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J. Horace McFarland Co.

Fantasy Zinnia, White Light

The Elegant Zinnia

CHARLES WEDDLE*

If you were to conduct a poll to find out which is the most popular annual garden flower in the United States you would certainly get a great variety of answers. When the results were tabulated, probably you would be surprised, since likely it would not be your favorite. So far as is known no such formal poll has been taken, but nevertheless the answer is in the sales books of the seed companies, any one of which will tell you that sales of zinnia seed consistently top those of everything else, and are approached only by petunia and marigold sales.

Surprising as this may seem, there are several good reasons for the popularity of the zinnia. The first of these is that it has such wide adaptability, for there are few areas in the country where it is not grown successfully. Another reason for the great popularity of zinnias is that they are easily grown and comparatively free from insects and diseases. Propagated by large seeds that germinate readily in any type of warm moist soil, the zinnia grows rapidly and blooms freely throughout the summer and early fall. The rank-est amateur has no difficulty with zinnias and the most discriminating professional horticulturist is well rewarded for his efforts in their cultivation. No other annual thrives so well in the hot dry summers common to the United States.

The third factor contributing to the popularity of zinnias is the wide range of colors. No annual in cultivation has such a diversity of colors, and it is approached only by asters and sweet peas, which have limited adaptability in this

country. Furthermore, with the improvement that has been made over the last twenty years, a great variety of flower sizes, flower types and plant habits is now available. The color range contains at least nineteen distinct hues, including white, cream, primrose yellow, buttercup yellow, cadmium yellow, orange, flame scarlet, crimson, maroon, shell pink, carmine pink, coral, spectrum red, rose, magenta, lilac, lavender and purple. In addition, the Navajo strains have two- and three-color combinations of the above hues arranged in attractive concentric circles in the flower head. There are also variegated strains, but these are not very popular.

In the 1910 edition of the *Cyclopedia of American Horticulture*, Bailey says: "The zinnia is rich in shades of purple and orange, but lacks the charming blue and pink of the China aster, and is poor in reds compared with the dahlia." Some of these deficiencies, however, no longer exist. Some of the new pastel mixtures, especially Crown o' Gold Pastel Tints, David Burpee Mixture, and Burpee's Super Giants contain many fine clear pinks. Likewise the Dahlia Flowered and California Giant types contain red varieties which closely rival the dahlia varieties. Not all the colors that occur in a well grown mixture of zinnias occur as straight varieties, but no doubt this will be remedied soon, so far as is possible.

Zinnias are often criticized for their stiffness and coarseness. While this is true to some extent, due to the texture of the flower parts and the precise manner in which the rays (petals) overlap, the later introductions beginning with the California Giants are

*Plant Breeder, W. Atlee Burpee Seed Co., Doylestown, Pa.

more graceful. The Fantasy varieties especially are graceful, with their curled and twisted petals, as are the David and Super Giant mixtures, which contain some heads of the Fantasy type, but larger.

All in all, it seems there is sufficient reason for the great popularity of the zinnia.

Like many popular garden flowers, the zinnia is native to the great southwestern portion of North America. The native habitat of *Zinnia elegans* is Mexico. A few species, however, occur in Texas and Colorado. The genus gets its name from Johann Gottfried Zinn (1727-1759), professor of medicine at Göttingen, Germany, who first described it. The wild form of *Zinnia elegans* as originally cultivated is a single daisy-type flower with a high center, similar to, though smaller than the "medicine hat" types that occur occasionally as rogues in modern varieties. The first double forms appeared in 1858 in a planting from some seed received from the West Indies by M. Grazeau of Bagnères, France, and were introduced by Vilmorin in 1860. They were 2½ to 3 inches across with only 5 or 6 rows of rays. How far the present-day varieties have been developed is seen by the fact that they often reach 5 inches in diameter and have from 12 to 20 rows of rays. The zinnia immediately after introduction became very popular, and during the early sixties of the last century was extremely fashionable. Its popularity soon waned, and by the eighties the zinnia was considered an old fashioned flower.

Previous to 1880 the development of *Zinnia elegans* was limited. Bailey states that fixation of the colors proceeded rapidly after the introduction of double forms, but apparently very few separate colors were available before 1894, when at least two American

seedsmen were offering "Dwarf Double" zinnias in the stronger colors, pink and rose being still missing. The "Dwarf Double" varieties were what is now known as the Cut-and-Come-Again type. The Pompon or Lilliput type was also known in mixtures during the eighties. In 1886 the Dwarf Mammoth mixture, the forerunner of the present giant flowered types, was introduced, and by 1904 Peter Henderson listed several separate colors. The only colors available in the Lilliput or Pompon type at that time were scarlet and white.

Other types of *Zinnia elegans* known before 1900 were Tom Thumb (very dwarf) and the Curled and Crested which were the forerunners of the modern Fantasy types.

Zinnia angustifolia (*Haageana*), the only other species to achieve any importance, was introduced in 1861 (single) and 1871 (double). This is now known as Mexicana or Mexican Hybrids. *Zinnia multiflora* (*Z. tenuiflora* Bailey) has occasionally been listed, but has never become important, although it may have been used in breeding.

