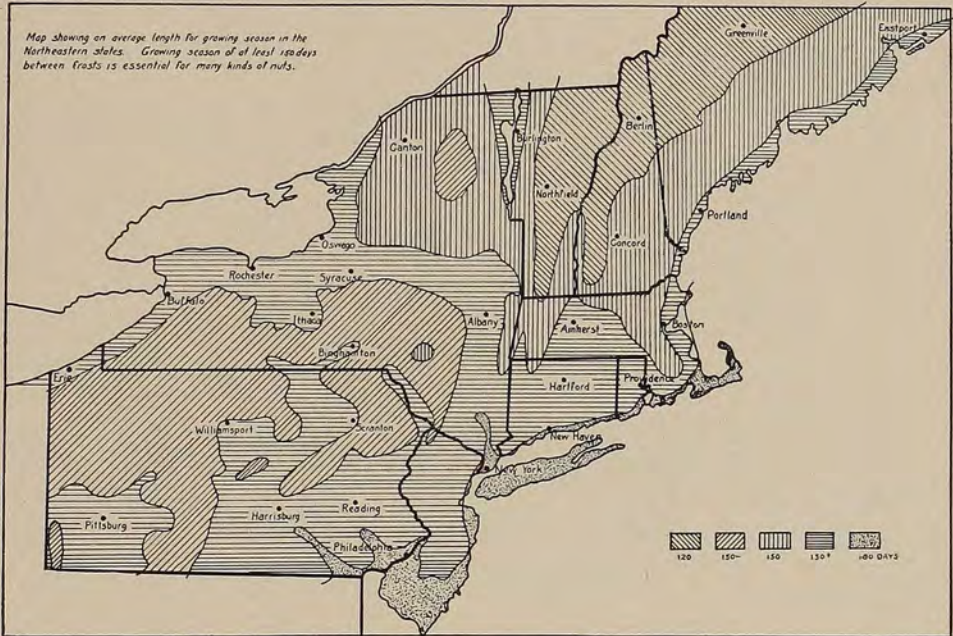
The maps accompanying this article have been prepared from data supplied from the U. S. Weather Bureau publications modified in the light of other known climatic and geographical features. The zones are only approximate and local conditions such as altitude, exposure, and nearness to bodies of water may have an important effect on the growth of trees.

tributing to our knowledge of nut culture in the northeast.

Climatic Factors

With nut trees, as with all other plants, the most important determining factor in their survival and growth is the climate of the region where they are planted. Apparently the limiting factor with many species is winter cold, particularly the absolute low temperatures reached in any one season. Most nut species are long lived trees and although the winters of several decades many not be injurious the occasional exceptional winter may entirely wipe out a given species or variety. This has occurred in parts of the north with the

Persian walnut. Previous to 1933-34 there were a considerable number of these trees flourishing in the fruit belt of western New York State, many of which had grown to a bearing size. The unprecedented cold of that season killed most of the trees outright except in a very limited area where the temperature did not fall below -20°F . This temperature is critical not only for most varieties of Persian walnuts but for many varieties of filberts, Chinese and Japanese chestnuts, heartnuts, and some black walnuts. There is little use in planting trees of these varieties if such temperatures are of frequent occurrences. The zones with temperature above -20°F . over a 15 year



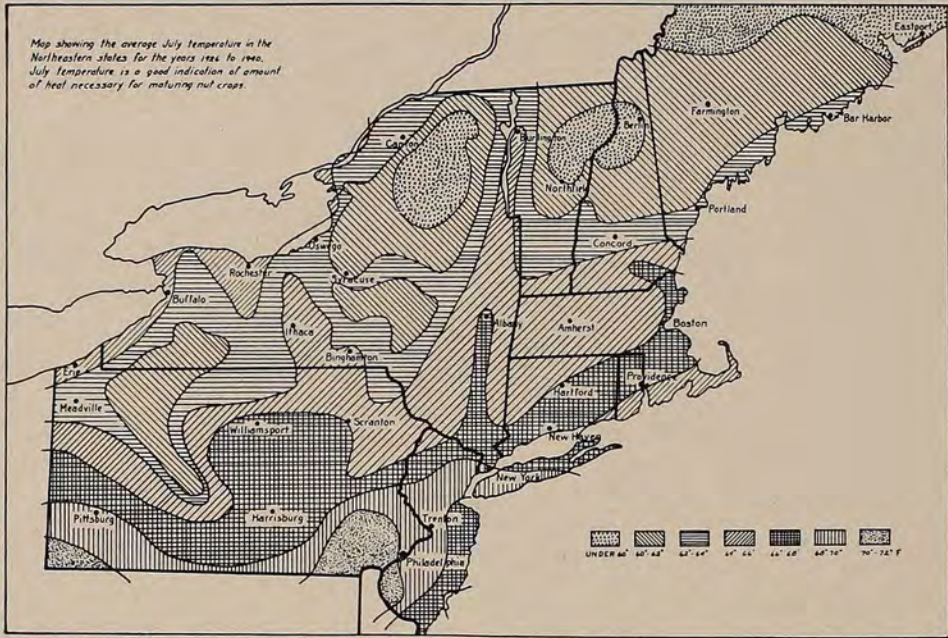
Average length for growing season in the northeastern states. (See note of explanation under temperature map.)

period are shown in the accompanying map.

Another climatic factor that is of real importance in the growing of nut trees is the length of the growing season or the number of days between freezes. Practically no species will stand a hard freeze after the growth starts in the spring. These spring frosts rarely kill the trees outright but destroy the new shoots and with them the year's crop. At Ithaca, New York, it is probable that this killing of the new growth on hickories and walnuts is responsible for crop failure more often than any one other factor. The leaves come out from other buds after the freeze and during the growing season the trees appear normal except for the fact that there is no crop. Most of our nut tree species require a growing season of at least 150 days between frosts al-

though butternuts and filberts may require less. The length of the growing season for the various parts of the northeastern states is shown on the accompanying map.

Somewhat less damaging than late spring frosts are freezes which occur in early fall. Black walnuts are particularly likely to be damaged at this time. The nuts on the trees will not be hurt by light frosts but if the temperature goes to $+25^{\circ}\text{F.}$ or below there is likelihood that not only will the leaves be frozen off the trees but the nuts themselves will be frozen so as to make them poorly flavored and useless. In many cases if the leaves are frozen from the trees the development of the nuts will stop and the nuts are poorly filled. Early fall freezes, if the drop in temperature is rapid and occurs before the growth on the trees has



Average July temperatures in the northeastern states for the years 1926 to 1940.
(See note of explanation under temperature map.)

hardened, may cause serious damage to both trees and nuts.

Associated with the same problem as the length of the growing season between frosts is the mean summer temperature sometimes expressed as total summer heat. Varieties of fruit trees, nuts included, require a certain amount of heat above a base temperature in order to develop their fruits. Thus, even though the growing season may be sufficiently long, if the temperature during the growing season is too low, nuts will not mature. This is particularly important with those species that normally grow farther south such as the northern pecan from Illinois and many of the black walnut varieties. These trees may be perfectly hardy as far as winter low temperatures are concerned but they rarely mature a crop because of cool summers and the short

growing season. Sometimes exceptionally warm seasons will mature nut varieties in a region where they usually fail to ripen. The same thing is also true of grapes and other fruits.

Local variations in climate are often important in determining the suitability for growing nut tree species on a particular site. On the accompanying maps the climatic zones are indicated in a general way. Within these zones, however, there may be certain sites which are more favorable for the growth of nut trees than others. These sites are related to proximity to bodies of water, good air drainage, protection from winds or other favorable factors. An example of such a site has been observed at Aurora on Cayuga Lake, New York. Here on a certain bench close to the lake and surrounded by rather high banks, a number of species

were growing for many years that were not adapted to the surrounding region. These included a California redwood, a number of Persian walnuts and a few northern pecans. These trees had grown to considerable size and had produced satisfactory crops but in the winter of 1933-34 the lake froze over for the first time in many years and the temperature on a single night dropped to an unprecedented low point. All of the trees except the pecans were either killed or badly damaged. Advantage should be taken of such locations wherever they occur. On the other hand exposed hillsides, frost pockets, and high elevations should be avoided.

From the above discussion of climate and an examination of the maps, it becomes evident that parts of the northeast differ greatly in their suitability for growing nut trees. In northern New England, particularly Maine, New Hampshire and Vermont, only a few of the most hardy kinds such as the butternut can be grown. In southern Pennsylvania, however, most species and varieties will succeed. In between these areas conditions become increasingly less favorable from south to north, the suitability of any locality being influenced by local factors that effect temperature, air drainage, and the like.

Species And Varieties

As before indicated, the problem of growing nut trees in the northeastern states is largely a matter of varieties and their adaptation. The greatest concentration of the more valuable native species, particularly the black walnut and the shagbark hickory, is in the Mississippi River basin, particularly the Middle West. Named sorts origi-

nating in these regions are probably not adapted to northern New York or New England and should be planted with the realization that it is an experimental project or else there should be assurance based on tests that the varieties will succeed. The probable solution of the problem is to obtain varieties that have originated locally or under similar climatic conditions and are of proven worth.

BLACK WALNUT. The black walnut, although primarily a plant of the Mississippi River basin and the region of the Great Lakes, is hardy in most parts of the northeast and one of the most valuable nut trees for the region. It is extensively planted around the farmsteads in southern New England and southward and has escaped along the fence rows and in waste places where it is not native. Most of the varieties which have been named and propagated originated to the west and south of New England and have not proved suitable here. At Ithaca, New York, the variety Thomas has been one of the most successful but apparently this is about the limit of its northern range and even here there are seasons when the nuts do not mature. Other varieties extensively propagated such as Ohio and the Stabler, do not mature at Ithaca or farther north. Varieties of northern origin have as yet not been sufficiently tested to be sure of their behavior in New England. They are, however, the most promising of this region and are well worth a trial. Among these can be mentioned the Snyder from the Ithaca region, the Wiard and Allen from Michigan, the Huber and Cochrane from southern Minnesota and the Cresco from northern Iowa. These are being propagated sparingly by nurserymen and could be

propagated to order if the grower so desires.

Varieties successful in southern New England, central Pennsylvania and southward are the Thomas, Elmer Myers, Stambaugh, and Sparrow. These are available from nurserymen.

Those interested in nut culture should observe trees growing in the northern part of the black walnut range and select those which produce the best nuts over a period of years. These can be propagated by nurserymen on order or grafted by the individual himself. It is only by such selection from trees that are successful that progress will be made in the varietal adaptation of nuts to a northern environment.

The variation in cracking quality and size of black walnuts is great. Some of the better sorts may have as high as 35% kernel although 20% kernel is good and most common seedlings have considerably less. Black walnuts are best adapted to deep, rich, slightly alkaline or neutral soils with good drainage. They are found growing naturally in alluvial soil in the river valleys. In the north such sites should be avoided if they are "frost pockets."

BUTTERNUT. The butternut extends the farthest north in its natural range of any of the important nut trees and in fact in northern New England, it is about the only nut which will succeed. Here it should receive much more attention than it has in the past. It has the disadvantage of being rather short-lived under some conditions. The cause of this in some cases is a parasitic fungus but in others it is apparently related to the nature of the tree itself.

Although the butternut will succeed fairly well on the poorer upland soils it thrives best on richer neutral soils with

good drainage. A dozen or more varieties have been selected but only a few have been propagated commercially. Some of the named sorts that are propagated by nurserymen, at least in small quantities, are the Kenworthy, Irvine, Love, Craxezy, Thill, and Van der Poppen. For some unknown reason the butternut is not easily propagated. Named varieties certainly deserve much more attention than they now receive because of their very superior cracking quality as compared with the ordinary run of seedlings.

PERSIAN WALNUT. Attempts have been made to grow the Persian or English walnut in the northeast for many years with recurring damage from winter cold. Trees in the protected fruit region of New York became large enough to bear good crops until the extreme cold winter of 1933-34. At that time practically all Persian walnuts in the east were killed outright or very severely damaged. Apparently the temperatures of -20°F . becomes critical for most trees of this species and quick drops in temperature in spring or fall may be injurious at higher temperatures.

At the present time there is a very real interest in what is known as the Carpathian walnuts which have been introduced from Poland by Mr. Paul Crath of Toronto, Canada. These trees are grown from seeds or grafts from trees in the Carpathian Mountains which have withstood temperatures as low as -40°F . Some of these trees have been growing in North America in both Canada and the United States for fifteen to twenty years and show promise of successful culture. Many seedling trees have now fruited and a few varieties have been named and propagated among them the Littlepage

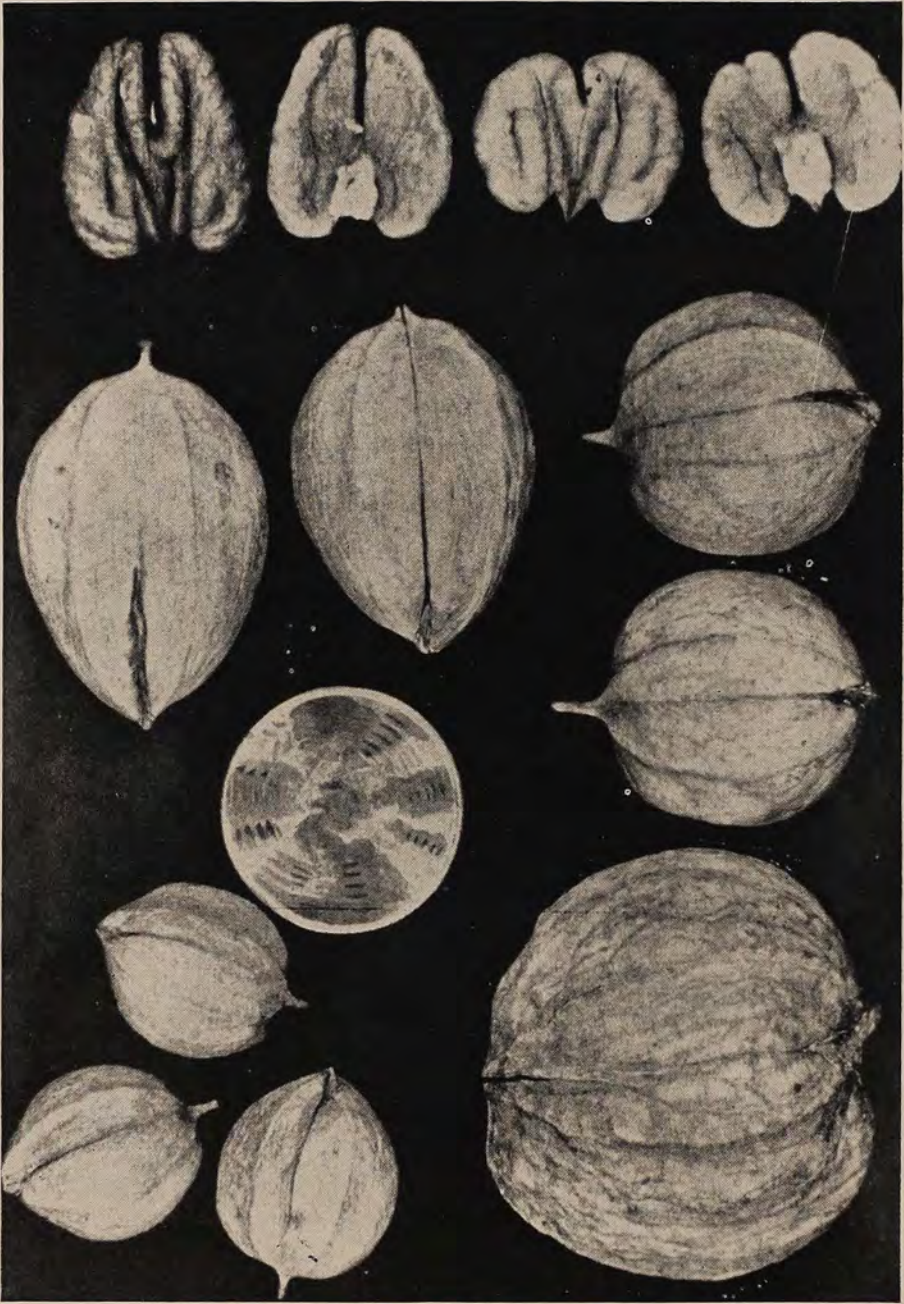
and the Metcalfe. A recent contest discovered a number of other superior types that should soon be available. Trees are available mostly as seedlings in both the United States and Canada. It should be borne in mind that even though the Carpathian walnut is hardy there may be other climatic factors which are limiting in their culture, such as length of growing season or the amount of summer heat available. Indications are, however, that they are adapted to relatively short seasons and they have shown little killing back from winter cold. They have however been damaged by late spring frosts.

JAPANESE WALNUT. The Japanese walnut (*Juglans cordiformis ailanthifolia*) makes rapid and luxurious growth even in rather poor soils and is well adapted for use as a shade tree. It comes into bearing early and has a tropical appearance which is very pleasing. Seedling trees vary considerably in their hardiness but for the most part withstand winter cold in all except the most severe parts of the northeast. At Ithaca, many have withstood temperatures of -35°F . without damage. On the other hand there are some seedlings which have been damaged at -20°F ., and early fall freezes may be damaging at higher temperatures. The nuts of the Japanese walnut resemble the butternut in flavor of the kernel, but in general are not so highly flavored. Some types of this nut are fairly smooth whereas others are rough much like the butternut. It was thought that these rough nuts were hybrids with the butternut, but the fact that such rough nuts occur in Asia where there are no butternuts indicates that they are probably only a form. The name *buartnut* is used for Japanese walnuts of the rough shelled

type. As yet there are no named varieties of this nut.

HEARTNUT. The heartnut (*Juglans cordiformis*) is a sport or mutation of the Japanese walnut resembling it closely in foliage and growth habit. The nuts have much better cracking quality, however, and with most of the named sorts kernels can be recovered in whole halves. The shells of some of them can be split apart with a knife inserted in the base of the nut. The nuts are smooth and attractive in appearance and although usually smaller, they are much superior to the ordinary forms of the Japanese walnut. There is variation in hardiness of the different named varieties and at the present time it is impossible to give a well substantiated opinion as to the adaptation of the named varieties to northern culture. The Lancaster has not been hardy at Ithaca. Other sorts in the trade are the Bates, Faust, Ritchie, Stranger, Walters, and Fodermaier. Anyone interested in planting this nut will do a real service by keeping records of their performance and giving the information to experiment stations or the Northern Nut Growers' Association.