The GIANT MAMMOTH strain as previously noted was the first large flowered strain to be introduced, and was the forerunner of the other large flowered types. It is seldom offered now. This strain for some time was available in all colors. The flower heads are large (3 to 5 inches across) and often as deep as broad. The petals are broad and coarse of texture and the colors dull as compared with the Dahlia Flowered and more recent introductions.

The DAHLIA FLOWERED strain introduced by Bodger in 1919 marked the first great step in the development of the modern zinnia and the one which started the trend away from the coarse formality of the Giant Mammoth type.



I. Horace McFarland Co.

Lilliput or Pompon Zinnia, Black Ruby

Petals of the Dahlia Flowered varieties are somewhat narrower than those of the Giant Mammoth, and slightly cupped, giving the flower an upright and somewhat stiff appearance. The flower heads sometimes exceed 5 inches in diameter, and are usually deeper than the California Giants.

Good varieties of the Dahlia Flowered type are Canary Bird, a rich bright yellow; Dream, deep lavender; Exquisite, light rose with deep rose center producing a lovely two-toned effect; Maiden's Blush, shell pink; Polar Bear, white; Royal Purple, deep purple; Will Rogers, deep scarlet; and Oriole, two-toned light orange.

GIANTS OF CALIFORNIA zinnias are slightly shallower on the average than the Dahlia Flowered, but are more graceful. The petals are slightly reflexed and are less symmetrical in their placement, and the heads are not so deep. The stems are long and the colors are bright. This is the type usually grown by florists for cut flowers. Several colors are found in the California Giants which are not found true in any other class. Outstanding varieties in this class are Cherry Queen, a bright carmine rose; Salmon Queen, azalea pink or salmon rose; Purity, white; and Rose Queen, deep rose. The Giants of California were introduced by Bodger in 1926.

SUPER CROWN O' GOLD, varieties Desert Gold and Crown o' Gold Pastel tints, may become a new race of large long stemmed zinnias. They are distinctive also for their feature of having an overlay of deep golden yellow on the various colors.

The CACTUS FLOWERED zinnia is an old type seldom seen now. The petals are quilled by having their edges rolled up, showing the reverse colors and giving a stellate effect to the flowers that, although hard, is pleasing. The reverse colors are dull but often

make extremely attractive, harmonious combinations. This is available only in mixtures, but should be tried up.

DAVID BURPEE and BURPEE'S SUPER GIANTS, introduced by the W. Atlee Burpee Seed Company in 1940 and 1942 respectively, show considerable promise in that they contain some new tints and colors and some forms new to very large flowered zinnias. The David Burpee mixture contains flower heads with petals rolled, curled and twisted not unlike the Fantasy varieties. The petals also have a crepe-like appearance which is attractive and adds something to the color effects. The foliage is peculiarly crinkled.

The Super Giants are very large, with a wider range of clear attractive colors than is found in any other mixture. The form varies from that of the California Giant to that of the Fantasy types. When the colors and types found in this mixture are fixed, there will be a whole series of new colors and types.

The CUT-AND-COME-AGAIN (*Zinnia elegans pumila*) as previously mentioned is the original form of the double zinnia. It is still listed in a wide range of colors, and is quite popular. The flowers are globular and similar to the Giant Mammoth except in size. The plant is well branched and the flowers are numerous.

The NAVAJO or GAILLARDIA-FLOWERED zinnias arose from crossing *Zinnia elegans* with the Mexican or Haageana types (*Z. angustifolia*). The flowers are about 2 inches in diameter, and the colors are bright, with many two- and three-toned combinations. These are available only in mixtures.

The EARLY WONDER group is the earliest flowering race of zinnias and is said to blossom within 30 days from seed. The plant is semi-dwarf,

and has several stems which have no lateral branches, and the flowers are similar to the *pumila* varieties but looser in conformation. Varieties in this group are Gypsy, burnished orange; Fandango, fiery salmon cerise pink; and Fiesta, deep red. Since the stems do not branch, the period of bloom in this class is short.

The TOM THUMB type is seldom seen and so far represents an ideal that is attained only in a few individuals, namely that of the largest possible flowers on the smallest possible plants.

The SCABIOSA FLOWERED type likewise has not been fixed. The ideal flower form of this type is very similar to that of the anemone-flowered chrysanthemum. The disk florets of the center of the flower are elongated into a tube which is the same color as the rays. Thus, the flower has a cushion center with a few rows of ray florets around the outside. Yellow is the only true color offered in this type.

The FANTASY type is by far the most interesting medium sized zinnia. Although introduced as something new in 1935 it represents an improvement of the old Curled and Crested type listed as early as 1902. The flowers of the Fantasy type are extremely informal due to the rolling, curling and twisting of the rays. The flowers are 2½ to 3 inches in diameter. The plants are somewhat more dwarf than the large flowered varieties, but are strong growing and prolific bloomers. They make excellent cut flowers and are often grown under glass in the spring or in cloth houses in the summer.

Varieties listed are Orange Lady, deep orange; Rosalie, light rose; White Light, white; Star Dust, golden yellow; Pink Frills, pale orchid pink.

Other types in the medium sized group are the variegated type with flowers striped with two colors, and *pumila* Picotee, which has flowers

tipped another color. Although some of the Picotee varieties are popular, none of these types are true.

The CUPID zinnias are dwarf compact plants which cover themselves with small perfectly shaped flower heads ¾ to 1½ inches in diameter, and are very popular and useful garden subjects. Popular varieties are Elf, carmine; Tiny Tim, scarlet; Pixie, yellow; and Snowdrop, white. Red Riding Hood is the smallest in this class and is similar to Tiny Tim in color. The flowers are ½ inch in diameter.

The LILLIPUT zinnias fall between the Cupid and the Cut-and-Come-Again in size. The plants are taller and less compact than the Cupids. A good color range is available in this type.

The *Haageana* or MEXICAN HYBRID zinnia (*Z. angustifolia*) is about the size of the Lilliput type, but has bicolor effects similar to the Navajo type with orange, mahogany red, wine red and yellow markings.

Zinnia linearis is a small single flowered species which is becoming popular. The plant is dwarf with narrow leaves, and the flowers are small orange singles with a delicate stripe sometimes tracing the length of the petal. It is free blooming and makes an attractive border plant.

Zinnias are among the easiest of all garden flowers to grow, and will reward the smallest amount of effort. They respond, however, to almost any amount of attention. They withstand drought but respond to plenty of water. They will grow in poor soil but are at their best in moderately rich soil. Not every garden flower responds in direct proportion to the amount of effort expended upon it, but the zinnia does.

The breeding and growing of quality zinnia seed is a difficult task. The more desirable fully-double forms pro-

duce little pollen and therefore less seed than the singles and semi-doubles. Thus varieties have a strong tendency to revert to the single type. Furthermore, color inheritance is very complex, and pollen is carried long distances by insects. Therefore great care in isolation is necessary to maintain pure stocks. For this reason, the gardener should buy the best seed that is obtainable from the most reputable seed growers. Otherwise the plants may be very inferior, with many single flowers and undesirable colors. This cannot be emphasized too strongly.

Zinnias love sun and will endure considerable heat. In fact, they will refuse to grow if sown before the soil is warm. Therefore, they should be given a sunny location. Sown after all danger of frost is past and when the soil is warm (about May 15 in the latitude of Philadelphia) they will come into bloom early in July and continue to flower until frost. They are especially adapted for sowing among the flowering bulbs for filling in after they are gone.

Although any garden soil is suitable a light well drained sandy soil is preferable. Thorough preparation is desirable and moderate fertilization is usually beneficial. A light mulch of lawn clippings, peat or straw applied early in the growing season often produces a marked response. Soil reaction should be neutral to slightly acid.

The large seeds germinate in four or five days in warm moist soil. If earlier plants and blooms are wanted, the seeds may be sown in the greenhouse or cold-frame, transplanted to 2½-inch pots, and later planted in the flower garden. The plants should not become potbound, or they will become stunted and never recover.

Spacing of the plants depends on the soil fertility and the variety and type grown. The small flowering types such

as *linearis*, Mexicana and Cupid may be set 6 to 8 inches apart. The Dahlia Flowered, California Giants and Giant Mammoths require 15 to 18 inches.

The soil around the plants should be soaked whenever irrigated. Frequent light watering does little good and may spread mildew. Well-grown plants will require no staking.

With the introduction of improved types and varieties, zinnias are coming into their own as commercial cut flowers. Florists who have difficulty producing China asters find zinnias a welcome and satisfactory substitute. They may be grown in the greenhouse in early spring by sowing the seeds in February or early March in the benches where they will flower during May. Zinnias are at their best here and in the cloth house during the summer. The stems stretch out long and graceful and the flower size is greatly increased. The California Giants, the Super Giants, the Fantasy varieties and the Cupid varieties are especially adapted for commercial use.

No insects are peculiar to zinnias, but several common garden foragers attack them. Among these are such chewing insects as caterpillars, grasshoppers, Japanese beetles, blister beetles, and the cucumber beetle. These may be controlled with dust mixtures, including Cryolite arsenicals, or other stomach poisons. Sucking insects attacking zinnias are aphids, leaf hoppers and tarnished plant bugs. White flies and red spiders are often serious in greenhouses and cloth houses. Pyrethrum and rotenone sprays are most effective on these. When they are not available, nicotine sulfate is the alternative. Clean cultivation is important in the control of the tarnished plant bug, since contact insecticides are ineffective and the adult insects winter on rubbish.

Mildew is the most common disease



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Robusta Fluted Zinnia

of zinnias. The first symptoms appear as a grayish white powdery growth on the leaves which may spread, finally causing the foliage to turn brown and

die. Flowers also may become affected. Dusting sulfur is commonly used and quite effective in controlling mildew. It should be applied when



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Scabiosa-Flowered Zinnia, Dazzler

the foliage is slightly moist, directing the dust downward and letting it settle on the foliage below the flowers. If the flowers are covered their color is

bleached. - A prepared copper mildew spray, "Sporgo," manufactured by the General Chemical Co., has proved effective at Fordhook Farms, and has

the advantage that it does not bleach the flowers or discolor the foliage.

Blossom Blight (*Choanephora sp.*) often attacks the blossoms during warm moist weather. It is a dark mouldy growth which is more likely to attack the ripe heads, and for that reason these should be removed. Prepared copper sprays and sulfur dust are most effective in preventing it.