HICKORY NUT. A number of species of hickory are native in the northeast. Among these are the mockernut (*Carya alba*), the shagbark hickory (*C. ovata*), the red hickory (*C. ovalis*), the pignut, (*C. glabra*), the bitternut (*C. cordiformis*), and the shellbark hickory or kingnut (*C. laciniosa*). Of these the shagbark hickory is by far the most important. Mockernuts are gathered to some extent from the wild but are undesirable because of their thick shells. The pignut is usually not bitter but with few exceptions is of such poor cracking



Hickory nuts of various types. The large nut is the kingnut or shellbark hickory, *Carya laciniosa*. The nuts in the second row are superior types with good cracking quality. The disk is slightly larger than a twenty-five cent piece.

quality as to be of little value. The bitternut is intensely bitter, astringent, and quite inedible. Some of the hybrids with the shagbark hickory have been propagated because of their thin shells but are of poor cracking quality and flavor. The problem of growing hickory nuts in the northeast is much the same as with the black walnut. Although many sorts have been named a large part of them have their origin in the south and west, and when brought into the northeast are not successful because of the short growing season and lack of heat. The northeast must rely on varieties which have originated in the northern states. Among these may be mentioned Davis, Fox, Glover, Goheen, Kirtland, Mann, Miller, Nielson, Whitney, Beeman, Bridgewater, and Wilcox. Most of these were reported in some of the nursery catalogs in 1939 and many of them could be propagated on order.

One factor standing in the way of increased planting is the difficulty of propagating the trees. Young hickory stocks have a very large tap root, making the trees difficult to handle in the nursery. This can be surmounted by cutting the tap root about 18 inches underground at least a year before transplanting, thus forcing lateral roots to form. Well managed nurseries provide for this and such trees are much more likely to succeed than those transplanted from the wild.

PECAN. The pecan so extensively grown in the cotton belt and extending in its natural range into parts of Indiana and Illinois, has not been successful in the northeast. This is not because of tenderness to winter cold but rather to the relatively short, cool growing seasons which do not mature the nuts.

There are a number of hybrid varie-

ties which make good shade trees. Among these the Burlington is particularly attractive. It has been perfectly hardy at Ithaca, has good clean foliage and occasionally has matured a few nuts. Usually they have been frozen on the trees before maturing. Other hybrid sorts such as the Gerardi, the Des Moines, and the Pleas have attractive foliage and make good shade trees.

In favorable locations in southern Pennsylvania some of the northern varieties of pecans occasionally mature crops of nuts. Anyone planting these should use varieties which are of northern origin. Among these are the Greenriver, Major, and the Posey.

CHESTNUT. In the past the chestnut has been by far the most valuable of the nut trees in the northeast. The wild groves of this species have, however, been almost completely destroyed by the chestnut blight. This disease, coming into the New York area about 1900 has now covered practically the entire native range of the chestnut in North America. Sprouts from old stumps may live from year to year, their usual history being that they grow until they are about two or three inches through and 10 to 15 feet high. At this stage the bark forms fissures through which infection occurs with the result that the sprouts are killed and are replaced with suckers from the base. Sometimes these sprouts become large enough to bear a few nuts and there are constant rumors that the chestnut is coming back in the forest. This, however, does not seem to be the case as there are no recorded instances of real immunity among trees of the native chestnut. There has been a persistent attempt on the part of the federal government and some state forestry departments to introduce or

develop other species or hybrid varieties of the chestnut which would be resistant or immune to the blight. In this some success has been achieved. The Chinese chestnut (*Castanea mollissima*) and the Japanese chestnut (*C. crenata*) although not immune to the blight are highly resistant. Hybridizing these with each other and with the native American species to obtain blight resistant types is underway. There are at the present time a number of varieties that are distinctly promising. Among these are Abundance, Carr, Hobson, and Yankee. These are available from nurserymen and are well worth a trial. Newer sorts developed by the U. S. Department of Agriculture are the Nanking, Meiling, and Kuling, are excellent for size and quality and are worth a trial. Some stock-scion incompatibility has appeared with Chinese chestnut varieties so that planting seedlings of good strains is being done. Many of the nuts are fully as sweet as the native chestnut, and considerably larger. The trees are not as hardy as the native chestnut and may be damaged by temperatures ranging around -25° F. There undoubtedly is great variation in hardiness in these varieties and they should be tested further.

FILBERT. Two species of native filbert occur in the northeast. One of these is the beaked filbert (*Corylus cornuta*) and the other the American filbert (*C. americana*). These, however, are relatively inferior as compared with the European species, *C. avellana* and *C. maxima*, which together with their hybrids are the basis of the world's commercial industry. In New York tests have been made at the Geneva Experiment Station where a large number of varieties of European filberts have been grown. The limit-

ing factor with most of these has been winter cold and late spring frosts. Temperatures of -20° F. have seriously injured many of the European varieties and late frosts frequently destroy the staminate catkins or pollen producing flowers and thus prevent a crop. The variety recommendations of G. L. Slate based on experience at Geneva, New York are as follows:

Cosford and Medium Long are two of the hardiest varieties and with the exception of Italian Red are the most productive. Both are vigorous, upright trees. Cosford nuts are of medium size and thinnest shelled of all varieties tested. The nuts of Medium Long are slightly larger than those of Cosford and the shell is of medium thickness. The pellicle or fiber on the kernel is rather heavy.

Italian Red has thus far produced more nuts than any other variety tested, but at the Geneva Experiment Station in recent years the tree has not been as hardy as it appeared earlier and the variety is placed third on the list. The tree is vigorous and upright.

Barcelona in the earlier years of the test was the most productive variety, but recently the trees have experienced so much winter injury that the variety is recommended for limited trial only. The nuts are large, thick-shelled, and the kernels are covered with a heavy pellicle, but the tree is less vigorous than others, not productive, and is lacking in hardiness.

Red Lambert is as hardy as Cosford and Medium Long and produces a fine large nut, but the tree is unfortunately very unproductive and of value only as a pollenizer. Its spreading habit of growth makes it unsuitable for planting in a hedge with other varieties, most of which are of upright habit.

More recently a promising develop-

ment in the filbert situation is the hybridization of American with European varieties. The varieties Rush from Pennsylvania and Winkler from Iowa of the American species are the varieties most used. Rush is a tall growing shrub and has borne well at Ithaca. Winkler is hardier, more productive and bears larger nuts, but makes a low growing shrub. Of the hybrid varieties the Bixby and Buchanan are now regarded as being the most promising because of their size and other merit of the nuts and hardiness of plant. Many other seedlings are being tested and seem promising.

Cultural Practices

It is not the purpose of this paper to give details as to the propagation of nut trees. In general the same principles are involved with this crop as with other fruit trees but the material is somewhat more difficult to manipulate and wholly efficient methods of budding or grafting have not been developed. It should be emphasized here, however, that in common with other fruit species, grafted trees are very much superior to seedlings. Nut varieties might very well be compared to apple varieties in this regard. Anyone who is familiar with the small, hard natural apple fruit which is found in the pastures of New England and knows of its bitter, astringent flavor can appreciate the difference between these and the better named grafted varieties such as the Baldwin and McIntosh. The same differences exist with the nut trees also. The great majority of seedling nut trees have nuts that are so difficult to shell that there is little incentive to grow them. The named and grafted varieties, however, may be said to be as superior to the ordinary run of seedlings as the grafted apples are

superior to natural fruit. Better varieties of nut trees should bear nuts of good size which have a high proportion of good quality kernels which are easily shelled out. It is not difficult to imagine what a difference it would make if the many millions of wild trees bore nuts of as good quality as the selected and named sorts.

Obtaining trees of desirable varieties may be something of a problem. Many varieties are already in the trade and are being propagated by nut tree specialists. It is also possible to have particular varieties propagated to order. It must be realized, however, that nut trees are much more difficult to produce in the nursery than are apples or pears and in justice to himself, the nurseryman is compelled to charge more for the nut trees than for other fruit trees.

For one really interested in the growing of nut trees a good practice is to top work established stocks by grafting. It is not too difficult to learn the technique and in many localities there are nurserymen and plantsmen who will make grafts as desired.

To grow seedling stocks it is necessary to stratify the seeds before planting. This should be done in the early fall before the nuts have been allowed to become very dry. The process of stratification involves keeping the nuts at temperatures slightly above freezing. Best results are obtained by keeping nuts buried in moist peat moss at a constant temperature of about 35-40° F. Such conditions may be found in cold storage houses. For the grower, successful stratification can be attained by exposing the nuts to winter temperatures. This is done by burying the nuts in sand and leaving them in an exposed place which should be well drained. Protection with wire netting

is necessary to keep rodents from destroying the seeds. If danger from theft by rodents is not likely and the soil is well drained, the seed nuts may be planted in the nursery row in the fall or they may be planted in their permanent location in the fall or the stratified nuts planted out in the spring.

Those desiring only a few nut trees of named varieties may best purchase them from nurserymen who are specializing in nut tree propagation. There are a number of these in the northeast and Middle West. A list of nurserymen can be obtained from the Northern Nut Growers' Association. If nut growing is to be carried on as a hobby and a considerable number of trees are to be involved, a good practice is to raise seedlings and get them established in their permanent location and then graft the most vigorous individual trees to well-chosen varieties. Scions may be obtained from trees locally or from nurserymen who furnish scions.

Soils suitable for nut trees are the same as those required for almost any other fruit crop. The first requirement is that they shall be deep and well drained. Thin topsoil overlying impervious subsoils which remain soggy will not grow good trees. Often rocky soils are very good because they usually are well drained unless the underlying rock is impervious. The most favorable soils are friable loams of good organic content and good moisture holding capacity. Fertility can be easily supplied to poor soils which are suitable in texture and drainage by the use of leguminous cover crops, and by application of barnyard manure or complete commercial fertilizers. It is a mistake to plant nut trees on heavy, worn-out soils that are not good agricultural lands. On the other hand they may very well be planted in rocky lands

incapable of cultivation provided other conditions are favorable.

The planting of nut trees does not differ essentially from planting trees of other kinds except possibly that most nut trees have few fibrous roots and hence must be planted with unusual care. Hickories are difficult to transplant because of the scarcity of lateral roots and the slow rate at which new roots are formed. If the taproot has not been cut a year previous to digging or the tree transplanted in the nursery row once or twice, there are likely to be practically no fibrous roots and the chances of survival of the tree are slight. If seedling trees are to be brought in from the woods, it is of great advantage to cut off the taproot about 18 inches below the surface of the ground a year before transplanting and thus stimulate the formation of the lateral roots near the surface. There is an advantage in buying trees from nurserymen skilled in the propagation of nut trees because attention is given by them to developing a good root system.

While the trees are out of the ground, care should be taken not to allow the roots to become dry before planting. Keeping them covered with wet burlap or puddling them in a moist clay is highly important. Some trees can be bought balled and burlapped but this is expensive and should be unnecessary. The hole should be dug large enough so that all of the roots can be accommodated readily and the topsoil should be worked in carefully around them. One of the most important practices is to firm the soil about the roots with a tamping stick of some sort. At the time of planting the soil should be moist but not wet enough to puddle or cake when firmed with the tamper. After planting, the trees should be well

watered and weeds kept down about the trees either by cultivation or by mulching. This is particularly important until the trees become well established. At the time of planting the tops of practically all nut trees should be cut back to about one-third or one-half of the wood present in the nursery, making sure that at least several good buds remain. This is important because even with carefully dug trees a large proportion of the root system is destroyed or damaged in digging and the top must be cut proportionally. After planting, if the season is dry, the trees should be watered during dry periods of at least the first season or longer if necessary until they become established.

On soils that are low in organic matter a good practice is to work in granulated peat moss with the soil about the roots. Care should be used that the peat is well soaked with water either before or after planting, otherwise it will be of no benefit. Covering the trees with wax has been recommended by some authorities but under conditions of hot sun this practice has proved injurious and is not recommended.

After the nut trees become established not much care is needed. Pruning is of less importance than with most fruit trees. With walnuts and hickories it is sometimes necessary to correct faulty crotch structure and space the limbs about the trunk. The most common fault is the development of two leaders which are about the same size. If this occurs one should be removed or at least pruned severely to dwarf it with relation to the other. Hickories and walnuts should be so trained that central leaders, or modified central leaders will develop. For best yields filberts should be trained as stan-

dard trees without suckers at the base. In removing a sucker, the soil is dug away from the base of the tree exposing the base of the sucker where it joins the root and the sucker removed with a sharp saw, cutting close to the main root.

Fertilizers

Nut trees respond to fertilization and good soil management much as do other fruit trees although many wild trees apparently do well in competition with other vegetation. Outstanding growth or yield is usually associated with an unusually favorable situation as to soil fertility, moisture supply or other soil conditions. It is a mistake to think that nut trees will survive under adverse conditions. Neglect, especially before the trees are well established, will often result in the loss of the trees. Nut trees do particularly well under cultivation which keeps weeds and other growth away from the soil over the roots. This, however, is rarely practical with nut trees in the fence row or around the home. The benefits of cultivation can be largely secured by mulching the area under the trees so that the weeds are kept under control. Any plant material such as old hay or straw or garden refuse is suitable for mulching purposes.

On soils low in fertility nut trees will respond to applications of nitrogen. Either sodium nitrate or ammonium sulfate may be used, the former probably being preferable with the walnuts which are adapted to neutral or alkaline soils. Trees growing in sod may be fertilized at the rate of one-fourth pound of ammonium sulfate or sodium nitrate for each inch of the diameter of the trunk until they have attained a diameter of about six inches when about one-half pound may be used for

each inch in diameter up to the maximum of 15 to 20 pounds per tree. With large trees that are well established, much more fertilizer should be added. The above is of course only an approximation. The actual needs of the tree will depend upon the natural fertility of the soil and other conditions. The trees should be observed carefully to avoid either excessive stimulation of growth, which would make the trees liable to winter injury, or the other extreme of an under-vegetative condition as indicated by yellow, sparse foliage and poor yields. In general trees suffer much more from the lack of fertility than from too much. If trees are to yield regular crops they must be fertilized regularly and adequately. There is some evidence to show that some of the minor fertilizer elements, particularly zinc, are deficient in some of the soils of the northeast.

Zinc deficiency shows up as weak yellowish growth late in the season. The leaves are small with the edges curled upward. Application of zinc sulfate is usually an effective control.

Insect And Disease Troubles

Insect and disease troubles are about as common for nut trees as for any other shade trees. The problem is complicated by the fact that most home owners can not have their trees sprayed. There are a number of caterpillars which destroy the foliage. Among them, most commonly encountered is the walnut caterpillar which appears about mid-summer and may seriously defoliate the trees one or more times in a single season. These may be controlled with arsenate of lead. Where the trees are not sprayed it is often possible to destroy the worms by collecting them when they gather on the trunk in a mass to shed their skins.

These caterpillars and others on hickories can often be destroyed before they attain large size on small trees by picking off the leaves upon which they are feeding. They usually feed in groups close together. Hickories and chestnuts sometimes have the nuts destroyed by weevils. The control here is to destroy all nuts which drop to the ground before the weevils emerge. This may be fairly easy if the trees are in the lawn but difficult if the ground is rough. The Persian walnut is attacked by the codling moth, which is similar to that which damages apples. Spraying with arsenate in mid-summer when the moths appear is an effective control.

Diseases are usually not troublesome with nut trees although under some conditions they may be. There is a blight which sometimes attacks the filberts, appearing as dead and brown shoots. If affected parts are cut out promptly and burned, the trouble is usually easy to control. Some varieties of walnut, particularly the Thomas, become infected with a perennial canker. This is relatively less damaging on trees that are growing rapidly so that good cultural practice is a means of control. Of course the chestnut blight has been the most devastating disease of nut trees which has practically wiped out the chestnut in its natural range. Methods of controlling this disease in the American and European chestnuts have not been developed. Of the blight resistant Chinese and Japanese species, it is worthwhile to cut out blighted limbs as they occur and to cut away bark cankers on the trunk. The cut surfaces should be painted with some good antiseptic solution.

Nut trees, particularly the hickories and walnuts ordinarily bear only in alternate years. This is a natural ten-

gency which is to be observed also with other fruit trees. There is apparently little that can be done to control it although it may be lessened somewhat by an adequate fertilizer and soil management program. Thinning the nuts while still green should also be of help but is not practiced. What happens is that during the bearing year the crop is such a heavy drain on the food manufactured in the leaves or possibly other substances, that there is not enough for bud formation for the following year. Different varieties vary in this respect. The chestnut and the filbert do not alternate as seriously as the walnut and the hickory.

Cross Pollination

Most kinds of nuts require cross pollination. From a practical standpoint this means that at least two varieties of each species which flower simultaneously should grow together. With kinds that are frequently planted this may offer no problem to the individual home owner as neighbors may have trees which will be a source of pollen. With the filbert and chestnut, however, two varieties should always be planted together. To a somewhat lesser degree this is the case with the Persian walnut and the hickories. The pollination requirements of black walnut are not well understood but it is highly probable that cross pollination is necessary for this species also. In small areas where several trees cannot be planted, a part of the tree may be top worked to another variety. The pollen of the walnut, filbert and hickory is wind borne and may be carried over a considerable distance. It is impossible to state with accuracy how close together it is necessary for trees to be planted for cross-pollination. Any-

where within the radius of 100 feet should be satisfactory.

Harvesting Nuts

Nuts should be allowed to become fully mature on the trees and preferably to fall naturally. Mild shaking is sometimes practiced to bring down the last of the crop but clubbing the branches is seldom justified. Nuts should be picked up as soon as they fall. This is particularly necessary with the Persian walnut which discolors if allowed to lie on the ground and with the black walnut, the husks of which may disintegrate into a brown mass if not picked up within a few days after falling. Black walnuts should be shucked soon after harvesting to prevent discoloration of the kernels. Small quantities of black walnuts are beaten or tramped from the husks. With larger quantities the old fashioned corn sheller may be adjusted to remove the husks satisfactorily. Black walnuts that are washed immediately after removing the husks will remain an attractive brown color instead of turning black. Nuts of all species should be allowed to dry after the husks are removed. Small quantities can be spread out on the floor of a well ventilated shed or attic. With larger quantities some sort of racks with screen bottoms can be devised. The drying room must have a free circulation of air.