Alternaria Leaf Spot or *Alternaria* Wilt is a relatively newly discovered disease of zinnia, but may become very serious—as serious as aster wilt. Spores of *Alternaria zinniae* are carried in the seed and in the soil, making it easily disseminated and very difficult to eradicate.

The lower leaves are usually attacked first, the younger leaves and blossoms becoming spotted later. In 1944, which was a very dry season at Fordhook, the roots became infected, causing the plants to wilt before any other symptoms were evident. The spots on the leaves are dark brown with purplish borders, and affected flower heads turn brown and wither before they are mature.

Control hinges upon planting disease-free seed in disease-free soil. This is not easy, for treating the seed in hot water at 121° F. for 30 minutes and sterilizing the soil with steam, formaldehyde or chloropicrin (tear gas) are the minimum operations for absolute control. Two varieties, Cherry Queen and Eldorado, are said to be resistant to *Alternaria*.

Although this disease is not yet serious because it is not widespread, it is being spread rapidly through plant-

ing of infected seed. It is entirely possible that zinnias may be as difficult to grow in the future as China asters are now. The spread of *Alternaria* is very insidious because it causes no noticeable damage in the California seed fields. It is thought that permanent control of *Alternaria* on a national scale could be accomplished if seed growers would treat their stock seed and grow only on clean land.

Although the zinnia has been developed in less than a hundred years beyond all expectations, there are still many things to come in this stalwart beauty. Several colors are missing in the Cupid and Fantasy types, and actually there are new colors possible in all the types. The Tom Thumb type itself is not yet true. Furthermore there will be the whole range of colors to breed in this extra dwarf zinnia. New types are bound to come, for example, Fantasy type heads as large as 5 inches in diameter on long, graceful stems are definitely in the wind. For those who think the Fantasy types too informal there will be varieties with only slightly rolled and twisted petals.

It is entirely possible that hybrid seed may be offered in the near future. Hybrid varieties will be larger and more vigorous, and will contain colors unknown previously except rarely in mixtures. They will be more uniform than heretofore thought possible. The gardener who considers the zinnia too old fashioned or beneath his dignity must be unfamiliar with the newer varieties with their many delightful characteristics. Zinnias are well worth growing in every garden.



Hardy Single, North Star

Garden Chrysanthemums

ALEX. CUMMING

The hardy chrysanthemum is gradually and surely attaining a position in garden popularity close to that of the rose. There is every reason why it should for it is at its very best after killing frosts have virtually destroyed all other flowers. Again, it is inching up "season-wise" so that the day is not too far distant when it will also be an important factor in the summer garden. A hasty review of its development within the last 25 years is offered by way of confirmation.

Professor Mulford of the U.S.D.A. did some good pioneering in develop-

ing earlier hardy kinds—kinds more resistant to both heat and cold. That, too, during a period when the chrysanthemum was not a satisfactory garden plant color-wise or culturally. Of his good introductions, I think the brilliant Algonquin, very early, very hardy—and withal a good honest growing plant—registered a real advance. All chrysanthemums up to this time were of the Hortorum type. New kinds were simply improvements, but none radically different from the type. Somewhat different in habit among these Hortorums was the widely pub-

licized Azaleamum. Its early-flowering trait and moundlike or cushion growth plus its ability to thrive under average garden conditions filled a definite need. Since the introduction of the Azaleamum many other varieties of this cushion type have been developed, all of which have the desirable trait of making a colorful showing in late summer.

Species blood lines were brought into the group first with the introduction of the Bristol Hybrid Koreans in 1932 to be rapidly followed with the *arcticum* hybrid group. More recently *Chrysanthemum nipponicum* has contributed directly; a few other related species less directly. The infusion of all this new blood within the last 15 years has given us a far better type of garden chrysanthemum, for in addition to the added vigor characteristics of the hybrid, other material changes have been brought about—intensification of color, a much wider range, and a multitude of blends have appeared. Better too is the habit of growth. A rather pronounced trait of the typical Korean Hybrid is its habit of branching from the ground; hence a much more prolific plant when in bloom. Nor should we overlook the garden value of the plant in itself long before it blooms. A lusty growing chysanthemum plant is a picture in itself.

The greater spread in the flowering season can perhaps be best illustrated by noting the change in the seeding habit. A few years back it was just about impossible here in New England to secure seed from outdoor plants even in the most favorable season. Among those early Korean Hybrids there were some from which seed could be taken in the garden, conditions being right. Now many kinds seed so freely in the normal season that it is not unusual to see hundreds of seedlings springing up in various gardens.

Somewhat of a nuisance this trait can be, but it at least indicates a great and desirable change in the flowering habit of the garden type of chrysanthemum.

This accumulation of added traits combined with greater hardiness has made it practical to grow them in zones that previously were considered out of the question. By and large, the chrysanthemum actually comes closer to being an indispensable garden subject than any other group one can think of because it continues the effective garden season for weeks and weeks after those early frosts have destroyed just about everything else. This, in fact, is the time when we see the chrysanthemum at its very best; it takes a frost or two to bring out the real snap and brilliance. We should bear in mind too that it was not too long ago when the hardy aster, not the chrysanthemum, was the dependable source of all garden color. With this improvement has come new methods of uses that should be better known.

The garden chrysanthemum providing, of course, the plants are young and well grown, can readily be dug up most any time of the growing season without the slightest trace of setback or injury. It is an established practice in many good gardens, public and private, to replace annual displays immediately after frost has destroyed them simply by moving in chrysanthemums in bud or bloom, the plants, of course, being grown in the service garden or elsewhere just for this purpose. This can be real helpful to the small gardener too; there are always gaps and prominent spots that need color during those fine autumn days. It is surprising how a few plants can transform a garden picture so completely.

Let us keep in mind too the fact that few flowers compare with the outdoor chrysanthemum for cut flower usage

alone. There is a long season of cutting from the better kinds and a remarkably wide range of color and blossom types to work into nice arrangements. Equally important, the chrysanthemum when cut keeps exceptionally well—three to four weeks can be counted on with good care. A dozen or more plants grown in any out of the way corner just for cutting would prove a mighty good investment figured on the present cost of flowers. It's a grand feeling to have surplus flowers for your friends at a season when they are far from plentiful, so don't overlook the possibilities of the chrysanthemum just as a cut flower.

EASY TO GROW

Suppose we first of all dispose of some of those traditional rules that still appear in print, insisting that chrysanthemums must be planted in sheltered spots on the south side of a wall or hedge or in a warm, protected corner; that they must be watered daily and the foliage sprayed often during hot weather. There was reason for these rules some years ago; today every one is wrong, absolutely wrong.

Grow your chrysanthemums away from dry foundations, hedge roots and stuffy corners. The protection is not needed for these hardier, early flowering kinds and these conditions breed blights and insect pests galore. That persistent overhead sprinkling provides exactly the conditions needed for the rapid spread of eel worm and other insects that apparently were not troublesome in years gone by.

Equally bad is the practice of planting chrysanthemums between quick growing annuals or perennials in the mixed border. Plant them in beds, not too wide, by themselves as you would roses, or in groups of three or more plants along the forward side of the

mixed border where they can be cultivated and watered as needed in group fashion. For cut flowers or as an extra supply for autumn transplanting, grow them in straight rows. Perhaps a row or two can be located so it will serve as a dividing line or hedge in the vegetable garden. Space the plants 20 to 24 inches apart in the row with the rows a full 4 feet apart. In beds or groups in the border, 18 to 20 inches apart will be about right for average soil conditions.

The soil should always be prepared thoroughly. Use manure freely, if available, with shredded cattle or sheep manure as a second choice. Add bone-meal at the rate of a handful per plant, then a 2-inch layer of peat or leaf mold. Dig this in to a depth of 15 inches at least, mixing it thoroughly at the same time. This deep soil preparation is important for it adds up to a well anchored root system, the kind that resists hot, dry spells, also severe winter conditions.

Proper watering is just as important. As previously mentioned, frequent light applications are harmful. The penetration is insufficient; consequently the roots are brought to the surface and easily injured through heat and surface drying. When water is needed, water so that the moisture penetration goes down below the roots, certainly not less than 12 inches in depth, more is better. The easiest way would be to let the hose run slowly over a short piece of board or through a burlap bag tied over the hose. This to prevent soil erosion or washing, the hose to be moved from time to time as needed. This may appear somewhat of a job but keep in mind that it does not have to be done often. After watering, cultivate the soil lightly so that an inch of well pulverized dust mulch will result, then watch the plants respond. The surface will of course look fear-



Pink Radiance

fully dry after a day or two but don't let that tempt you to water again. Just cultivate lightly once a week. When the plants show definite signs of wilting in the late afternoon it will again be time to water. Here in the North not more than three such waterings are needed in a normal season.

Throughout the South and West or wherever summers are abnormally hot and dry the matter of watering is all important. To refer to particular instances, Billings, Montana and Rome, Georgia, could not be considered good chrysanthemum country. In Montana, Mr. J. W. Currie takes care of this situation nicely by countersinking his beds three or four inches. Every two weeks throughout the summer the beds are flooded by letting the hose run slowly, no water at any time touching the foliage of the plants, the soil lightly mulched at all times. In Rome, a 6-inch board edging was used around the beds, the soil saturated about once a week. In spite of cultivation this treatment naturally brought the roots to the surface by late summer, then a 2-inch mulch of rotted barnyard manure and peat was added, which of course would be helpful in bringing the plants through winter safely.

The matter of pinching puzzles the beginner and it's little wonder. Pinching actually means stopping the growth by pruning off an inch or two from the top, thus inducing side or lateral branches, consequently a more bushy, compact plant. To pinch or not to pinch is the problem. Cushion varieties, naturally low-growing and branching, require no pinching at all. This applies to some of the pompons as well as the larger kinds. The majority of varieties, however, tend to run up two or three rather fast growing shoots in late spring. That kind requires pinching. It is good practice to pinch first in early May when the

shoots are about 9 inches high. Just nip off about two inches from the tips. A month or so later all straggly shoots can again be pinched and, if necessary, a few weeks later again. No pinching should be done after the end of July. By that time the plants should be very well branched, lusty and healthy, already a garden ornament.