One of the commonest difficulties experienced with nut trees in the north is that the kernels fail to fill. There are a number of causes which contribute to this condition. Probably the most frequent, particularly with the hickories and walnuts, is too short a growing season or too little summer heat. Under these conditions the leaves are frozen from the trees while the nuts are still immature and no further

development of the kernels takes place. The problem may be better understood when it is realized that in the development of most kinds of nuts, the growth of hull and shell to full size takes place early in the season. During the latter part of the season the kernels are developed from the carbohydrates which are manufactured by the leaves. It is thus obvious that any condition which cuts down the effectiveness or destroys the leaf surface will effect the filling of the nuts. This may be due to loss of leaves by insects or diseases or to interference with their effective function by drought or inadequate nitrate supply. Another condition is found in trees in an over-vegetative condition where the growing shoots use up the food materials which otherwise might go into the kernels. This is apt to be found with young rapidly growing trees or trees kept growing with frequent irrigation. There is little that can be done to control the failure to fill except to grow varieties which are adapted to the locality as to length of growing season and protecting the leaf surface from pests and disease troubles. Supplying water at time of drought and a good fertilizer program are also helpful.

Summary

In the foregoing pages an attempt has been made to outline the requirements for growing nut trees in the northeastern states. There is nothing in the situation which should encourage anyone to try to establish commercial plantings in this area unless possibly with some of the newer chestnuts and some varieties of black walnuts. On the other hand it should be emphasized that there is real value in planting grafted trees throughout the northeast both for shade trees and for the nuts

which may be produced for home use. The fact that at the present time we do not know which varieties will succeed best over a period of years only adds to the interest of the problem. Enough is known to assure the growing of good shade trees and certainly in some measure improved nut crops will result. Nut kernels are a product that is without equal for food value and palatability, and producing a supply for home use merits the attention of all who have land at their disposal.

All home owners in the villages and on the farms may be encouraged to plant nut trees for shade with the realization that even though the large crops of superior nuts may not result, the testing of the varieties will be a real service in developing our knowledge of nut growing in the northeast.

It should also be emphasized that at the present time there are undoubtedly many superior varieties of nut trees that are adapted to growing in various localities but which have not been propagated and tested. They are standing as wild trees in the fields and along the fence rows on the farms or in door-yards. Trees which bear nuts of outstanding value and which bear crops fairly regularly should be brought to the attention of some agency which would be capable of judging the relative merit of the variety and seeing to it that the tree is propagated and tested further. The Northern Nut Growers' Association, Spencer B. Chase, 2338 Parkview Avenue, Knoxville, Tennessee, has been organized to do this sort of thing. Some of the state experiment stations and the USDA are also equipped to test the merit of new varieties. Anyone knowing of superior trees will do a real service by calling them to the attention of one of these agencies.

Window Gardening

ELVIN McDONALD¹

Window gardening is becoming more popular each year . . . and with the array of new and old plants suitable for window culture, it is easy to see why. Vines and other plants, well arranged, can be a highly decorative part of any room, to say nothing of the new life they give a window which otherwise is ordinary. Shelves of all types increase a window's capacity and effectiveness, while plant brackets and wall vases add their smart effect, too. Handsome plant stands, flower boxes, and trays help fill in even the most barren rooms.

If you have failed with house plants, probably the reason can be laid on one of the following: injurious gases, plants unsuitable for house growing, lack of knowledge of the plant's needs and common every day neglect. A fancy container, a dash of water once in a while, and a dark corner with no humidity, will not keep a plant growing.

Most window plants like a temperature minimum of 60° Fahrenheit with a rise of 10 to 15 degrees during the day. Set the pots on a tray of moist sand or pebbles to increase humidity.

Amaryllis

The *Amaryllis* can well be called the "Queen" of window garden plants. It gives us its strikingly beautiful blooms in the dead of winter. Bulbs are purchased in the fall, potted and brought to warmth and good light as soon as they are rooted and the bud is showing at the neck of the bulb. After flowering, continue watering and

feeding regularly to get as many leaves as possible. Put it outdoors in the summer if possible and bring it in before frost. Dry it off, and repot. Then you will be ready to enjoy its blooms again.

Geraniums

Many people have failed with *Geraniums* even though they are thought to be very easy to grow. To bloom indoors, *Geraniums* must have direct sun. Place them as close to the glass as possible. A good potting soil can be made up of three parts good garden soil and one part peat moss. They bloom best when a little pot-bound. Four-inch rooted cuttings, out of two-inch pots from the florist repotted in a three-inch pot, will provide a beautiful showing in record time. They do not require heavy fertilization.

Most everyone is familiar with the *zonale* types of *Geraniums*, but very few people have grown the fancy-leaved varieties, and the Ivy-types. The Ivy *Geraniums* make good hanging basket plants. Most of them have very beautiful double flowers and they come in almost every color. The flowers of the fancy-leaved varieties are not especially attractive. They must have good sunlight to bring out the brightest colors of their foliage. Some of them have two-color foliage, others, tri-color.

Begonias

Begonias offer a wealth of window-garden material. For the shady, humid place, the highly colored *Rex* varieties fill the bill. The popular, wax (*semperflorens*) *Begonias* make good plants for the sunnier spot. There are dwarf,

¹Editor, *The Gloxinian*, official publication of the American Gloxinia Society.

tall, and trailing Begonias . . . indeed you may choose a variety for almost any need, and if you buy wisely, you will be able to have some bloom on your plants most of the year. They like a soil rich in leaf mold, fast draining, but on the rich side.

Stem and leaf cuttings are very easy to root, but a terrarium or discarded fish bowl will be needed to root them in because they need high humidity until they are established. In the warm, bright weather of spring and summer, the cuttings seem to root faster, and grow better. All Begonias are easy to grow from seed, and you will enjoy some real thrills when they begin to develop into full-fledged plants.

Gesneriads

Perhaps the GESNERIACEAE which includes the *Saintpaulia* (African-violet), *Gloxinia* (*Sinningia*), *Achimenes*, *Episcia* and dozens of others makes up one of the largest groups of plants for indoor culture . . . and plants that are adaptable to windows and locations with not much direct sunlight. They prefer a light, porous, rich soil. Too much light will cause the leaves to yellow, while too little light will produce limp stems and may prevent blooming. Some of the Gesneriads are tuberous rooted . . . others are fibrous rooted. The *Saintpaulia*, *Streptocarpus* and *Episcia* are among the latter. *Gloxinia*, *Achimenes*, *Reichsteineria*, and *Naegelia* are among those that are tuberous rooted.

The *Episcia* perhaps offers to us one of the most promising foliage plants of many years. Why they have not been grown more generally before, I do not know, but I am finding them to be very adaptable to many conditions, and, although they are noted for their beauti-



Peggie Schulz Photograph
Episcia fulgens

ful foliage, they also have beautiful blooms most of the time.

Achimenes flower in the summer and are dormant in winter. Their small tubercles are handled in much the same manner as is used for *Gloxinias*. They need moist soil and should be shaded from direct sunlight during the summer. Their name comes from a Greek word meaning "to suffer from cold." In addition to brightening a window-garden, they may be used to decorate a sheltered porch.

The *Streptocarpus* is almost ever-blooming under good conditions. They need a tiny bit more sun than the *Saintpaulia*. Other requirements are the same. There are a number of species available, as well as some new hybrids which are very outstanding.

Aeschynanthus pulchrum is a fibrous-rooted Gesneriad for hanging baskets. It has thick, leathery, dark-green



Elvin McDonald Photograph

Episcia viridifolia

leaves, that look much like those of the *Hoya carnosa*. It can stand quite a bit of sun. It blooms in the spring usually,

but may have a few blooms on it during other seasons. It should be given a rest period in the fall, during which

time it should not be watered except enough to keep the leaves and stems from shriveling. Brilliant orange and yellow flowers.

Gloxinias need a good deal of sunlight in the window-garden, so an eastern or southern exposure will probably prove to be best. A collection of Gloxinias may be started almost any time of the year. The spring and fall seasons of the year are considered to be the best starting times by many people.

Reichsteineria macropoda is a plant I have not grown long and only recently it rewarded me with its beautiful vivid orange flowers. They are small, tubular flowers borne on dainty clusters atop two inch stems above the beautiful velvety green leaves. It requires the same culture as the Gloxinia. It is tuberous rooted. It could get along on less sunlight. Orange or yellow coloring in Gesneriad blooms is hard to be found. Therefore, this might be a good plant to use in hybridizing to get yellows and oranges into our Gloxinias and African-violets.

There are many more Gesneriads that you may want to try. They are all very interesting plants, and they'll richly reward you for the small amount of effect it takes to grow and flower them.

Cyclamen

Cyclamen plants are among the most regal of all house plants, I think. The plants should be kept as cool as possible during the summer, and placed in partial shade. Syringe the foliage during the summer quite often. They need a 50° night temperature. Withhold water almost entirely after flowering and give the plant a rest.

Foliage Plants

There are many foliage plants to choose from. Among my favorites are the *Crotons*, *Coleus*, *Philodendrons*, fancy-leaved *Caladiums*, *Maranta* (Prayer Plant), *Pilea microphylla* (Artillery fern) and *Dracaenas*.

Most everyone likes to have some Ivy. Two things are important for the success of Ivies. They like plenty of moisture and an acid soil. Place in a north or east window with not too much sun. Wash the leaves gently every week or two. There are dozens of new varieties to choose from.

Summering

Most house plants will profit by a summer spent in a well-protected spot outdoors. Bring them in well before frost is expected. You must remember that when you bring them in, the growing conditions are changed greatly and you'll need to pamper them extra for a while. Some plants are just too tender for this treatment, but as weather conditions vary from place to place, it is impossible to point out which plants can be put outdoors and which ones cannot. Here in the Oklahoma Panhandle, without a lath-house, or any other special protection, I would hesitate to put out ANY house plant!

Grow House Plants From Seed

Growing house plants from seed is a hobby in itself. You can do nothing that will bring you more enjoyment, I am sure. Always buy high quality seeds from a reliable seedsman and follow the directions for planting that are on the packet.

Indeed there seems to be no end to the amount of material available for window gardens. Once you start this



Jim Hudson Photograph

Episcia fulgida

fascinating hobby, you will continually be on the lookout for new and unusual house plants. You may want to try them under fluorescent lights. Already African-violets and Gloxinias have proved to thrive under this "artificial sunlight." Always keep your plants in

a healthy, growing condition so they will not be so likely to take up every little bug and disease that come along. If some of them do get infested or sickly, take them away from the rest of the plants, and either treat them, or discard.

Selecting A Wood Preservative

JOHN P. LEONARD

Wood is the most adaptable material in the service of mankind. It is found in nearly all parts of the world; it is light in weight, easily worked, cheap (that is, it was cheap until recently), pleasing in appearance and of enough varieties to meet every demand, will absorb shock, withstand heavy stress, is acceptable to paints, glue and other materials and if properly protected will outlast many of the materials used in construction. Because of these favorable characteristics wood is in great demand.

The annual harvest from our American forests has been much more than the annual growth. Because of this over-cutting it is imperative to make the wood we do use last much longer. Ten per cent of this annual harvest is used to replace lumber that has decayed in service; some more is destroyed by insects, while still more is discarded because of warping, checking or shrinking.

More and more people are becoming conscious of the value of preservatives and are treating lumber to overcome these losses through decay or insect attack. Because of this great demand on our forests, many smaller trees are being used for lumber; consequently a greater proportion of the lumber is sapwood. Sapwood accepts moisture or solution more readily than heartwood; there is, therefore, a greater tendency for today's lumber to swell or warp if moisture is allowed to enter the wood. The dwindling supply of decay resistant lumber and the substitution of non-resistant materials lend further emphasis to the desirability of providing maximum protection. Lumbermen,

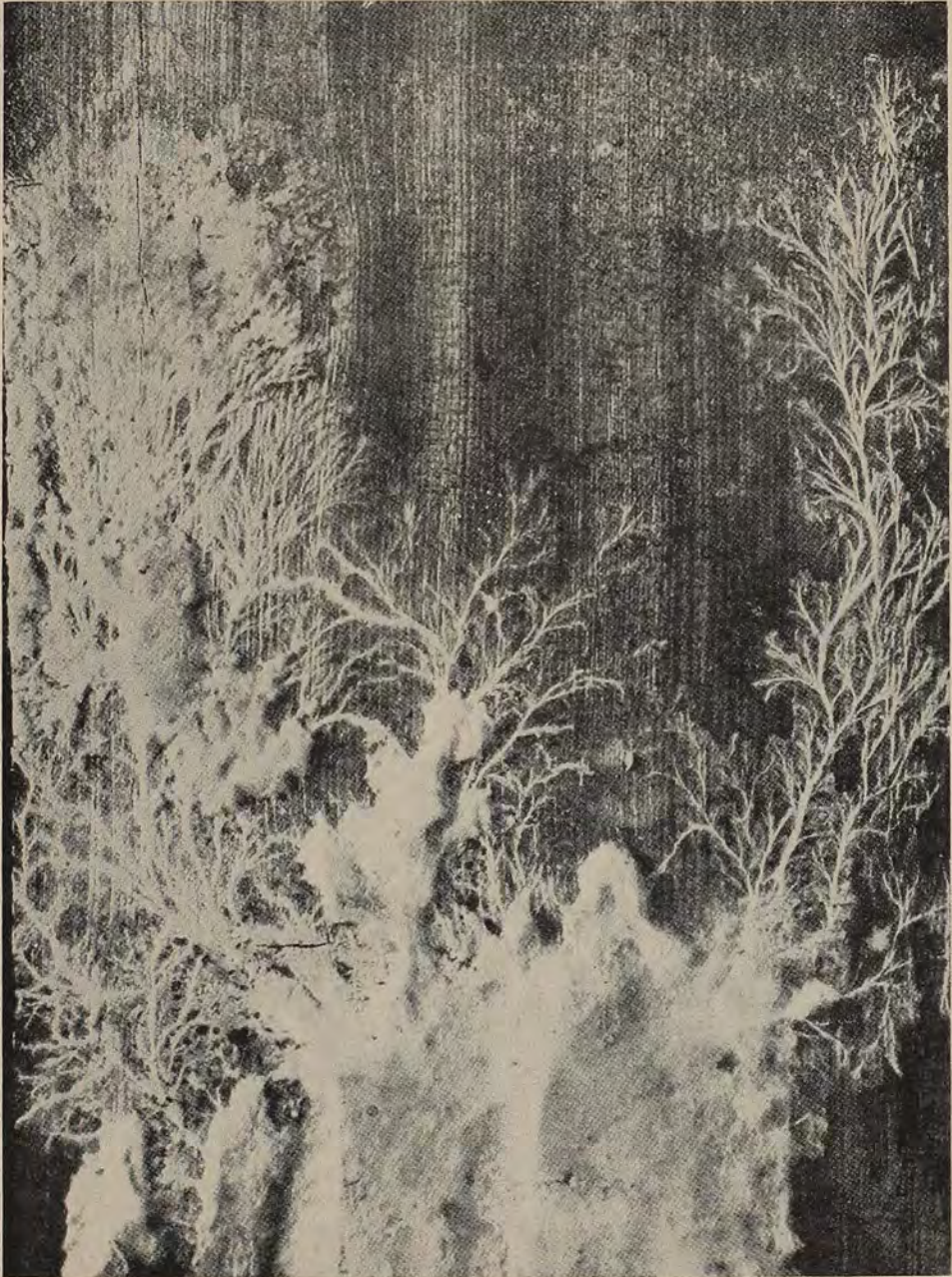
architects and home owners are accepting this challenge and are demanding a preservative that will help stabilize the lumber while it protects against rot and insect attack.

Dry Rot

A term generally applied to those fungi which destroy wood in buildings and is misleading, for although it describes the appearance of the timber after attack, moisture is absolutely essential to the growth of all fungi. This indicates the importance of water repellents in any preservative treatment. Most fungi find a moisture content of between 20-30% most favorable for attack. Nearly all lumber has some moisture present, but under good conditions of light, heat and air circulation the moisture content does not reach the desired amount for fungus growth. There are many places around a building where those unfavorable conditions for the growth of fungi cannot be maintained. These are the areas where some treatment is necessary, to act as a watch dog against the invasion of fungus attack.

How Dry Rot Destroys Timber

Dry rot is a common name for the condition in which certain fungi leave wood after they have eaten away the cellulose or sugars, rendering the wood brittle, powdery, and with strength gone. Fungus usually appears in lace-like strands or sheets on the surface or in the cracks in the wood. These web-like strands are fine hollow tubes reaching out to find food, they have the ability to absorb the starches, sugars, and other organic material in the wood



All illustrations accompanying this article were prepared from illustration furnished by the author

Poriaei vaillantii. Fungus in form of sheets and strands on timber.

cells. As they feed and grow they produce "fruit-bodies"—much like mush-

rooms or flat pancakes—which produce millions of minute spores. These micro-

scopic seeds may lie dormant for years, awaiting the right conditions of heat and moisture in which to "germinate" and send out a new set of feeders, another "fruit body," and another area destroyed. Because dry rot requires a moisture content of between 20 and 30% (moisture in most woods, normally, is below 20%), a good preservative should contain a good water repellent together with the preservative.

*What To Look For
In A Wood Preservative*

1. It should be non-toxic to higher forms of life, plants and animals.

2. It should be easy to apply, safe to handle, and readily available.

3. It should inhibit or materially reduce any micro-biological attack and render the wood unpalatable to boring insects.

4. It should not adversely affect the usefulness of the products treated.

5. It should be economical to use. (Initial cost not a true yardstick of economy.)

6. It should be non-soluble in water or soil, and remain in the wood after the vehicle has dried out.

7. It should give good coverage, good penetration, and long service.

8. It should be paintable—that is, furnish a good bond for paint.

9. It should have a water repellent effective enough to inhibit the transmission of moisture into and out of timber; the water repellent should be in complete solution with the other ingredients and be carried into the wood (not just a surface treatment); it should not prevent the paint from bonding to the wood.

10. The preservative should not bloom—leave crystals or other material on the surface of the wood to

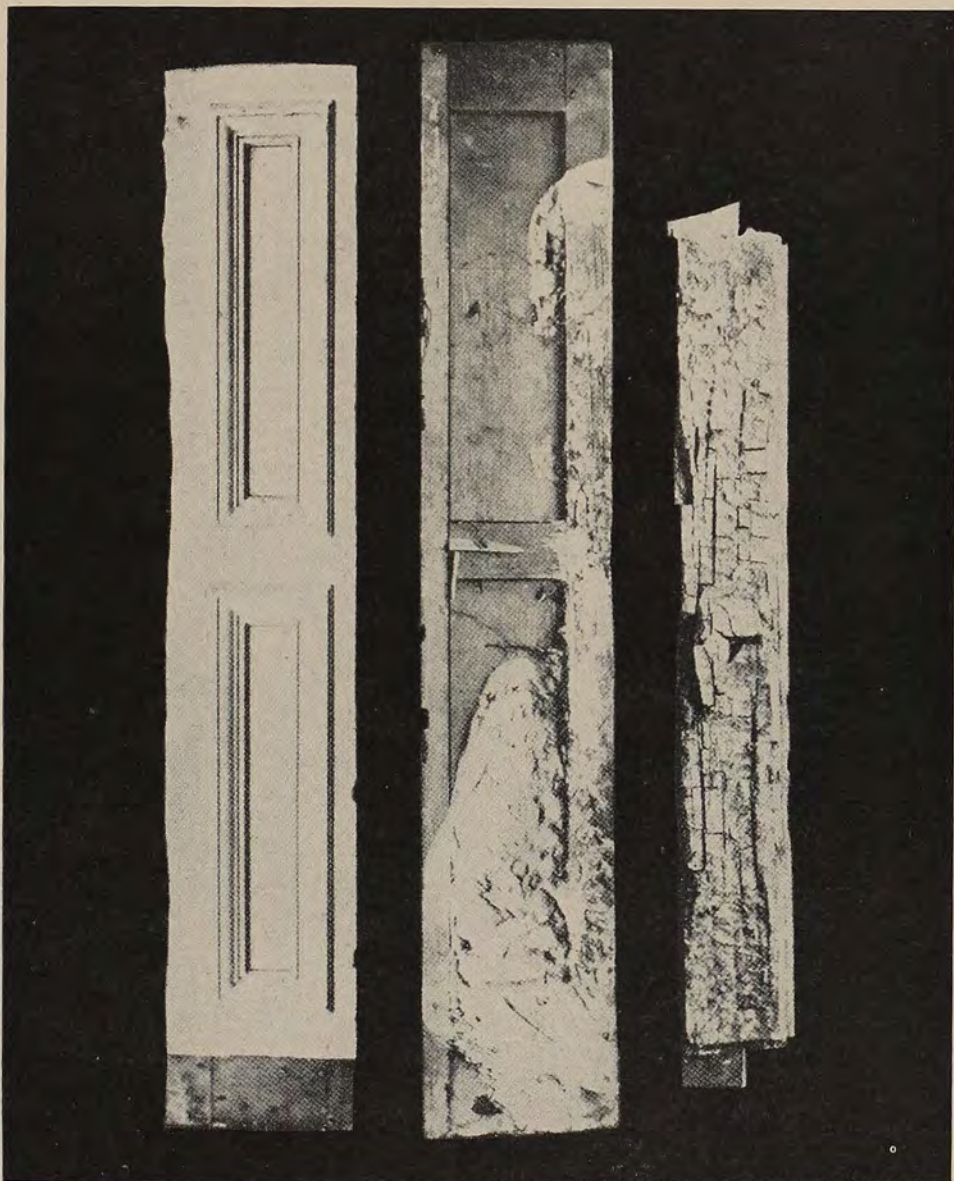
interfere with a good paint job.

11. The preservative should have containers plainly marked with contents of preserving ingredients, so that purchaser may know what he is paying for.

12. It should not cause corrosion of metals in contact with treated wood and should not require special protective equipment while being used, and no special skill should be required to produce a good job.

In building wood frame walls, Cuprinol should be used to protect the frame from decay. Local fire laws often prevent the kind of ventilation that would carry out the condensed moisture so it is important to use a good water repellent preservative to protect those areas that cannot be reached again. Wherever condensation collects in the wall, all that is needed to cause the spores of rot to become active is the right temperature. The naphthenates have another value in that they blend well with water repellents, have a greater penetrating value than most ingredients used in the preservative field. Using one of the mineral spirits as a vehicle, they do not distort the wood as they carry the preservative and water-repellent into the wood cells, thus reducing the movement of moisture in the wood.

The control of moisture in wood is of utmost importance. Moisture getting into the wood cells expands them, causing the lumber to swell. If no control is used and the wood dries out fast, the outer surface shrinks more than the inner cells, and cracks develop, grain raises, one surface dries ahead of the other, and warping results. When cracks develop they provide just the place for those fungi to start feeding, as they hold needed moisture longer, giving more time for rot to develop.



Merulius lacrymans. Left, front of panel showing no signs of damage. Center, back of same panel, attacked by dry rot, and showing fungus skins. Right, wood attacked by dry rot, showing cross shakes.

Warping, cracking, and swelling give the builder and the architect many headaches as well as much added cost. Stabilizing lumber by using a good water repellent preservative permits

the contractor or home owner to protect the property against rot and insect attack by priming as the job progresses. It also removes the need for a paint primer, as the preservative

gives all the protection a primer does plus the added value of being able to paint over the primer sooner because the water repellent, having kept the water out of the lumber, makes the surface dry sooner. It also allows building during cold weather and, using the preservative with water repellent during construction as a primer, there is no need to paint until the weather becomes favorable. Unfinished furniture, if treated at the factory, would arrive with smoother grain, fewer handling stains and in better condition, because any wood will pick up some moisture while in transit.

Contractors find that plywood forms that have been treated with a water-repellent preservative leave a smoother wall, strip off with less concrete sticking to the lumber, require fewer replacements, as the plywood gives longer service. Staging planks that are treated do not get used up for ordinary work, as the copper naphthenate leaves a green color that identifies them as staging planks and protects the lives of those who use them by keeping out rot. The water repellent feature doesn't allow moisture to get in to cause added weight.

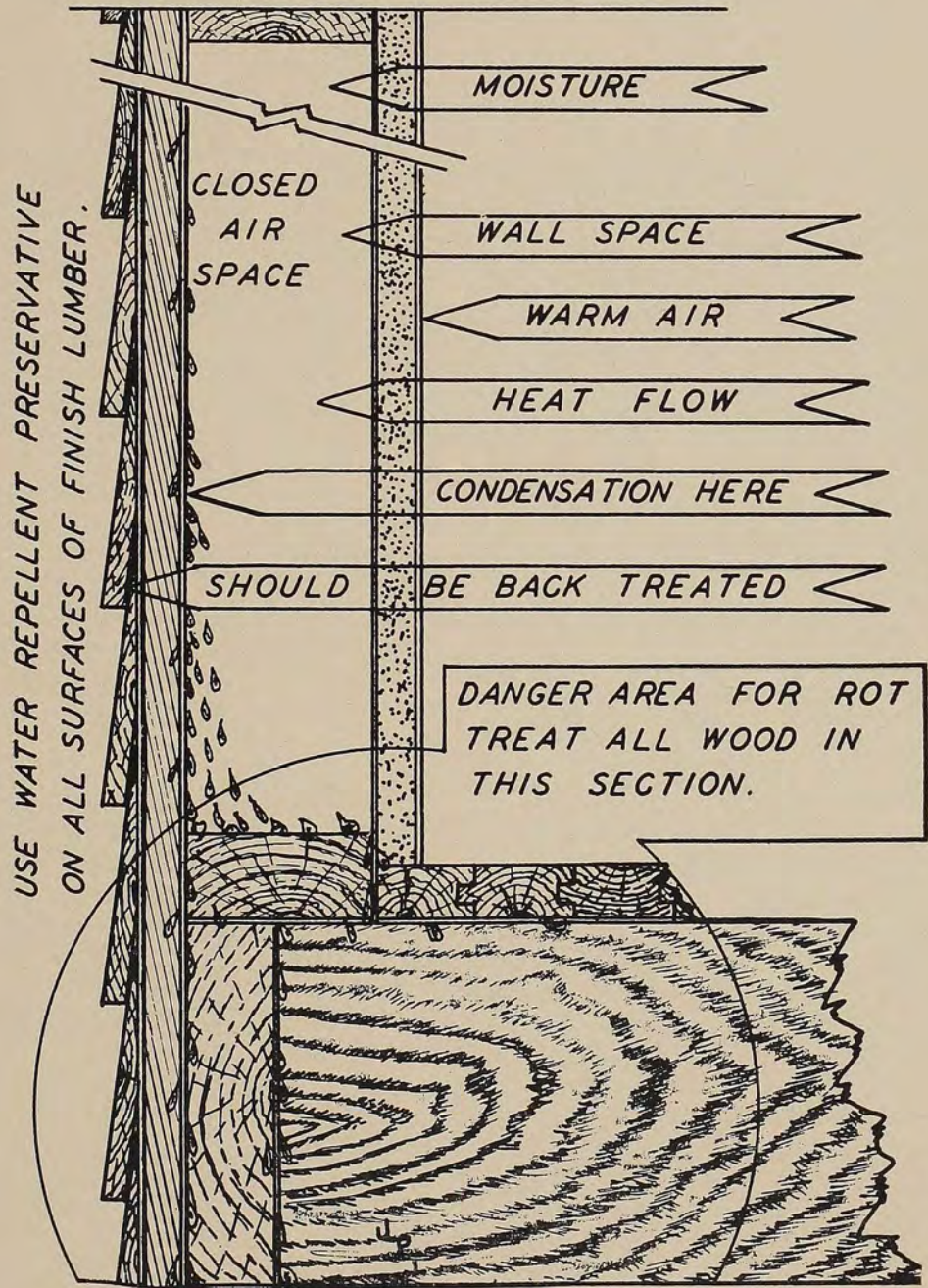
The carpenter finds that refitting and replacements are reduced by using the proper preservative. When he fits a door that came to him with a water repellent on it, he cuts off the ends, planes in the edges to fit the opening. This removes the treatment and opens up the wood so that moisture gets in, causing the door to swell or warp. It is many times more expensive for him to go back to refit the door than it is to protect it with a good water-repellent preservative.

An architect is constantly searching for materials that will give the home owner more comfort, better service, and

greater pride of possession. He is equally interested in assuring the contractor that the materials he recommends will give the service that area requires. It is important to him that the articles he recommends can be depended upon to do the job required and at a cost the home owner or contractor can afford. He likes to know when he specifies a preservative for back painting that the cost will not be too high, and that the preservative will not damage the finish by staining or blooming, that it will prevent the growth of fungi as well as prevent warping. He likes to know that plywood paneling or ranch type finishes can be stabilized and that moisture can be kept from blistering the finished paint. He likes to know these things, for he is responsible for them to the owner and the builder.

The well-made preservative, then, should have an effective water repellent, a really good preservative blended in an oil solution with penetrating agents to give deep penetration, one that does not stain lumber that is to be left natural or varnished, one that does not stain the clothing if contacted after reasonable time for drying, one that is non-irritating to the skin after application, and finally, one that gives lasting protecting.

Cuprinol copper naphthenate and Cuprinol zinc naphthenate meet these requirements. Cuprinol, one of the oldest copper naphthenate formulas for the protection of timber, was developed in Denmark 40 years ago to protect boat hulls, fish nets and ropes. It has been successfully used for many years in boat construction to prevent dry rot and teredo (ship worm) as well as an antifouling application. In more recent years it has been accepted in the building trades as a protective treatment



Drawing illustrates how condensation within wall space takes place and causes rot, swelling, and paint to peel.

against rot and termites, as well as an effective water repellent.

These preservatives are made in a complete solution of copper or zinc naphthenates, water repellent and other ingredients thinned with mineral spirits to the correct percentages to produce best results. When applied with brush, spray, or dip, Cuprinol puts this protective solution into the wood (not just a surface treatment). After the mineral spirits have dried out, you have a complete preservative and water repellent that stabilizes the lumber by controlling moisture movement as well as giving top protection against fungi and boring insects.

Other areas that are vulnerable are: window boxes, hot beds and sash, cold frames, greenhouses, flats and benches. High temperatures and humidity such as are needed for growing plants in a greenhouse are ideal for the growth of rot producing fungi. Some of these fungi are destroyed when the bench is sterilized, but there are areas around posts or at the sides of the bench where the amount of steam needed to pasteurize the soil properly does not reach into the wood to kill any nematodes or fungi from the previous crop. These areas need a coat of Cuprinol that will prevent the fungi from feeding and will kill the nematodes on contact.

There are many areas around the home, farm or business where the proper use of the right preservative saves many times the cost of the material in labor alone. For example, nurserymen use a covering for the roots of plants or shrubs that are to be transplanted. These coverings hold the earth around the roots and are commonly called "plant bags." Dutch burlap is especially made for this type of work. The openings between strands

are large enough for the roots to pass through when the shrub sends the feeder roots out after food. These plant bags rot in three or four weeks and if the plants are stored or remain on the roadside stand that long, it requires a new bag before they can be moved or shipped. These bags cost ten to fifteen cents each and it will cost fifteen cents in labor to make the change, if the bags are not treated with a preservative.

Tests have proven that one gallon of Cuprinol No. 14 for Florists mixed with two gallons mineral spirits will make a solution that will give three to five months storage at about two cents per square yard of Dutch burlap. By mixing one gallon Cuprinol No 14 with one gallon mineral spirits, plants can be stored up to eight months at about four cents per yard. Simply prepare the solution, allow the bags to soak for three minutes, pass them through a wringer to salvage the surplus, and they are ready to use.

One grower who buys Dutch burlap ready-cut in bundles, simply soaks the whole bundle in a solution of one part Cuprinol to one part mineral spirits long enough to wet all the burlap, hangs the bundle over the tub to drip and lets it hang for a week, or until all the bags are dry. He says it is a simple method and gives good results.

Fences are another area where preservatives save money. If fence posts are set up at ten foot intervals, it takes 528 posts to make one mile of fence. The average fence post (except cedar, locust and one or two others) will be non-serviceable after four years if set in the line untreated. To get a post ready for the fence will cost about 60c plus digging the hole and setting the post in line. At four years service life, the cost is 27c per year.

Rooting Chestnuts From Softwood Cuttings

ROGER W. PEASE¹

Introduction

In 1949, at the West Virginia Agricultural Experiment Station, investigations were undertaken in rooting chestnuts from softwood cuttings. Exploratory observations were made of the behavior of such cuttings placed in a bottom-heated cold frame. Both American (*Castanea dentata*) and Chinese (*Castanea mollissima*) cuttings were inserted at intervals of one week, from July to the middle of August. The basal portions of some of the cuttings were dipped in indolebutyric acid crystals in talc at a concentration of one to two hundred, and the basal portions of others were immersed for twenty-four hours in an aqueous solution of indolebutyric acid crystals, sixty parts per million. The rooting medium was one-third peat moss and two-thirds sand. Humidity was kept high by daily watering, and approximately three-quarters of direct sunlight were excluded. One cutting showed mild callous formation; the rest rotted under the soil surface within a few weeks.

References dealing with the successful rooting of softwood cuttings from American or Chinese chestnuts were apparently non-existent at that time, although in 1950 Bretz and Swingle reported "promising results" with leaf bud cuttings of hybrid *Castanea*.¹ Therefore literature dealing with other difficult-to-root species was appraised.² An inspection trip was made to an in-

sulated opaque structure for rooting various species at the U. S. Plant Introduction Garden, Glenn Dale, Maryland.³ Pertinent practices were noted. A rooting and germinating box, constructed as outlined in preliminary reports from Glenn Dale⁴ and tested by Dr. W. H. Childs of the Department of Horticulture, West Virginia Agricultural Experiment Station, was examined, and its advantages and disadvantages discussed. In appraising the data collected, greatest weight was given to practices followed in the insulated opaque structure at Glenn Dale. Table I lists practices selected. Where a specific reference was used, a bibliographical number is placed in column four. Practices left to be determined by experiment are indicated by X's in column three.

Material and Methods

In 1950 an insulated rooting chamber with independent soil and air temperature controls was constructed. (See illustration). Forced interior air circulation, low pressure fog nozzles, and white fluorescent lights were installed. Further details are listed in the second column of Table I. Table II indicates the methods used when the rooting chamber was put into operation in 1951.

Results and Conclusions

As indicated in Table II, in four out of five cases some of the solution-treated Chinese chestnut cuttings rooted during a seventy day period. Neither the untreated cuttings nor the

¹Assistant Horticulturist, West Virginia College of Agriculture, West Virginia University, Morgantown, West Virginia.

TABLE I
Practices Selected

Conditioning Factors	Initial Practices Selected	Practices to be Determined	Specific Sources of Reference
Type of cutting	Softwood cutting		
Time of taking cuttings		X	
Age of parent tree	Juvenile where feasible		8
Type and carrier of auxin	Aqueous solution of indolebutyric acid crystals		5
Maximum absorption of auxin by cuttings		X	6
Rooting medium, aeration, drainage	White, washed, building sand over ½ in. sphagnum, bench with hardware cloth bottom, bench supported by legs		{ 3 Glenn Dale
Soil water	Fog nozzles—continuous operation ^a		7
Humidity	Fog nozzles—continuous operation ^a		7
Kind and intensity of light	White fluorescent —200-250 ft. candles		4
Soil temperature and fluctuation	70°F. Minimum fluctuation		3
Air temperature and fluctuation	65°F. Minimum fluctuation		3
Ventilation		X	
Air circulation		X	
Concentration of auxin		X	

X's in column three indicate practices left to be determined.

^a Fog nozzles were closed periodically, and the chamber aired for approximately one half hour.

cuttings treated with indolebutyric acid in talc formed roots. However, some of the talc-treated cuttings calloused.