With good cultural attention chrysanthemums are fairly free of insect pests. Aphis of course will appear on the tender shoot tips at intervals through the season. This is easily remedied with Black Leaf 40 or Rotenone spray. Foliage blights can usually be prevented by dusting the plants with sulphur occasionally through the growing season. Fermate, a new fungicide which will probably be available soon, is remarkably effective. It's a good idea whenever you are spraying roses or other items to give the chrysanthemum plants a shot whether they need it or not. Prevention is always easiest.

Division of old plants again is extremely important. Most of the trouble that I have seen in various gardens could be traced directly to the fact that plants were not divided as they should be, consequently roots were sprawling and shallow. Again there is no fast rule that can be applied. The cushion or azalea-flowering type plants are all better in their second year, therefore should not be divided too often. This would apply to some of the pompons and in fact to any moderate growing sort, but those rugged growing kinds that sucker so freely all around the plant in spring should then be taken up and divided. A strong division is far better than an old plant. It is good practice too to plant these divisions out in an area that has not been devoted to chrysanthemums before if this is possible. In any case prepare the soil as advised above.

Winter protection is a problem, par-



New Korean-Nipponicum Hybrid



Fireglow

ticularly in the North. Again, in sections where the winter is comparatively mild, which indicates that winterkilling is not simply a matter of severe freezing. Soft winters with frequent thaws are the tough ones. For that reason it is never safe to say that a chrysanthemum is hardy under all conditions. Few plants are for that matter. Generally, a light winter covering of any material that will not pack is safe. Flat evergreen branches covering the ground first with a top dressing of salt hay or oat straw is good; leaves as a second choice. Where winterkilling is a chronic occurrence, however, it is safer to take up a certain number of plants each season, heel them in a cold frame, which should be covered with shaded glass or board shutters, anything to keep snow and rain out. A light mulch here again is advised. Another method worth trying out in an experimental way would be to dig a few plants with a reasonable amount of soil, nest them on top of the ground in some sheltered corner where drainage is good, pack leaves between the balls of soil with an inch or two of over-all cover. This has worked surprisingly well.

There is always a temptation to uncover too early. It's a good idea to do this gradually, loosening up the cover, removing some from time to time so there is a little mulch around the crown of the plants in late spring. Those late April freezes often kill plants that have overwintered perfectly.

A FEW RELIABLE VARIETIES

So many really fine varieties are available now that a fine selection can be chosen from any good chrysanthemum catalog. In the average garden I think a balanced selection would be in order, some to flower from August on but the majority could well be kinds that normally come into flower in late September or early October. The early-flowering kinds will be more or less exhausted by this time and there are still weeks of good chrysanthemum weather ahead. Here are a few varieties to consider: Early-flowering, Algonquin, yellow; Azaleamum, also listed as Amelia or Pink Cushion, is a good pink; Dean Kay, another good pink. In the bronzes, Apricot Glow and King Cushion; Fireglow, oriental red. No real good white cushion available yet, Queen Cushion is still about the best. The large double-flowering kinds are general favorites: Mrs. Pierre S. duPont, III, bronze; Red Velvet, crimson red; Avalanche, pure white; Magnolia, creamy pink and soft yellow; Pink Radiance, pink; Lavender Lady, lavender; Burgundy, wine red; King Midas, yellow. Fine varieties every one of these and better ones are coming. Never before has the breeder had such a wide range of material with which to work. There is a splendid future for the garden chrysanthemum.

Developing New Clones of Chrysanthemums

E. J. KRAUS

There is no flower other than the garden chrysanthemum which blends quite so harmoniously with the changing coloration of foliage, ripening fruits, and the haze of autumn. Each year sees new forms and colors added to the list of desirable varieties. Through their use the glory of the garden can be extended by a full month or even six weeks, often well beyond early frosts and into November.

There still remains, however, the need for types which bloom ahead of severe frosts but will continue in bloom over a long period of time; those which are sufficiently petal hardy so that the flowers and opening buds are not greatly injured or discolored by frosts or even light freezes. Particularly desirable are the early flowering varieties which will resist the low temperatures of northern winters and survive the freezes and thaws of late winter and early spring when the ground is bare of snow, mulch, or other cover.

It is well realized that this last point is controversial. There are many who have little or no interest in attempting to overwinter chrysanthemums in the open ground, but prefer to set out new young plants each spring. Much may be said for this point of view. Many varieties even though they pass through the winter in excellent condition will make much better showing in the autumn garden if devided and replanted in the spring. There are also a few varieties which produce quantities of germinable seeds. Usually such seedlings are of inferior quality but grow with such vigor that unless care is used to eliminate them, they soon crowd out the more desirable stocks, or form an undesirable mixture with them. Still

there are many gardeners who would like to possess winter hardy varieties which could remain in place for several years, thus saving the time and energy required for transplanting, and which would possess such other desirable features as attach to any hardy, herbaceous perennial.