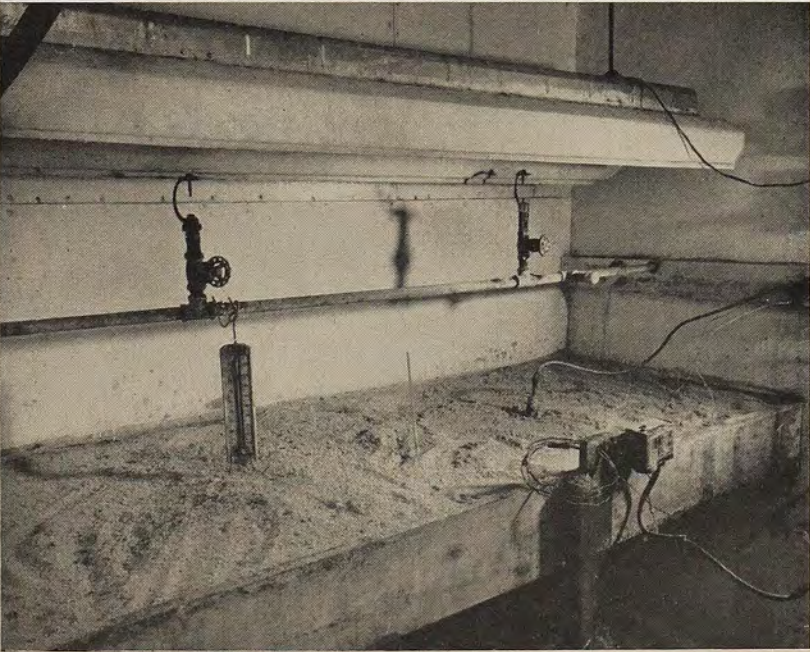
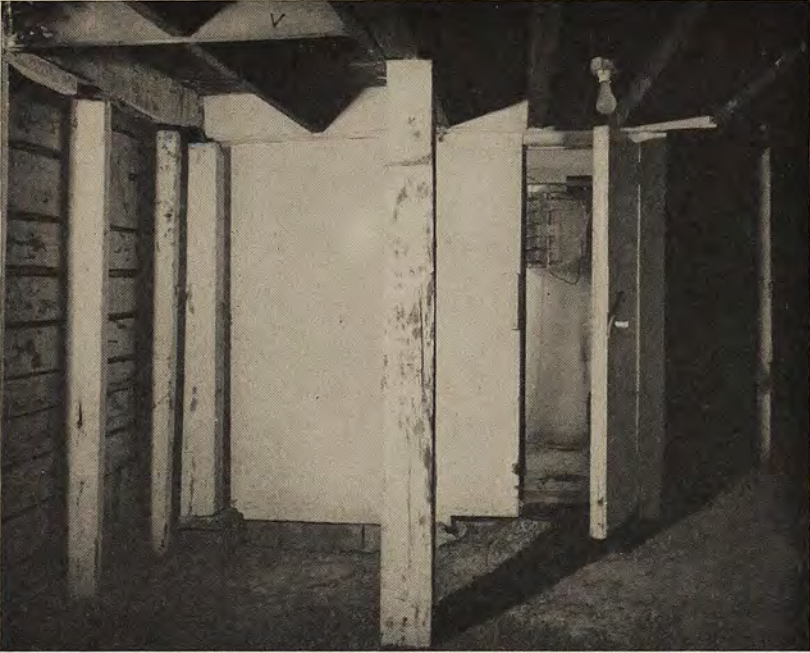
Because only one-third of the rooting box was available for chestnut cuttings, the number set in each case was small. Therefore, percentages of success are relatively unimportant. However, it was considered to be noteworthy that well-hardened cuttings taken June 9, July 24, and August 19 rooted seventy-five per cent, one hundred per cent, and sixty-six and two-thirds per cent respectively. The early-rooting shoot and shield cuttings did not form roots from the shields but from high on the cutting stems. Hence it was concluded that no further trials would be made with shoot and shield cuttings.

Materials and Methods 1952

Because of the high cost of con-

structing and operating a rooting chamber large enough for volume production, it was decided to test a bottom-headed cold frame in which some of the conditions maintained in the rooting chamber might be simulated. It was also decided to observe the response of softwood cuttings from juvenile American chestnut trees.

The fill of an outdoor cold frame was removed to a depth of eighteen inches, and free bottom drainage was provided. Twelve inches of coarse, white, washed building sand was placed in the excavation; then soil cable was laid. A thermoswitch which could control temperatures down to 32°F. was installed, and six inches of white, washed, building sand was placed over the soil cable. Low pressure fog nozzles were mounted. To



Illustrations accompanying this article were prepared from photographs made by the author

*Top: Outside view of rooting chamber showing interior suspension of cooling unit.
Bottom: Inside view showing rooting box and fixtures.*

TABLE II
Chinese chestnuts in insulated chamber

Date Set	Type and Condition of Cuttings	Number of Cuttings	Indolebutyric Acid Treatment		Rooted in 70 Days
			Carrier	Concentration	
6/9	Softwood sprouts plus shields from trunk, well hardened	4	Water. Soaked 24 hrs.	^a 60 ppm	3
6/9	Softwood tips, soft	6	None	None	None
6/9	Softwood tips, soft	6	Water. Soaked 24 hrs.	^a 60 ppm	None
6/21	Softwood tips, soft	6	Water. Soaked 24 hrs.	^a 60 ppm	None
6/21	Softwood tips, soft	6	None	None	None
7/14	Softwood tips, fairly hard	7	Water. Soaked 24 hrs.	^a 40 ppm	4
7/14	Softwood tips, fairly hard	7	None	None	None
7/24	Softwood tips, well hardened	7	Talc	1-200	None
7/24	Softwood tips, well hardened	6	Water. Soaked 24 hrs.	^a 40 ppm	6
7/24	Softwood tips, well hardened	6	None	None	None
8/19	Softwood tips, well hardened	6	Water. Soaked 24 hrs.	^a 70 ppm	4
8/19	Softwood tips, well hardened	6	None	None	None

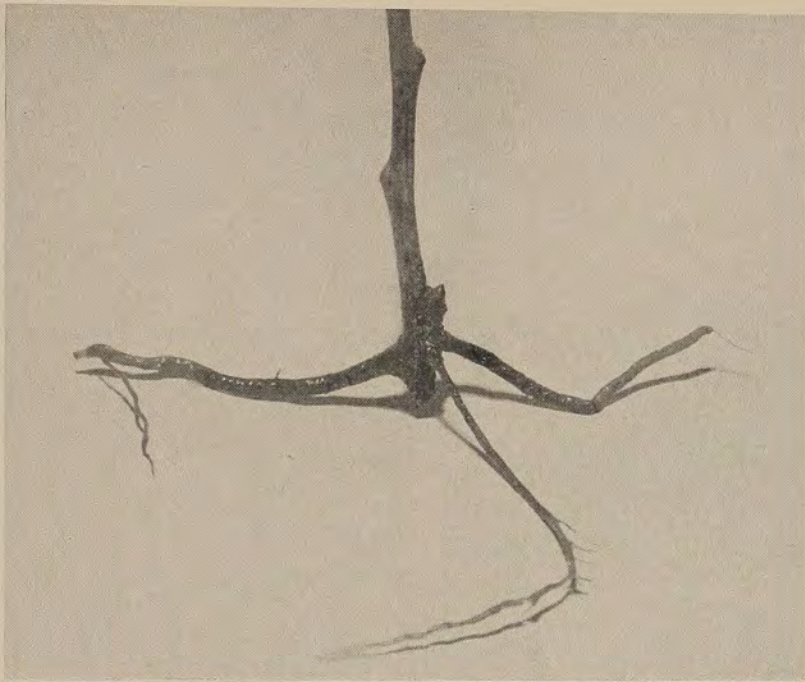
^a When treating the cuttings with an aqueous solution of indolebutyric acid crystals, cuttings were taken at noon on a sunny day.

aid in reducing summer temperatures, white shade strips were spaced to exclude three-quarters of direct sunlight. When air temperatures were taken inside and outside of the cold frame at noon on a hot day late in June, with the fog nozzles operating, the outside temperature was 98°F. and the inside temperature was 81°F.

On August 20, softwood cuttings were set in an available portion of the cold frame. The cuttings were taken from Chinese chestnut trees ten years old and three years old, and from three-year-old seedling American chestnut trees. The solution-treated cuttings were handled as of the previous year. (Footnote, Table II) The fog nozzles were operated eight hours each day.

Results and Conclusions

Tables III and IV show results and pertinent data. The treated Chinese chestnut cuttings from juvenile and ten-year-old trees rooted fifty-four and one half per cent, and fifty per cent, respectively. The difference between the two percentages was considered to be insignificant, and no conclusions were drawn concerning the comparative desirability of selecting cuttings from mature or juvenile trees. The twenty per cent success with juvenile American chestnuts was considered to indicate only that American chestnuts can be rooted from softwood cuttings. Although rooting percentages of Chinese chestnuts were lower in the



Top: Typical root system and damage.

Bottom: Over-wintered rooted cuttings with swollen buds.

cold frame than they had been the previous year in the rooting chamber, it seems possible that further investiga-

tion may result in the development of a practicable method for rooting the Asiatic species.

TABLE III
Chinese chestnuts in bottom-heated cold frame

Date Set	Type and Condition of Cuttings	Number of Cuttings	Indolebutyric Acid Treatment		Rooted in 70 days
			Carrier	Concentration	
8/20	Juvenile trees. Well-hardened softwood tips	11	Water. Soaked 24 hrs.	70 ppm	6
8/20	10 year old tree. Well-hardened softwood tips	10	Water. Soaked 24 hrs.	70 ppm	5
8/20	Juvenile trees. Well-hardened softwood tips	20	None	None	None

TABLE IV
American chestnuts in bottom-heated cold frame

Date Set	Type and Condition of Cuttings	Number of Cuttings	Indolebutyric Acid Treatment		Rooted in 70 days
			Carrier	Concentration	
8/20	Juvenile trees. Fairly hard softwood tips	10	Water. Soaked 24 hrs.	70 ppm	2
8/20	Juvenile trees. Fairly hard softwood tips	10	None	None	None

Cultural Practices

Results from investigations of methods for over-wintering were so inconclusive that further data should be obtained before definite recommendations are given. However, illustration shows two rooted cuttings after over-wintering, one *C. dentata* and one *C. mollissima*, both of which showed swelling, green buds when potted at the time of writing, April 15. Illustration shows a typical root system, and root damage which may have been caused by frequent transplanting.

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The Sweetgum Blight¹

PAUL R. MILLER AND G. FLIPPO GRAVATT²

Blight, a new disease of sweetgum, *Liquidambar styraciflua*, was first reported in 1951.³ The senior author first observed symptoms in the sweetgum trees on his property in University Park, Prince Georges County, Maryland, in 1948. In surveying for the disease in University Park and immediate vicinity in 1949, he found that 20 percent of the 3,000 trees observed showed various stages of decline. The number of trees in different stages of the disease indicated that it had been present for some years. However, numerous residents of the University Park stated that they had not observed the disease in former years and there was no evidence that trees had been removed. Local pathologists, foresters, and arborists were consulted but no one had seen this condition in sweetgum trees. In 1949, the senior author also spent several days making an automobile survey in an area of 30 miles radius from University Park but he noted no diseased trees.

Various pathologists have made cultures but have not obtained any organisms that they considered to be the cause of this disease. Further isolation work and inoculations by the Division of Forest Pathology are under way. In local areas, unusual climatic conditions sometimes adversely affect trees, but the progressive symptoms on

diseased trees and the increase in the number of trees affected in University Park suggest that the disease may be infectious. The Division of Forest Pathology now has the responsibility for the United States Department of Agriculture for survey and research on this disease.

Symptoms

The first visible indication of blight occurs in late summer; the leaves on affected limbs or small branches show fall coloration much earlier than on healthy branches. Normal, healthy sweetgum trees frequently show some differences in the time of appearance of fall coloration within a tree, but not so strikingly as trees affected by the disease. The following spring, diseased limbs may be dead. On diseased limbs that are not dead, leaves that are very small or slightly reduced in size may develop. The small-leaved branches sometimes gradually wilt and then dry up, on others the leaves prematurely become colored red or yellow. Sometimes many of the buds toward the terminal end of such branches remain green and normal in appearance for a while but do not open. Usually the end of the branch or leader, which started growth with small green leaves or failed to produce leaves, gradually dies during the summer and frequently there are brown to black areas in the twig bark.

Affected branches may show up in any part of the periphery of the crown or leader, and rather frequently the whole periphery of limbs will be af-

¹Reprinted by permission of the Publishers of *Plant Disease Reporter*, from *Plant Dis. Repr.* 36:247-252. 1952.

²Division of Mycology and Disease Survey, and Division of Forest Pathology, respectively, Bureau of Plant Industry, Soils and Agricultural Engineering, U. S. Department of Agriculture.

³Miller, Paul R., and Muriel J. O'Brien. An apparently new sweetgum disease in Maryland. *Plant Dis. Repr.* 35:295-297. 1951.



Top: Left, longitudinal and oblique sections of sweetgum branch affected by blight, showing irregular discoloration, somewhat more abundantly developed in this than usual. Right, and twig in right of left lower illustration, affected by blight, showing small sparse foliage, curling and browning of the leaves. Bottom: Left, first twig of a healthy sweetgum; second of a diseased tree. Right, blight is slowly killing this large specimen.

fect. On such trees only a few shoots along the main stem will be alive the following season and the entire tree will be dead before fall. Some trees die more rapidly than others, but in general there is a remarkable regularity to the decline and death after the trees show the first symptoms.

Some trees show a general thinness of foliage throughout the tree rather than on only one or two affected limbs. A normal sweetgum has a rather dense foliage, and trees with thin foliage are conspicuous in contrast. On some limbs of these thin, sparse-foliaged trees there are dead tips and gradually dying small leaves. Frequently the leader of the tree is affected first and later symptoms of dying extend on down the tree. This occurs more frequently in sweetgums growing in dense forest stands than on spreading trees growing in the open.

A cut across affected branches and tops reveals amber-brown to deep-brown streaks in the otherwise white satiny sapwood. There is no regular pattern of discoloration, sometimes there are just a few streaks and in other cases numerous narrow streaks or broad bands. This discoloration does not normally appear in cross sections of the limbless lower part of the trunks of diseased trees. In diseased sweetgums, some areas in the sapwood appear dryer than others. The heartwood exhibits the normal reddish-brown coloration.

Sweetgum is a very important forest tree in the southeastern quarter of the United States, from Virginia and Tennessee southward and westward to east Texas and east Oklahoma, inclusive. It makes up nearly 8 per cent of the total sawtimber (conifer and hardwood) of this region, or 18 per

cent of the hardwood sawtimber. In 1945, sweetgum sawtimber in this quarter of the country was estimated at nearly 26 billion board feet. As an ornamental and shade tree, sweetgum is outstanding in value in most of the eastern half of the country. Although its natural range is as stated above it is planted as an ornamental far north of its natural range and also in southern California.

Disease Distribution

Except for intensive observations and records indicating spread in University Park for the past three years very little survey work has been conducted for this disease. Numerous blighted sweetgums were found this spring in the vicinity of Aberdeen and Solomons Island, Maryland, and in Caroline and King Counties, Virginia, each nearly 60 miles from University Park, Maryland. F. H. Berry, of the Division of Forest Pathology, recently noted similar symptoms on sweetgum a few miles north of Richmond, Virginia, nearly 100 miles south of University Park. In nearly all of the small stands of sweetgums observed within the affected area, at least a few trees show the first stages of the blight and in some of the stands 5 to 25 per cent of the trees show symptoms, usually in an early stage.

Sometimes the diseased trees occur in groups, but they may be randomly distributed among healthy trees. The distribution of affected trees does not appear to be related to soil types. Diseased trees have been observed in open fields where they are growing in fertile, well-drained soil with no grading or other disturbance. The disease has not been observed in trees smaller than about 1 inch in diameter and 6 feet in height.

Similar Symptoms, Due To Other Causes

Garren⁴ recently reported what appeared to be a new disease of sweetgum in Alabama. His description, however, indicates that the disease differs materially from sweetgum blight in Maryland. He said, "This disease is definitely localized in the tree and does not develop throughout the perimeter of the crown as do most diebacks. It appears to be more prevalent and more destructive on younger trees, where it usually begins in the terminal portion of the leaders. Thus, 'leader dieback' is an appropriate descriptive name." He described internal symptoms associated with "leader dieback" as follows: "Inner bark and outer sapwood show streaks of blue-black to black discoloration extending downward beyond evident necrosis. Inner sapwood is normal, or with irregular, broken rings of light-tan discoloration."

Occasionally young sweetgums affected by blight in Maryland, especially in young, crowded, second-growth stands, show the first indication of the disease in the terminal portion of the leaders, just as in the leader dieback of sweetgum in Alabama and Mississippi. However, the sweetgum blight

kills all parts of the tree rapidly, whereas the leader dieback normally is confined to the leader.

Sweetgums injured by construction work, changes of water level, gas leakage, girdling of the bark, or fire often manifest some of the same symptoms as sweetgum blight, but close examination usually will show differences. Fire, for instance, practically always chars the outer bark. In determining the presence of blight, it is advisable to avoid confusion by disregarding all trees affected by such factors.

An Appeal For Information

The sweetgum blight is very serious in University Park and vicinity. Research on the cause, means of spread, and other factors concerning the disease is under way.

Information is needed now on the dying of sweetgum in other parts of its range, either now or in the past. We solicit the cooperation of the various state and private agencies interested in sweetgums. An appeal is made to tree workers and observers to send in information on dying of sweetgums to their state plant pathologist at the Agricultural Experiment Stations and to the Division of Forest Pathology, Plant Industry Station, Beltsville, Maryland.

⁴Garren, Kenneth H. Leader dieback—a "new" disease of sweetgum. *Plant Dis. Repr.* 33(5): 251-253. 1949.

Concerning Columneas

PEGGIE SCHULZ, *Editor*

The greenhouse gardener on the look out for something novel and exciting to use as basket plants would do well to explore the possibilities of adding a few Columneas to his collection. And some species can also be used to advantage in the window garden.

Columneas are trailing, climbing, or in a few cases, shrubby, members of the GESNERIACEAE. In their natural habitat, Tropical America, they often grow as epiphytes and cling to rotten stumps, wedge in tree crotches, or dangle precariously from debris-filled rock crevices.

J. B. Reark, plant explorer from Miami, Florida, reported on this genus for *The Gloxinian*:

"Among the most beautiful epiphytes found in Central America are those of the genus *Columnnea*. Occasionally one will come upon a tree which is filled with cascading sprays of *Columnnea*, the brilliant blossoms creating a riot of color in an otherwise somber forest. I have seen great plants of them growing to seven or eight feet across and bearing several score of blooming stems. This is the clue to culture, for the *Osmunda* lined hanging basket seems to suit them best, although they will thrive in regular pots which are well-drained."

I became interested in these plants when I read an article about them in the *Flower Grower* a number of years ago. The plant was described in such an intriguing fashion that I knew it was a "must" for me. Its owner said the *Columnnea* was grown in a basket



Harry Blossfeld Photograph

Nemantanthus longipes

hanging in front of a light window and that it had proven to be, "far more spectacular than Ivy or *Philodendron*." It took some searching but I finally located someone who would sell me a cutting. Since that time I have usually had one or more Columneas mingled with my other house plants.

Columneas grow well in equal parts of *Osmunda* fiber, coarse leaf mold, and peat moss. They will prosper in *Osmunda* fiber alone if bi-weekly feedings of liquid fertilizer are given. I grew some in Black Magic, a porous mixture designed for African-violets and Gloxinias, and they grew equally

as well as in my home made formula. Good drainage is essential and it is wise to prepare the pot by enlarging the drainage hole as in planting Orchids.

Columnnea gloriosa is the plant I searched for. The small hairy, brown leaves, have reddish undersides and make a perfect foil for the bright red and yellow tubular flowers. When grown in a window garden it has been my experience that this plant does not produce many flowers, perhaps not more than four or five during the season. The flowers last for a long time when grown in a cool spot. I've had them remain over three weeks in a 68 degree room. In a greenhouse the blooming period spreads from late fall into early spring.

The only other variety I have tried growing as a house plant is *C. Schiedeana*. Although it is a most beautiful foliage plant I have never had the pleasure of seeing one of its flowers. Nature intended it to be a climber but after it wanders around in the air for a while it tips slowly toward the earth and then once more begins an upward ascent. This odd habit makes the plant resemble a loosely coiled spring. The silky green leaves are over two inches long and I imagine that in an ideal growing spot they might grow to well over three inches. Undersides of the leaves are lined with heavy, coral veins. The flowers are reported to be "yellow and brown and borne in June." This species is a parent of *C. Banksi*, a hybrid listed by one dealer.

My two species are grown in a northeast corner during the early spring and into fall. Columneas are plants of evergreen habit but artificial heat and lowered humidity makes *C. gloriosa* drop leaves so I winter this

species in a terrarium. It is perfectly happy in this setting and often flowers in late February or early March. Some of the younger plants bloom in November or December.

Columneas can be rooted easily from cuttings. Sand, vermiculite, or any other commonly used media suits them. A terrarium is much to their liking during this phase of their lives. If you have no terrarium slip a drinking glass over the cutting to supply extra humidity. These cuttings strike root quickly when stuck in sphagnum moss and wrapped in the hormone-treated plastic film, "Air-Wrap." Roots form more rapidly from mid-February until August. After that root growth slows perceptibly and the cutting is apt to rot before any roots appear.

As soon as cuttings are well rooted they should be transferred to two-inch pots filled with the proper growing mixture. They make a most effective display in a greenhouse when fastened to rotten blocks of wood. Mature plants of *C. gloriosa* grow to about two feet in length in a greenhouse but seldom over eighteen inches in the window garden.

C. aurantiaca. A June flowering species, bearing orange flowers on long stalks.

× *C. Banksi*. A hybrid featuring small, glossy, green leaves with reddish undersides. Flowers are orange with a russet overcast.

C. crassifolia. A shrubby plant with large scarlet flowers.

C. hirta. The leaves and stems on this species are covered with reddish hairs. Flowers are vermilion red.

C. Oerstediana. This is the other parent of *C. Banksi* and it, too, has small glossy leaves and orange flowers.

C. stenophylla. When I visited Gar-

field Park Conservatory in Chicago last spring, I saw this plant in bloom. This species was discovered in 1942 in the Provinces of Solola, Guatemala, by Dr. Julian Steyermark of the Chicago Natural History Museum. It is the only one in circulation in this country. Norway recently acquired this species on an exchange basis and gave in return six varieties of *Columnneas* to Garfield Conservatory. This species grows upright and bears long, red flowers. The foliage is glossy green. I believe I noted seed pods on this variety but lost my notes so cannot be certain. The seed capsules however, were nearly as beautiful as the flowers. They looked like orchid colored birds' eggs wedged in the leaf axils.

C. vedrairiensis. A plant of this species greets you as you enter one of

the buildings at Garfield Conservatory. It is grown in a hanging basket and some of the branches are over three feet long. Leaves are small and oval and the flowers are orange-red.

Nematanthus longipes. This plant is so similar to *Columnnea* that it is usually called *Columnnea*, *C. splendens*. The tubular red flowers are borne from the leaf axils on drooping branches.

Although the genus *Columnnea* comprises about one hundred species it is difficult to find any listed in catalogues. One Florida specialist lists two species and one hybrid. However, like other semi-rare plants, once the gardening public accepts and learns to grow them, they will appear on the market in greater quantities.

(A contribution from the American *Gloxinia Society*)

Begonias For The Pacific Coast

STANLEY SPALDING, *Editor*

The *Begonia* hybridists in the west have been very enthusiastic over some of the *Begonia* species introduced in recent years, namely *Begonia boweri*, *B. mazae* and *B. epipsila*.

Several hybridizers have used *B. boweri*, a small, rhizomatous *Begonia* discovered in Mexico by Thomas MacDougall, and have produced some amazingly, beautiful *Begonias*.

B. boweri is a miniature, creeping *Begonia* with leaves having 'eyelashes' on its irregularly, brown-marked margins. The 'eyelash' characteristic seems to carry through to resulting hybrids and is very desirable. By crossing it with stronger, more drought resistant

Begonias, the results have produced beautiful plants tolerant to window garden culture.

Della MacLanahan of Los Angeles produced *Begonia* Bow-Nigra by crossing *B. boweri* with *B. nigricans*. It has medium-sized leaves with dark, black-green surface while the underside is a dark red. A distinctive, light green stripe runs from the center of the leaf to the tip; it rests, but never goes dormant and is a very heavy bloomer.

Another interesting hybrid Mrs. MacLanahan produced is *Begonia* Bow-Chance, a chance seedling of *B. boweri*. It is a totem pole *Begonia* with a rhizome that creeps and clings as it



Ivan Morrow Photograph

Begonia Bow-Nigra

grows. It has pale green leaves, brown margins and is extremely floriferous. The leaf stems grow downward, producing an overlapping effect with its leaves.

Begonia Bow-Arriola is a result of crossing *Begonia C-42* with *B. boweri*, thus producing an exceptional, mottled-leaved *Begonia*. When this *Begonia* is grown on shelves in a window, the



Ivan Morrow Photograph

Begonia Bow-Arriola

leaves grow vertical, turning towards the light. This enables one to view them in a perfect position to enjoy the color pattern of the leaves. Every window gardener will want this *Begonia*,

named in honor of Gus Arriola, the creator of *Gordo*.

Another MacDougall discovery, from Mexico, is *B. mazae*. This *Begonia* has given new impetus to *Begonia*

hybridizing. The deep chatoyancy (satin-sheen) on the surface of the leaves is a characteristic that invariably predominates in its hybrids.

Louise Schwerdtfeger of Santa Barbara has created some exceptional Begonias, owing allegiance to *B. mazae* as a parent. *B. Helen Krauss* is one example, with *B. dayi* as the other parent. This *Begonia* appears to be more tolerant than either of its parents and is a medium sized plant having smooth leaves with dark chocolate areas surrounding the veins.

B. Zaida is a hybrid of *B. mazae* and *B. epipsila*, the latter, a recent reintroduction from Brazil, by Mulford Foster. *B. epipsila* has heavy, textured leaves, green surface with bright red

undersides. This cross produced a *Begonia* with leaves having a bronzy surface, due to *mazae's* chatoyancy.

B. John R. is a beautiful star *Begonia* in a larger size class. It is a hybrid of *B. dayi* and *B. macdougalli* and has proven to be a tolerant plant, accepting the average care given most shade plants. It has smooth, light-green leaves with pronounced veins and has proven equally happy indoors and out, during mild weather.

Begonia hybridists of the West will continue to work to produce worthwhile hybrids, of the plants they enjoy most, in this Royal hobby.

DOROTHY S. BEHRENS

(A contribution from *The American Begonia Society*.)

Daffodil Section

ROBERTA C. WATROUS, *Editor*

Daffodils In The Landscape

How can we use Daffodils—the big glorious beauties, the charming dwarfs—in our landscape plan?

Let me recall the general principles of design: balance, proportion, scale, dominance, and contrast; each to be used in proper relation to the whole picture. Consider also interesting material and its relative suitability, as well as combinations of colors obtained by related tones, values, and masses. First, plan the location of your Daffodils; second, plan for strong groups of given varieties for each selected spot.

The large trumpets and large-cupped types need a background of sturdy texture and dignified form, usually

found in broad-leaved evergreens. Kingscourt, Gold-digger, Virginia Wright, Aranjuez and Scarlet Leader are stunning in front of *Berberis julianae* with its fragrant yellow blossoms. Use big white trumpets—Beersheba and Mt. Hood—or the bi-color Music Hall, or John Evelyn, Tinker, or Tunis in front of the metallic-foliaged *Mahonia aquifolium*. *Pieris japonica* with its waxy-white bloom heightens the glistening whiteness of Cantatrice and Ada Finch, increasingly effective with *Muscari* Heavenly Blue in front of them. Try Bread and Cheese, bordered by clear yellow *Primula*, in front of *Berberis verruculosa*. If planted in large groups Fortune, Rustom Pasha, and

Copper Bowl look happy at the base of *Rhododendron*. Against the small Holly foliage of *Osmanthus aquifolium* plant white Daffodils—Roxane, Rostov, Green Emerald, and Zero, or Duke of Windsor. The undertone of dark red in the foliage of *Leucothoe catesbaei* blends harmoniously with the pink Daffodils—Mrs. R. O. Backhouse, Tintoretto, Cameo, and Rosabella, or some of the doubles—Shirley Temple, Yellow Cheerfulness, or Insulinde.

In selecting small companion material for Daffodils consider the type, form, height, color and season of bloom of this bulb; its relation in texture to surrounding plants, and its importance in the landscape plan. Don't be afraid to plant other bulbs with Daffodils. The proper placing of *Chionodoxa*, *Muscari*, various *Scillas*, *Leucojum*, *Tritelia*, and Tulip species actually seems to prolong their season of bloom, for as one finishes the next comes on and makes continuing charming pictures. For example: winter aconite, February Gold, *Leucojum*, Thalia; *Tritelia*, W. P. Milner, and purple violets; *Scilla sibirica* and small white trumpet *Narcissi* with *Iris pumila*; Mangosteen or Rosslare on top of a low rock wall, looking down on the yellow and orange tulip Sunburst; with foreground of the same-colored *Primula*; Tulip Praestans with Firetail's red-edged cup matching it in color!

Our native plants are attractive

ground covers for Daffodils blooming at the same time: white *Trillium*, *Geranium*, and small yellow violets; *Phlox divaricata*, *Muscari*, and Actaea, Silver Chimes, Thalia, Moonshine, or Rippling Waters.

In the rock garden plant *Triandrus albus* ("Angel's Tears"), *Bulbocodium conspicuus* or *tenuifolius*, Beryl, February Gold, W. P. Milner, *Jonquilla simplex* and *plenus*, and Queen of Spain. Set in small, informal groups, so as to enjoy their individual charm.

Naturalizing Daffodils is really not a project for the rank amateur. Plan entire space first. Then use only one variety in each rather large drift and plant only varieties adapted for naturalizing. In the vicinity of Washington, D. C., proper selection gives ten weeks of bloom. For open woods or woodland paths try small-cupped varieties and the poets. In general, though, especially in grass, experiment with bulbocodiums, cyclamineus, and species jonquils.

In these garden pictures I suggest you plant mainly the sure-to-bloom varieties whose performance you can count on, and leave the temperamental and expensive treasures for the nursery row. You will get rewarding satisfaction when you have attempted and achieved a well-thought-out and carefully executed plan.

M. C.

The True Epiphyllums

W. TAYLOR MARSHALL, *Contributor*

The Forgotten Parents With An Outstanding Progeny

To most of us, the plants which are the most attractive, are those with the most beautiful flowers and it is evident that the True Epiphyllums have been rather over shadowed by the many-colored and brilliant hybrids found in most collections.

But I think you will find, as each true species is added to a collection, they become more and more interesting, and the wide range of plant growth, together with the difference in size and shape of the flowers, make them an outstanding and worth while collection by themselves.

The white flowers, some day bloomers and some night bloomers, are variable in size and most of them very fragrant. At the peak of their opening, these flowers have a sheen and radiance that can hardly be captured by the camera.

The natural habitat of the true species, continues from Mexico on the north, down through Central America, to as far south as Brazil and has been said to extend into Paraguay. In their wild state they are found growing in the accumulation of moss and leaves, in crotches of trees, on old tree trunks and on the ground, under the same conditions as the orchids and ferns. In the humid climate of our western tropics, they thrive and usually climb to great heights in the trees, sending out air roots to assist in climbing and through which they gather food and moisture from the air, but they are not parasitic in nature.

The collection I have been working to complete is based upon the sixteen species given in *The Cactaceae*, by Britton and Rose, but I am sure our

Tropics have many that have not been discovered. Mr. E. J. Alexander and Mr. T. MacDougall are doing much in field work and research along these lines now.

The name *Epiphyllum* is from the Greek, meaning upon a leaf, but this is misleading because the Epiphyllums have no true leaves, the flowers are borne from the areoles of the joints or stems as in all cacti. Among the many names used for these plants, *Epiphyllum* has the priority, having been first used by Hermann. *Epiphyllum Americanum* was listed in his catalog of plants at the Leyden Gardens in 1687.

The genus *Epiphyllum* was established by Haworth in 1812, based on Linnaeus' *Cactus phyllanthus*, and Haworth credited the name *Epiphyllum* to Hermann, when he established that genus. The name *Phyllocactus* was not published until 1831, but *Epiphyllum* having the priority, *Phyllocactus* becomes a synonym of it.

In 1890, Schumann described fifteen species and later added six more, making twenty one, calling them *Phyllocactus*. In 1913, Britton and Rose in *Contributions from the United States National Herbarium*, described twenty five species as Epiphyllums, but later in their monograph, *Cactaceae*, reduced that number to sixteen.

E. phyllanthus, meaning leaf-flower, was named the type species by Britton and Rose. This is the oldest true species, according to the records, being the *Cactus phyllanthus* of Linnaeus, of 1753, Haworth establishing the genus *Epiphyllum* on this species in 1812.

The plant is distinct from the other true species, being bright green in

color with a decided reddish-purple edge. I have found this reddish margin to be quite persistent during the year and becoming darker and deeper during the flowering season. The stems are usually flat, rather thin and weak. The flower, which is white, nocturnal and fragrant, is remarkable for its very long tube. The tube, twelve to thirteen inches in length, is pencil-like in width, curving upward to the rather small, daisy-like flower, the fruit being decidedly fusiform.

E. gaillardae, was first described in *Contributions from the United States National Herbarium*, as a new species but later in *Cactaceae* given as a synonym of *E. phyllanthus*. The interesting note about this species was the germination of the seeds while the fruit was still attached to the plant, something that has rarely been known among *Epiphyllums*.

E. phyllanthus has a wide distribution in South America, from Brazil, which is given as the type location, to Bolivia, Peru, and has been seen in Paraguay, also Panama to British Guiana. Dr. Rose's notes, made while he was in Brazil in 1915, speak of this *Epiphyllum* being very common along the coast in the wooded sections, and being epiphetic, climbs to inaccessible heights in the trees. It is a shy bloomer in cultivation and is not a rapid grower. I believe it was Alwin Berger who said, "This species is more interesting than beautiful."

E. oxypetalum, meaning with sharp pointed petals, is an old favorite and is found in most of our *Epiphyllum* collections. It has been called the Dutchman's Pipe and the Queen Cactus, and will always be a very popular plant. It is a rapid grower, up to ten feet and more and a most prolific bloomer, hav-

ing hundreds of flowers in the blooming season. Being a night bloomer the flowers begin to open in the evening, and are at their peak usually around midnight, then beginning to close and by morning are completely spent. Their fragrance can be noticed quite a distance from the plant. *E. oxypetalum* comes from Mexico and is found from Guatemala, Venezuela, down to Brazil.

It is widely cultivated in the Tropics because of its beautiful flowers. The long reddish tube, the reddish sepals and the pure white of the petals, with many cream white stamens and white style, have truly a breath-taking beauty against the green foliage.

E. Hookeri, a light green plant, quite sturdy, with many branches from terete stems, often woody at the base. The flowers are nocturnal, rather large and very beautiful. The color of the long greenish flower tube with tiny pink scale deepening into the greenish pink of the sepals is very striking. The petals are pure white, with white stamens and a red style. The pink-tipped sepals and red style give the flower a pinkish cast that is very beautiful. It is also a most prolific bloomer and in its wild state forms great masses on the trees. The distribution is Tobago, Trinidad and northern Venezuela. It was brought to England as early as 1825, flowered in 1826 and was called *Cactus phyllanthus*, but later was found to be quite different from that species.

E. crenatum, margins notched or scalloped, a very robust growing, grey-green plant with thick, sturdy stems and heavy mid-vein. The flowers are diurnal, white and very fragrant. This *Epiphyllum* has been used extensively in hybridizing, and many of our present day hybrids have this plant for one



Top: Epiphyllum oxypetalum

of its parents.

The flower is about five and one half inches across, with the sepals greenish yellow to cream, slightly reflexed, making a beautiful background for the cream white petals, which are about four inches long and about three fourths of an inch wide. Opening in

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Bottom: Epiphyllum crenatum

the day time, it remains open two days or over. The type locality is Honduras, but is found also in Guatemala. It is one of our popular white *Epiphyllum* and is in most of the *Epiphyllum* collections.

Maybelle Place,
Former President of Cactus and
Succulent Society of America.



Professor Arthur Blocher's garden at Amboy, Illinois. Top: Left, section devoted to Cacti from New Mexico; Right, from Africa; Bottom, General air-view of garden.

Succulents In Illinois

Xerophists are found in every walk of life but it has been noted that a larger per cent of doctors and teachers are interested in xerophytic plants than from any of the other walks in life. The interest of doctors is frequently aroused by the therapeutic value of a collection of potted plants to a bed-ridden patient and the rugged succulents can best survive the unfavorable conditions of such a situation. Teachers find that the hardly succulents make ideal school-room plants that incite in their pupils an interest in nature study.

Professor Arthur Blocher of Amboy, Illinois, has had an interest in xerophytes since his boyhood when he became interested in the local prickly pear, *Opuntia compressa*, because of the size and beauty of its flowers. He is an instructor and supervisor of five different school bands which necessitates his absence from home for five days a week. His week ends are devoted to the care of his large collection of cactus and other succulents.

Because of the rigor of Illinois winters it is necessary to grow all of his specimens in pots so that they can be stored in his large glasshouse in the winter but in early spring all of the plants are brought outdoors where raised beds are prepared for them. The pots are plunged into the sand of

these beds where their color and beauty is accented by the colorful stones outlining the beds.

To make his garden more interesting and valuable the species are assembled in groups representing the desert flora of Mexico, Texas, California, Arizona, New Mexico, Colorado, Oklahoma, and South America and there is a separate bed for the succulents from Africa.

Many of Professor Blocher's plants and most of the rocks used in outlining the beds were collected by him on six trips he made into our southwest for that purpose so that each plant and rock has its history and happy memories for him.

On these trips careful observations were made of natural soil conditions and this soil has been duplicated as nearly as possible with the result that the plants grow well and flower freely.

The collection now consists of about 2500 plants representing over 1000 species and these are increased by purchase or trade as opportunity occurs. It is but natural that with such a large collection there is constant increase by vegetative propagation and this surplus is used in exchanges and much of it is presented to beginners that may call on him, a generous trait not at all uncommon with xerophists.