Climatic conditions of much of the north central midwest is not particularly favorable to the overwintering of herbaceous perennials unless they are possessed of more than usual hardiness. Overwintering is generally much more successful in those areas where a blanket of snow may be expected by the end of November or shortly thereafter, provided this snow covering remains more or less continuously until the advent of early spring. Despite somewhat higher winter temperatures somewhat farther south, winter injury may be very great. This is particularly true if alternations of temperature from 20 below zero to somewhat above freezing prevail, and such alternation is associated with a covering of ice over the soil or with no covering at all. As often as not loss of plants may be more severe in March than at any time during the winter. If there are a number of warm days at that time, activity of the plants may begin and then, if such a warm interval is abruptly followed by sub-zero temperatures with little or no snow fall, great injury ensues. Alternate freezing and thawing of the soil with consequent heaving of the plants breaks many of the roots, and kills stem and roots as well. Such injurious effects may be decreased by the use of mulches of straw, excelsior, or coarse litter, but dense covering of fine material which tends to pack solid is

often worse than no covering at all, because of its smothering effect. Greatest destruction of plants occurs on heavy wet soils and on very porous ones in which plants may be very slightly anchored.

All this is mentioned because the development of winter hardy varieties of any herbaceous plant involves very many complexities. It is less difficult to select one resistant to severe cold than to conditions of alternate freezing and thawing. The most trying problem of all is to secure those which do not become sensitized or tenderized during the last days of winter and early spring, by starting into growth during a period of warm weather which is followed by an extremely cold one. My own experience during the past ten years has been that a clone of chrysanthemums having numerous rhizomes which spread out from the main stem two or more inches below the surface of the soil and these tend to produce during the autumn a sufficient root system to keep them firmly anchored, is more likely to prove winter hardy than those which produce few. It is particularly advantageous also if the tips of these rhizomes do not come above the surface of the soil, and above all that they do not start active growth during a brief warm spell in late winter. Even the possession of these characteristics does not absolutely insure winter hardiness. The record of the experiences of those who have been working for more than a century on the problem of winter hardiness in various plants still leave doubt as to what characteristics do insure winter hardiness. My own experience shows clearly that seasonal conditions vary so widely between different localities or even within any single locality that the hardiness of a given clone can be determined only after a number of years of testing in

various regions and under several methods of culture.

The same principles hold true in selecting for bud and petal hardiness. Seasonal conditions prevailing during the growing period, especially those just immediately preceding final bud swelling and flowering, exert a profound influence on the degree of frost or freezing injury at any given temperature. And, of course, as is well known, the conditions immediately following a frost or freeze are very important. Usually there is far less injury if the forenoon following a night of frost is cool or cloudy or rainy. Alas, all too frequently, the sun bursts out bright and warm, and by noon the garden may become a sorry sight indeed. Unfortunately too, for him who is endeavoring to select for hardiness, no two autumns are quite the same—a severe freeze may come by mid-September or not before the end of October. But he need not feel too worried over this; sooner or later out of a series of years will come a test autumn with an early, genuine freeze. Then is the time for a stout heart and resolute purpose. Out must go all the promising selections and accumulations through perhaps four or five years, and only those which have withstood the test be retained. Or perhaps one should say those which have come nearest to the goal sought, for perfection seems always to lie ahead, and never quite attained. My own work, or rather, I should say pleasure, has now extended through ten years, and during this time I have grown many thousands of seedlings, one year 14 acres of them, though under present circumstances very few things are grown. From among all the hundreds of original field selections which have been made, all but 125 have been already discarded. A few have sufficient merit for introduction and trial, to determine whether under

the wide range of conditions a clone must be grown they may truly establish a place for themselves.

To prove truly worthy for everyman's garden is an enormous demand indeed. As to their time of blooming, Chrysanthemums are highly sensitive to photoperiod, differences in day length between north and south. They are even more responsive to temperature, most of them coming into bloom earlier and more quickly in cool weather than in warm. Blooming is greatly accelerated by cool nights. Some clones are far less adapted to withstand ill effects of rainy or foggy weather than are others. During prolonged periods of warm rainy weather leaves may blacken and drop, a characteristic which may be shown one year and not another. The tone and intensity of color is deeper in cooler weather. In the case of varieties which are not completely double, the relative size of the yellow open center varies with growing conditions. An enumeration of various characters and their relation to environmental and cultural conditions would make a long list. The perfect variety is still to be attained. And then, too, don't forget the things called personal preference and popularity. What one individual most admires may be distasteful to another.

The greatest need which will aid in hastening progress is a larger group of patient individuals who will help in the growing and selection of additional good varieties. It is doubtful indeed if any individual working at one place could possibly select a number of varieties that would prove superlative for all other areas. The day should be hastened and welcomed when there will be a number of individuals working under particular environments for which varieties may be developed and selected. Among these workers let there be a free interchange of materials

and constructive criticism. Adulation and condemnation come in adequate abundance without solicitation. Neither extreme is particularly helpful. It is with the hope that others may become interested that I set down some of my experiences through the past number of years in which I have been trying for hardy clones.

SOURCE OF PARENT STOCKS

One of the varieties selected because of its winter hardiness was a common form known to grow and bloom year after year in dooryards, old gardens in neglected corners—exposed or partially shaded, and more or less overgrown by weeds or grass. The bushes are tall and scraggling, but in October give a fair wealth of small, crowded, magenta flowers, often still in bloom after the early snows have partially covered them. The memory of this variety as it grew year after year in my grandfather's garden more than 50 years ago was an impelling factor in my decision to use it as a possible parent. In the same category is another somewhat similar variety. It is equally hardy, is not so tall, and has nearly double white flowers which turn purple and brown soon after expanding. I have followed its annual performance here on the sandy soils of Chicago for many years. Whatever their undesirable qualities, both of these varieties possess the great merit of hardiness to cold, and compete favorably year after year with miscellaneous crowding vegetation.