Recent Advances In Horticulture

FREEMAN A. WEISS, *Editor*

We often speak (or write) rather glibly of "progress in horticulture" perhaps without distinguishing mere novelty or change from advance. Every year we are confronted with an array of new varieties of fruits, vegetables and flowers, all doubtless meritorious in some respects and often questionably so in others, but only time—and usually a long time—must elapse before it is clear whether a real horticultural gain has been registered.

In this column we have, from time to time, recounted certain discoveries that we have called advances in horticulture. To date they have dealt chiefly with new materials and new ways of applying them for the control of crop pests and weeds. Taken singly all these discoveries have had some element of interest, and for the most part have seemed to give significant evidence that the science of horticulture is progressing. Have they, however, contributed tangibly to making gardening less arduous or more rewarding; have they really eliminated some of the disappointments and failures which every gardener sometimes experiences? Or have they confirmed what Vergil wrote nineteen centuries ago:

"The Sire of gods and men, with stern decrees

Forbids our plenty to be earned with ease,

But wills that mortal men, inured to toil,

Should cultivate with pain the grudging soil."

As for a comparison of the quality

of modern varieties of fruits and vegetables, or of the beauty of contemporary cultivated flowers, with that of their forebears, the present author is too circumspect to attempt. We are grateful for the size, the fine appearance, the productivity, of our modern horticultural plants; but we recall some notable examples of quality and beauty in certain varieties that have been around for quite a while: Yellow Bantam corn, The Stayman apple, the Hale peach, the Maréchal Niel Rose, the Daffodil Beersheba. The modern plant breeders, or at any rate their advertising representatives, sometimes extol the quality of their current output by claiming that it is equal to that of these old-timers, but their chief emphasis is usually on commercial features, such as earliness, better substance, uniform bearing, better shipping quality, and especially disease and pest resistance. It is with reference to the latter characteristics that we feel bolder in evaluating the progress of horticulture.

It is a matter of historic record that the plant breeders have again and again come to the rescue of some crop that is threatened with ruin—locally even with extermination—by some pest or disease, and have discovered or bred new varieties possessing immunity from the immediate hazard. Often, to be sure, the new variety then proved susceptible to some other enemy that restored the hazard, but at least the horticulturist got a breathing spell. By trial and error, by successive triumphs and failures, the crop improvement workers have insured the

salvation of one crop after another, which might otherwise have been lost under our modern system of intensive cultivation, often of a single plant variety over wide ranges at one time.

The organisms responsible for diseases and other forms of crop damage have, unfortunately, been no less persistent, and they are undergoing constant adaptation to the new kinds of plants which the crop breeders present to them. There are many examples of this and many ways in which the crop enemies accomplish their purpose, which also is to survive. Sometimes a genetically new race of the pest, whether insect, fungus, or even virus, arises as a result of hybridity or of mutation. Sometimes a pre-existing strain, that possesses some special survival ability in relation to the plant that is resistant to ordinary strains, multiplies and finally predominates. Sometimes there is a slow adaptation to the situation created by the advent of a resistant crop plant, which is apparently initiated and stimulated by the very existence of a new character.

It is this latter process which has given the manufacturers of pesticides—our chemical warfare corps against crop pests—so much concern since the recent development of super pesticides such as DDT, benzene hexachloride, and the organic phosphates. The rapidity with which resistant races of insects and mites have, in some cases, developed and flourished has been disconcerting to say the least. In most

instances the enhanced resistance has been to only one of the new pesticides at a time, but sometimes there has been an increased tolerance for a variety of poisons. It is noteworthy that the resistance or even immunity which some pests have developed against particular chemical compounds of the man-concocted kinds has not extended to some of nature's own bug poisons, rotenone for example.

It will be a long time before the final chapter is written in this conflict between the chemists and crop pests, and in some respects the outcome can not with any assurance be foreseen. We can not be sure that we are not by the very process of constantly producing more potent pesticides collaborating in the evolution of hardier and more aggressive pests.

We choose to believe otherwise, however. The examination of the evidence will require more space and time than are immediately available, but at the risk of boring any who may seek information, in this column, of the progress of horticulture we propose to review it further in future issues. The question has long-term, even philosophic, bearings that transcend the immediate problem of whether to use DDT in one's own garden, perhaps thereby becoming an accessory in the breeding of super pests. We do not think Vergil's contention will soon be overthrown, but we fully believe that the soil will become less grudging and cultivating it less painful.

A Book Or Two

Reviews in this issue were prepared by: Doctors John L. Creech, Francis de Vos, Angus A. Hanson, Conrad B. Link, and Freeman A. Weiss, and Messrs. B. Y. Morrison and Frederic P. Lee

Please refer to Page [ii] for explanation of the "(Library)" notations.

Your Guide To A Greener Lawn.

Geoffrey S. Cornish. The Massachusetts Horticultural Society. Boston, Massachusetts. 1952. 64 pages, illustrated. 75c. (Library)

This small book should be of considerable interest to home owners who value the appearance of their lawns. The book contains sound information on the establishment and maintenance of lawns presented in a straight forward manner. The text is arranged in outline form with numerous sub-headings and is adequately indexed for a publication of its size. The descriptive material and recommendations are brief and to the point, a very desirable feature from the standpoint of the reader who wants his information in an accessible form. One of the outstanding features of this publication is the emphasis that has been placed on the value of sound management practices, e.g., in the discussion of crabgrass eradication, the author points out that the growth of crabgrass is encouraged by poor management, such as, light daily sprinklings, mowing too close, and inadequate fertilization. Several useful sketches, prepared by Carol Burr Cornish, are used to illustrate management practices, equipment, pests, common weeds, and useful lawn grasses. In general, the sketches are very informative with the exception of those depicting the common lawn grasses which are somewhat lacking in detail and attention to identifying characters.

Photographs are used to illustrate common diseases, landscaping, and new equipment. A chapter on lawn questions and answers should be particularly enlightening. Practical answers are provided for several of the more common and vexing lawn problems. The book also includes interesting chapters on insect pests, weed eradication, selecting and purchasing lawn seed, and new grasses and grass substitutes.

Principles of Nursery Management.

Willis P. Duruz. A. T. De La Mare Company, Inc. New York, 1953. 176 pages, illustrated. \$3.50. (Library)

The copy here for review is from the First Printing of the Second Edition, and the Author's Preface states that there have been considerable revisions. We do not have the First Edition, so cannot offer comment on that, but the present volume is one of the best horticultural books that has ever crossed this desk.

In the Preface of the First Edition, the author writes: "This textbook was written to fill a need for a guide to the practice and study of Nursery Management. It is intended as an introduction to the subject for those who are beginners, and as an aid to those already engaged in the nursery business." He goes on to elaborate the points considered.

The style of writing is not professorial in the unhappy sense of that word, but if the reader fails to be in-

structed it is not the fault of the text and if he further fails to be enthusiastic, he should not be concerned with the nursery business at all.

Every phase of nursery work is treated, briefly, almost succinctly, but never with any lack of clarity. One goes from the most general treatment of historical developments to bookkeeping procedures at the end. Each chapter has an admirable analysis at the end, and a splendid list of references for further reading if one wishes. There is a useful index and the illustrations show the most practical clarity of detail, and are of admirable examples. The only phases of nursery life that are not discussed are those related to very highly specialized plant products, but even these are mentioned and one could easily apply the principles laid down for general nursery management to them.

The stress throughout is on management and all discussions relate to the perfecting of management.

Do not miss this book!

Plant Anatomy. Katherine Esau. John Wiley and Sons, Inc., New York. 1953. 735 pages, illustrated. \$9.00. (Library)

The complex subject of the structure and development of seed plants must be considered as reading material for the advanced student, academic or amateur; there is no light manner in which to present the subject matter. Dr. Esau, however, has considerably overcome this barrier by means of her straightforward style and by continual explanation of the concepts and basic terms at the beginning of each chapter. In addition, a series of well-chosen photomicrographic plates is appended. Particularly interesting are the chap-

ters on flower, fruit, and seed which have been treated with wider scope than most texts on anatomy. This is considered by Dr. Esau as an experimental approach since the boundary between morphology as it relates to external form and anatomy, which is concerned with the internal plant structure, is vague where the flower and its derivatives are concerned.

Plant Diseases. In Orchard, Nursery and Garden Crops. Ernst Gram and Anna Weber. Edited and adapted by R. W. G. Dennis; translated from the Danish by Evelyn Ramsden. Philosophical Library, Inc., New York. MacDonal, London. 618 pages, 8 color plates, 349 text figures. 1953. \$18.50. (Library)

With this hefty volume English plant disease manuals have become encyclopedic, a distinction formerly reserved for German or sometimes French handbooks in this field. This increase in bulk is partly a consequence of the multiplicity of ailments to which modern cultivated plants are heir, and the corresponding activity of plant pathologists in studying and writing about them. It is also due, in this volume, to the exceptionally thorough discussion which is presented for each of the many diseases described. The book is emphatically not big for mere big-ness's sake, and there has been very competent selection of the material. The numerous illustrations will help the layman to recognize many diseases that he may encounter, and the very full discussion of symptoms, as modified by place and season, will be useful to the professional plant pathologist. A great variety of details is given, in a fashion interesting to even a casual reader, of the manner in which parasites attack and host plants defend.

There is a wealth of suggestions on means of avoiding or mitigating the course of plant ailments. Though designed primarily for the needs of European gardeners, it is well adapted to American conditions, too, and numerous citations are given to plant pathological studies made in this country. Because of its size and expense it is not the sort of practical handbook that the small cultivator cherishes, but as a comprehensive treatise and a distinguished volume for the library of the professional grower or the earnest amateur this is a very valuable addition to plant disease literature.

Flowers of the South, Native and Exotic. Wilhelmina F. Greene and Hugo L. Blomquist. The University of North Carolina Press, Chapel Hill, N. C., 1953. 208 pages, illustrated in color and in black and white line drawings. \$5.00.

This is a book that will interest every one save the most technically-minded taxonomist and he too might well consider its excellencies.

The end papers are zone maps showing the divisions of the country that fall within the attention of the authors and for this volume are "the South." One error crept into the legend, as pointed out to the reviewer by Mrs. Greene, namely the word "time" at the end of the third line in the legend for Zone 2 should read "years." This should be self-evident from the rest of the legend's text, but we regret with the authors that it happened.

The text is made up of brief paragraphs, devoted to the plant Families and follow the sequence used by Small in his *Southeastern Flora* and the Baileys for the exotic plants that are included. It is interrupted at times by pages that deal with the plants il-

lustrated in color on the pages facing the texts.

The painting and drawings are the work of Mrs. Wilhelmina F. Greene and the text, of Dr. Hugo L. Blomquist. The number of plants treated is five hundred and the reviewer wonders how any one could face such a task of choice, even if the preface states that "selection has leaned more to the objective side than to that of the sole preference of the authors." The botanical texts are clearly written and for the layman above all others often with a very useful note that will be of value to gardeners. There are also included many bits of information that would be relegated to "Remarks" in a more formal text, but which are of great value to the layman and gardener.

The illustrations fall into several categories. First, there are admirable line drawings in black and white that accompany each paragraph of description. There are no indications in the drawings themselves as to the amount of reduction necessary, but the actual size of the plant is mentioned almost uniformly throughout the texts. Second, there are the reproduction of paintings of individual species or pairs of species. Many of these are exotics; all are given common name captions. Third, there are reproductions of paintings in which a great number of plants are shown, in most cases, the collection being based on plants in bloom at one time in the given locality. The author takes great pains to point out that these are not offered as "Flower Arrangements" so no one need start looking for Hogarth Curves or any other nonsense. The color work in reproduction seems to be excellent and we hope that Mrs. Greene agrees in this. Her own work, chiefly water color has all the

excellencies of swift sure work and the clarity that only water color can give.

Whether one starts at the beginning of the book with the native plants interrupted occasionally by a plate of an exotic, or turns at once to the section on exotics does not matter. Or if one pleases, he can dip into the middle of the book with no less pleasure. There is an index as a further aid.

Flower Garden For The Amateur.

Alfred C. Hottes. Garden City Books, New York. (Reprint, Midland Publishers, 1949, \$2.95). 1953. 160 pages, illustrated. \$1.98. (Library)

Alfred Carl Hottes has again written one of his helpful garden books. This is a book for the beginning gardener written to give simple practical help. The chapter on Annuals gives instruction on their general culture followed by a discussion of the plants themselves. They are divided into several groups based on their height and habit of growth. This is followed by lists, with some discussions, of annuals for all uses and suggested plants for an annual bed. Perennials are considered on the basis of their approximate time of bloom, beginning in mid-March and then at weekly intervals throughout the year. This is followed by a section on their culture and suggestions for their landscape use. The bulbs are grouped into hardy and tender kinds using the term bulbs in its widest sense.

Roses are described as to their several different types and simple cultural instruction. The chapter on vines—Nature's Drapery, considers annual and perennial vines, their culture and uses. Shrubs and flowering trees are discussed in the order of their period of bloom. This is followed by lists with

comments on trees and shrubs for various landscape uses as well as lists of plants with similar characteristics.

A series of questions with answers covers the important points on soils and the nutrients in the soil or fertilizers added. Propagation,—Its fun to grow your own,—gives the reader many suggestions for sowing seeds and making of cuttings. The last chapter discusses pest controls and briefly the use for each of the several kinds of materials.

A new gardener or homeowner who has discovered the thrill of working in the soil and growing plants will find this book very helpful in getting a start.

Azaleas And Camellias. H. Harold

Hume. The Macmillan Company, New York. 1953. 93 pages, 9 photographic illustrations, one in color. \$2.50. (Library)

This is a revision of the earlier 1931 edition. Dr. Hume is Provost and Dean Emeritus of the College of Agriculture, University of Florida.

The volume is for the beginner particularly in the southeastern part of the United States. It describes many of the *Azalea* and *Camellia* species, varieties, and hybrids, gives cultural directions, and deals with propagation, growing sites, garden uses, soils, planting, fertilizing, pests and diseases, and growing in pots and tubes.

The book is brief and compact and reflects Dr. Hume's extensive knowledge of these plants. It does not purport to be a substitute for his more complete works, *Azaleas, Kinds And Culture* and *Camellias, Kinds And Culture*, published in 1948 and 1951, respectively, nor for the comprehensive *Azalea Handbook* recently published by The American Horticultural Society.

The Story Of Trees. Ferdinand C. Lane. Doubleday and Company, Inc., Garden City, New York. 1952. 384 pages, illustrated. \$5.00. (Library)

The publisher states that this book is "a lively combination of believe-it-or-nots, and ancient myth, historical anecdotes and lucid scientific explanations." This kaleidoscopic picture of trees (the book is divided into eighteen titled sections, with 89 sub-titles) is indeed lively and susceptible of piece reading. The sections on Religious Associations, The Food Producers, Secondary Products, and Some Unusual Trees are interesting and packed with enough statistics to satisfy the most ardent enthusiast of figures.

The author in his attempt to popularize tree physiology, does so with very poor results. Many of his statements are downright misleading, e.g. "Osmosis *** is based upon a common characteristic of liquids. When placed in conjunction they tend to mingle and equalize. We observe this tendency every time we drop melted butter into hot soups or add cream to our coffee." "The available water is *** of two kinds *** free water and water of adhesion" "hidden rivers that course upward through the fibers of a great tree" "water in a tree performs much the function as that in an automobile radiator. There water is needed to cool the engine, and for the same reason the tree *** which is an elaborate engine *** needs similar cooling."

The book is well illustrated with good black-and-white photographs of specimen trees, logging operations and reforestation procedures.

Conifers In Britain. B. Alwyn Jay-Adam and Charles Black, London, England, 1952. 183 pages, with 136

full pages photographic illustrations. \$5.10.

Seventy of the conifers most frequently grown in gardens and woodlands in Great Britain (and for the most part the United States) are identified by natural size or enlarged photographs of their leaves, buds, and stems. The photographs are extraordinary and interesting. They show well the size, shape, and arrangement of leaves, buds, scales, leaf scars, hairyness of shoots, resin on buds, and the like. Flowers and fruit are omitted as not always available.

There are also clear descriptions of each genus and a key to its illustrated species.

Mr. Jay has executed ably an unique and effective piece of work. To make the best use of the illustrations for identification purposes the reader needs a small pocket magnifying lens to observe the leaves and stems outdoors. The printer has also done his part finely.

Plant Hunter In Manipur. F. Kingdon-Ward. Jonathan Cape, London, England, 1952. 254 pages, 12 photographic illustrations, 2 maps. \$2.50.

For plant lovers who enjoy travel books. This is the latest of the plant exploration volumes of Captain F. Kingdon-Ward of Great Britain, one of the foremost of today's plant explorers and geographic botanists in the field of ornamentals. The year is 1948 and the journey is one to Manipur, then a semi-independent Princely State of India adjoining the northwest frontier of Burma. Ukhral, a village 45 miles northeast of the capital city of Imphal, served as the main base. The flora described is largely that of Mt. Sirhoi.

Captain Kingdon-Ward was accompanied by his wife on this 17th of his plant hunting assignments. It was undertaken on behalf of the New York Botanic Garden and others in search of plants suitable for the warmer regions in the United States.

The area has seasonally alternating winds (monsoons), wet summers, dry winters, an elevation of 6000 to 9000 feet, and is never very cold. It is covered with forests but the types of forest are sharply stratified by altitude. Among the worthwhile ornamental plants are the gorgeous *Magnolia campbelli*, the Manipur lily, *Lilium mackliniae*, *Rhododendron johnstoneanum*, a magnificent huge *Sorbus* (mountain ash), *Engelhardtia spicata* allied to the walnut, *Rosa gigantea* scrambling 100 feet over trees and opening enormous white flowers, a *Symplocos* with large blue fruits, the white flowered *Rhododendron lindleyi*, many orchids such as the famous fall blooming blue *Vanda coerulea*, the beautiful *Manglietia insignis* and *Rhododendron maddeni*, *Iris kumaonensis*, *Jasminum heterophyllum* a small evergreen tree with golden yellow flowers, and *Primula sheriffiae*.

Captain Kingdon-Ward tells his story with verve and excellence of writing. At the same time he gives a scientifically accurate picture of the plants and geography.

American Trees. Rutherford Platt. Dodd, Mead, & Co., New York, 1952. 256 pages with 40 pages photographs, 8 in color, numerous line drawings, and an illustrated Guide to the Quick Identification of Trees. \$3.50.

This volume contains descriptions of around 300 trees grouped by regions

and subregions, as the Great American Woods (east of the Rockies), the Middle West, the South, Southern Florida, the Northwest, California, and the Southwest. Unusual characteristics that aid in identification are emphasized. Fourteen keynote trees east of the Rockies are three-starred, and other trees outstanding in their regions are designated by one and two stars. Excellent drawings by Margaret L. Cosgrove of the leaves and occasionally drawing of the various unique features accompanying most descriptions. The photographic illustrations by the author are most attractive. The text is directed to the perceptive naturalist, contains many unexpected facts of interest, and is agreeably and appealingly written. The book lives up to its theme, Take any tree and find that "Something marvelous is going on here." Gardeners and horticulturists will find much help in selecting suitable trees for their various purposes and regions.

Trees And Their Story. Dorothy Sterling. Doubleday and Company, Inc., New York. 1953. 120 pages, 147 illustrations, \$2.00. (Library)

This is the sort of book any boy or girl of the Scout age would treasure, and yet the humble reviewer, who feels and appears to be eighty, found great delight in the presentation of the entire story. The illustrations, made from bright, new, black-and-white photographs of Myron Ehrenberg, tell a complete story, in many more words than could be printed in the text. The functions of each part of the tree is told in a very fascinating fashion yet very truthful, based on scientific data. About fifty genera of trees are discussed, in flower, fruit, leaves, etc. The handsome end-papers are welcomed in modern book-making, ex-

pertly selected, and could set a pace for the return to this once flourishing art.

The Lily Yearbook, 1953. No. 16.

Editor, P. M. Syngé. The Royal Horticultural Society, Vincent Sq., London, S.W.1., England, 1952. 167 pages with 26 photographic illustrations. \$2.40 postpaid.

The Lily Group of the Royal Horticultural Society, Great Britain, and its Lily Committee were formed about 1932. This is the Lily Yearbook of that Group, not the Lily Yearbook of its colleague, the North American Lily Society. However, the president of our North American society, Dr. S. L. Emsweller, has the leading article, The Lily Research Programme at the Beltsville Station, a lecture given before the Royal Horticultural Society on the current lily propagation, breeding, and forcing research of the United States Department of Agriculture and the collecting work among native lilies of some of its scientists. Lilies at the Oregon Bulb Farm, by Jan de Graaff, is another American contribution.

Two articles on Notholirions, an account of lilies introduced since 1900, a listing with data of named English and Canadian hybrids, and extensive notes on *auratum* lilies in New Zealand are included.

The usual Lily Group and Lily Group Brain Trust discussions appear, this time on the raising of lilies from seed, care of lilies from the seedling to flowering stage, and miscellaneous topics, plus notes on the Lily Group exhibit, excursion, and dinner.

The high quality of the Lily Yearbook is doubtless aided by the fact that the membership of the Society's Lily Committee and Correspondents of the Lily Committee appears to contain the

larger share of the world's "lily brains."

Lily enthusiasts will all relish this workmanlike and interesting volume. Likely enough a substantial share of each edition already goes to the members of the North American Lily Society and other American lily gardeners.

Hollies. H. Harold Hume. The Macmillan Company, New York. 1953. 242 pages, 9 illustrations in color, 69 in black and white. \$6.75. (Library)

Here for the first time do we have a comprehensive treatment of the Holly as a horticultural subject. To the Holly enthusiast it will be his bible, to the average gardener an interesting and helpful book and to the horticulturist a useful and authoritative source of information on this increasingly popular species.

Dr. Hume runs the gamut of horticultural points of interest in his discussion: Holly and man, the botany of the Hollies, descriptions of the many varieties and clones of American, English, Chinese, and Japanese Hollies, Caffeine Hollies, noteworthy Hollies, Holly propagation and pollination, culture, the value and uses of Hollies as landscape subjects, orcharding, insect and diseases.

Of particular interest and value are the informative descriptions of sixty clones of *Ilex opaca*, thirty-two clones of *I. Aquifolium*, thirteen clones of *I. crenata*, and six clones of *I. cornuta*. Although this is only a handful of the named varieties now being offered in the trade, it constitutes the most comprehensive treatment of its kind now available. Dr. Hume is to be commended for bringing together these descriptions to serve as a guide through the bewildering number of clones being distributed.

The Gardener's Pocketbook

Ligustrum lucidum

This species that has been confused and is still confused in some places with the related *L. japonicum* is now coming into flower whereas the other has been out of bloom for over a month and has seeds that are almost full size even if not yet ripened or darkened to the black purples that they show later on.

The subject of this note is not so handsome in leaf but makes a larger, almost tree like plant to eighteen feet here and still growing. The large flower clusters remind one of those of *Syringa amurensis* when one compares that species to the other wild Lilacs. They are not so large nor is the effect as foamy as that of the Lilac but it is not bad. In the immediate locality, the greatest competitor for attention is the Oleander which is in full glory and dominates any scene as *Rhododendron* would in more northerly plantings.

June, Pass Christian, Mississippi

Tulips Got Name in Diplomatic Error

This fall 350,000,000 tulip bulbs, roughly two for every person in the United States, will be imported from Holland and planted by people who don't have the faintest idea how the flower got its name. History shows the name was all a mistake!

A sixteenth-century Austrian diplomat to Turkey, not comprehending the soft language of the Turks or the verbal struggles of his interpreter, accidentally named the flower.

Tulips are now synonymous with spring the world over, but in those days Europe was ignorant that this magnificent upstart of the flower world even existed. Since no one knew

enough to spot the Austrian's bungle, his false appellation stuck.

It was Ogier Ghiselin de Busbecq, ambassador from Emperor Ferdinand I to Suleiman the Magnificent of the Ottoman Empire, who first named, mentioned and introduced the exotic flower to Europe.

Travelling through the Turkish countryside on his way to Constantinople, Busbecq spied what he later described as "quantities of flowers—Narcissi and Tulipans, as the Turks call them—much to our astonishment because it was almost mid-winter, a season unfriendly to flowers."

Busbecq's mistake was in misunderstanding his interpreter's smile. The Turks had a word for the flower—Lalé. The interpreter probably compared the inverted flower to a turban—"dulband" in Turkish—and the confused ambassador thinking that was the name of the flower, dubbed it "tulipan." This he transliterated into Latin and the novel bloom was christened *Tulipa*.

In no time at all the word "Tulip" denoted the last word in "get-rich-quick" schemes. Europe, especially Holland, went wild over the flower, and fantastic prices were paid for the bulbs from which they were grown. It was in this period that Holland became preëminent in the cultivation of tulips and to this day she supplies the bulbs for the gardens of the world.

Busbecq unwittingly gave the flower a name that has all but had poets tearing their hair out—since not much rhymes with "tulip" other than "julep."
Edward Gottlieb

Gloriosas

Of the several species or forms planted in the garden here, the first to

flower is *G. Rothschildiana*, which now in late May has almost finished its flowering. The roots bought from a Florida source have yielded plants about four feet tall with very broad leaves and a goodly number of flowers, each has produced one side branch in each case flowerless which may be due only to the fact that the plants are potted and this is their first season.

In the open ground, the next to bloom is the root bought as *G. Verschuuri* probably an horticultural name. The plant is only about two feet high and has produced only two flowers this season. They are about the same color as those of the first species, but have less yellow at the base of the segments on opening, and the segments themselves are shorter and broader with an almost truncated look. Neither this nor *Rothschildiana* show the frilled margin to the segments that one sees in pictures and which seems to belong to *G. superba*, a plant that is only now making its appearance above ground.

Comparisons on performance are hardly fair here as the roots are not all in equally favorable locations. It was necessary to do some experimenting to discover where they would be most safe if left out of doors over winter in this climate where the temperature can sometimes drop to 15° F. But where they seem at home and luxuriate, *G. superba*, the old and established form, will clamber to about 12 feet and yield a goodly sequence of bloom. If seed is allowed to form, the largish pods hang on till late and then burst open to show the dull orange coated seed. Germination is not too difficult, the following spring but maturing of the seedlings is rather slow if they are not given rather special attention in the way of watering

to prolong the growing season for good root development.

Pass Christian, Miss.

*Will Spring Bring Flowers . . .
For You?*

For the amateur hoe-and-rake wielder one pleasantly painless way to achieve a spring show of flowers is to plant bulbs in the fall.

Thanks to the research of the Dutch bulb experts, you can have continuous bloom from late winter to early summer with little effort. An annual floral pageant like this can make you feel like another Luther Burbank.

First on the bill: Snowdrops. These wee heralds of spring show up each year ahead of all the other flowers and satisfy your yearning for winter's end. To arrive on time, they need planting early in the fall. For best results, place them near Hemlock or Yew or any other place where they are not likely to be disturbed and can thus thrive for several seasons.

Clumps of the hardy Dutch *Crocus*, either in a gay yellow or in shades from pure white to deep Bishop's purple, are perfect for rock gardens. They too are early spring arrivals.

Next to come in on cue in the spring will be the little species Tulips and your Grape Hyacinths and Daffodils. Later come your larger Tulips, including the early varieties, the Triumphs, Darwins, Cottage and Parrot types, and Hyacinths and *Scilla*. Don't forget the Hyacinths, because their rich scent will perfume your entire garden. Blooming during the cool days of April, Hyacinths often last for weeks.

Gardeners new to the hobby usually discover undisclosed artistic ability as they create patterns utilizing trees and flowers. Tulips can be combined with Dogwood, cherries, almond and fruit

trees for a delightful scenic effect. Daffodils can be "naturalized" scattering them near trees as though they were growing wild.

Tulips look best in groups of six, twelve or more, edging garden walks, surrounding a garden gate and drifting in the foreground of shrubbery, lending a touch of Holland to your garden. They come in every shade of the spectrum, and range in shape from the conventional inverted cup to the most exotic forms with intriguing names.

Like all other bulbs, Tulips are planted in most regions in October and November. Early flowering types, like the Kaufmannianas, will bloom in late March or early April. May-flowering types such as Darwins, Breeder and Cottage Tulips will often last into early summer. Your dealer will give you charts showing correct planting times and techniques.

Holland's bulb growers, with 300 years of experience, pass on these rules for bulb flower gardening:

1. Remove topsoil to a depth of about six inches for Tulips, Daffodils and Hyacinths. Three inches is enough for minor bulbs: Snowdrops, *Crocus*, Grape Hyacinths. Four inches is right for species Tulips and *Scilla*.

2. Insert bulbs in their respective beds with pointed ends up. Press the base of each bulb firmly against the bottom of the hole in which it rests. Plant Tulips and Daffodils at least six inches apart to allow for spread of foliage.

3. Push the soil back over each bulb until the last one is covered, then smooth off the bed and your planting is done.

4. If you're really ambitious you can cover the soil with a layer of mulch or leaves or straw, just after the sur-

face is frozen, removing this in the early spring.

5. Sit back, relax and wait for spring to arrive, with the pleasure of seeing your handiwork blooming—your own private flower show!

Philip Klarnet

More Re Rosa mutabilis

The small note on this Rose in the April issue brought a note from a member in La Jolla, California.

"Our next door neighbor has two bushes over ten years old which are now about six feet high and as much through with stems as large as your wrist.

"These plants were a gift from a friend, a sister of Mr. Howard, the rosarian and were imported from France. This friend called it a China Rose. They bloom all the year round without special care and are fragrant. They do seed.

"There is an account of this rose in *Old Garden Roses* by Edward Bunyard and this I will copy for you.

"Except from *Old Garden Roses* by Edward Bunyard under 'Varieties of the China Rose.'

"Tipo Ideale (R. turkestanica, R. mutabilis). Flowers medium, single, in varying shades of pink, rose, buff and yellow; pistil $\frac{1}{4}$ in., styles separate. Sepals beyond bud, two fine wings. Pedicel few glands, hip smooth. Young leaves deep crimson, large thorns below. Makes a low spreading bush. This is an old Rose. A drawing by Redouté exists in the *Jardin des Plantes*, Paris, taking it back over a century. It may sport to a climbing form, as I hear of a house in the Midlands covered with it up to the second story."

The member writes further that she "finds no mention of *Rosa mutabilis* or Tipo Ideale in *The Genus Rosa* by Miss Willmott although other China Roses of what is probably the same period are mentioned."

The plant here in Pass Christian, set fruits freely but they were all removed to encourage more growth. The bush is now about two feet tall and as broad and in mid-August is covered with bronzy red new growths and the beginnings of a new crop of flowers.

Pass Christian, Mississippi

Comments On Liquid Fertilizers

The following press release from the National Fertilizer Association supports the position taken by State fertilizer control officials:

"The American public was warned today to be on its guard against the fallacious claims being made by some manufacturers of liquid fertilizers designed for home garden use.

"The people should not be misled by the advertising now being blatantly and widely promoted. Commercial fertilizers, liquid or dry, are of great benefit toward improving the productivity and quality of vegetables and flowers raised by the home gardener, but many of the statements currently being made about some liquid fertilizers contain absolute misrepresentations of fact.

"The following are a few of the claims; also the comments by The National Fertilizer Association:

(1) *Claim:* Certain liquid fertilizers offered for sale to home gardeners are claimed to contain valuable radioactive materials, or other materials described as having magical properties.

Comment: This is untrue. Even if they did contain such materials, the

materials would contribute little or nothing to the value of the products.

(2) *Claim:* Liquid fertilizers are superior to the more common dry fertilizers in their effects on plant growth.

Comment: This is untrue. Although the plant food contained in liquid fertilizers may become available to plants somewhat more quickly than the plant food in dry fertilizers, it has no greater relative merits under most circumstances.

(3) *Claim:* Liquid fertilizers are more economical than other fertilizers.

Comment: This is absolutely false. Liquid fertilizers sold to the home gardener are generally the most expensive offered to the public.

(4) *Claim:* Liquid fertilizers achieve instantaneous favorable results on crops and flowers.

Comment: All types of fertilizers are beneficial to plant life but none does its work instantaneously.

"When purchasing fertilizer or fertilizer materials, users were urged to consider the following cautions: (1) Buy only from reliable firms; (2) Be sure the product is approved and registered with your State's fertilizer control office; (3) Secure and follow the fertilizer recommendations of your State's experiment station."

Agapanthus Flowers

Purely to satisfy my curiosity, the individual flower stems were pulled from the head of my largest bloom stalk and counted. One hundred and forty-five! It is no wonder then that the blooming period should last over three weeks. Other stalks with smaller heads were not counted, as all such plants were clearly in less vigorous condition than the largest plant, most of them not yet fully recovered from

the process of division to which they had been subjected before sale.

Only a few of the garden visitors in this area appear to be familiar with *Agapanthus* which seems regrettable since it is as "old-fashioned" as Camellias, and indeed belongs almost to the same era of garden style.

The plants are now pushing new fascicles of leaves along side the ripening stalk and those that did not flower continue to produce new leaves, though they seem to have come almost to the climax of their growth, in August.

Pass Christian, Mississippi

Rose Garden Is Donated To United Nations

A garden of nearly 2,000 prize-winning Roses have been donated to the United Nations Headquarters in New York by All-America Rose Selections, an association of the country's leading growers.

The garden, consisting of twenty of the finest All-America varieties, is the first public Rose garden to be established on Manhattan Island in its 300-year history. There are small Rose gardens in the Museum of Modern Art and on the roof tops of Rockefeller Center, but an admission fee is required for both. The U. N. garden located on the eastern end of 45th Street, between the Assembly Hall and the Franklin Roosevelt Drive, will be open to the public when the landscaping projects have been completed.

The varieties included in the garden were selected on the basis of exhaustive tests over the years. Any Rose winning the All-America designation has to undergo at least six years of development and testing in competition with the finest varieties developed throughout the world. Tests are car-

ried on in twenty-two special gardens located in the different climatic sections of the country. The testing proves their ability to grow well under widely varied conditions.

The garden is laid out in two rows of ten squares each. Hybrid Tea Roses accented by Tree Roses fill these squares. Along each side are banks of gay, colorful Floribundas, massed for dramatic color effects.

Sidney B. Hutton, president of A.A.R.S. stated that the U. N. garden is part of the Association's program to "Beautify America With Roses." Gardens have already been established in New Orleans and Detroit as memorials to the war dead of those cities, and other installations are planned for the future. The Association has also donated extensive plantings in public gardens in more than 100 cities throughout the country.

"We know that the Rose is the world's favorite flower," said Mr. Hutton, "and we want to do our part in making available to the public the beauty and enjoyment of these lovely flowers. We feel that this planting at the United Nations Headquarters is particularly appropriate because Roses are found in virtually every country of the world and are loved everywhere."

The prize-winning varieties included in the garden are:

Hybrid Teas: Rubaiyat, Dickson's Red, Charlotte Armstrong, Mirandy, Peace, Grande Duchesse Charlotte, Mission Bells, Horace McFarland, Helen Traubel, Lowell Thomas, Chrysler Imperial, San Fernando, Forty-Niner, Capistrano, Mary Margaret McBride, K. T. Marshall, Mojave, Sutter's Gold, Diamond Jubilee and Fred Howard.

Floribundas are: World's Fair, Vogue, Fashion, Ma Perkins and Lilibet.

Tree Roses are: Peace, Vogue and Charlotte Armstrong.

L. Richard Guylay

Fern Gardens And Critical Fern Species

The American Fern Society recently published in its Journal a list of commercial dealers from whom living fern plants are obtainable. It seems desirable again to raise the problems of the conservation of native species and to suggest a number of principles which should govern the use of rare and otherwise critical species as components of fern gardens.

There are a number of fern species so rare or so captious in their cultural requirements that they should not be considered as eligibles for the amateur's fern garden. It would follow that such species should not be collected by individuals, purchased from dealers nor offered by them. They would be like most native song birds as an ultra protected group. This group would be species like *Dryopteris fragrans*, the rare woodsias, *Asplenium viride*.

A second group of ferns would be such as may be relatively easy to grow in the average garden but which occur wild in limited quantities and areas.

They might be considered in the same class with game birds and fish which the individual is permitted to catch in limited quantities for his own use but which are barred from resale, except from certified sources. Perhaps *Dryopteris filix-mas* and *D. Goldiana* belong here among ferns.

The restrictions just suggested should not apply to properly certified collection for scientific use. Nor should they apply to the raising and distribution of spore-grown specimens of any species, no matter how rare. While there are undoubtedly plenty of wild specimens of many of the most decorative fern species, even for commercial sale, there would be little difficulty in providing an abundance of plants of some of the less common but horticultural species if growers would set up simple spore-culture facilities.

In general, what is here suggested is not a set of rules or restrictions but a sort of code of action. Don't try to add to your garden species of ferns or other plants for which the chances of survival are practically zero. That even gives opportunity for the acquisition even of rarities if the highest quality of preparation has been provided and if the species have been raised, not raided.

Dr. Ralph C. Benedict

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¹Prepared by Bernard Bridgers.

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