Several years ago I secured several very small, dwarfish plants from one of the parks in Fort Wayne, Indiana. These were said to have come from seed from Japan, and although the plants were not winter hardy and the flowers small and of little value, the plants bloomed in mid-June. These particular plants have long since died,

but they have contributed the character of early bloom which persists in some of their now distant offspring.

Through the U. S. Department of Agriculture several plants of hardy, early flowering varieties, from among the hundreds of seedlings grown and tested by F. L. Mulford, were secured. Each plant was different in form and color. They were of the same general hereditary stock as the dozen or more varieties since named and introduced by the Department of Agriculture, but none of the latter was among them. Of those secured, one proved entirely sterile in crossing, but two others produced seeds abundantly when inter-pollinated or when crossed with those from other sources. On several occasions I have used the yellow variety, Algonquin, both as a seed and pollen parent. It is a relatively early and profuse bloomer, entirely winter hardy here at Chicago, and a vigorous grower. Similarly, Geronimo (bronze) has also been used sparingly because of its early blooming habit, and in some of the first crosses Seminole (white) was used because it too is relatively early and profuse in blooming. Both tend to lose their foliage rather early here at Chicago and all have soft petals as they age the flowers assume a tassel-like form which results in a somewhat wilted appearance. Despite this they are very valuable to any breeding program and have definite garden value because they are early and winter hardy.

Because it is a rich deep red, the Korean variety, Mars, was used one year in some of the crosses. Many interesting forms and colors were secured and by self pollination of the best of these seedlings, some desirable individuals have been obtained. Most of the seedlings bloomed later than October 5, and so were discarded. A few early flowering plants of this line have

been continued, however, and by crossing these with some of the earliest flowering types from other lines of descent, hardy varieties of desirable plant form and good red color and style of flower are being secured. Red varieties are of several types. Many have the reverse of the petals light gray or white, which gives the floral mass a washed out appearance. Others are bright when they first open but soon fade to a red brown or dull copper red which is quite unattractive. Those of a third class are deep rich velvety red, somewhat lighter on the back of the petals. They often fade to a darker color, but they are definitely red, not a confused mixture courteously referred to as red. Such varieties have flowers unusually resistant to frost injury. Even though slightly injured, they still have great garden value long after most varieties have faded and gone.

Similarly, the variety Astrid was used several years ago as a parent. It was employed because it was reputed to be exceptionally winter hardy. Actually it has not proven to be so either at Chicago or Lake Geneva, Wisconsin. No plant of it persisted there through more than two winters. Also during some years it made very large bushy plants which produced no bloom whatsoever. Nearly all the seedlings resulting from this cross were single, although some were duplex and others semi-double. All were very late in blooming and in general the petals were subject to frost injury. Because of these characteristics, Astrid has not been used during the past six years as a parent, but from among the earlier crosses a few plants were saved. By self pollinating or crossing some of those of earliest bloom with the very earliest blooming plants from other lines, a few attractive seedlings were secured. The flowers range from sin-

gle to fully double, the plants are upright and compact. The flowers of the original crosses of Astrid were unusually beautiful in color and texture, having form and finish of highest excellence. A few of the derivatives from this parentage also show this finish, but this line is not now being continued because it produced a high percentage of single flowers, and especially because the plants tend to come into bloom late in the season. This would not be a serious drawback in regions regularly having a mild, prolonged autumn season, nor would it be under the conditions which prevailed in the vicinity of Chicago during 1940 or 1944, but ordinarily such a season cannot be expected.

Other varieties which have entered into our selection work are greenhouse forms of various types and colors, some of them not winter hardy, others partially so. The variety Glory of Seven Oaks is hardy most winters here in Chicago, and many of its offspring have a characteristic twiggy form, suitable for borders perhaps, but the plants tend to be very brittle; so much so that after they attain some size or are about to come into bloom, they split apart from their own weight, especially after a rain, or are easily broken during cultivation or oven by brushing against them. The use of greenhouse varieties has resulted in a great range of flower type and plant form, but has also meant vigilance and vigorous adherence to ideals in discarding everything which is not strictly hardy when tested in the open garden. No specific line of parentage from these early crosses is now being continued, but it was from them that a complete color range was first secured. Extensive use has been made of many of the varieties selected and introduced by Mr. Alex Cumming. Attempts are made to secure various promising new introductions as they

appear, test them for at least a year in the open ground and leave them out over winter under natural conditions. If the variety survives and offers some characteristic not already inherent in clones previously selected, it may be used in future crosses, occasionally even though a clone does not survive the winter, it may be used if it has some outstanding quality. The list used is far too long to mention them all individually, but the very interesting color and sheen of Granny Scoville, and the color, plant habit and comparative hardiness of Autumn Lights deserve special mention. I have not used Amelia despite its early blooming habit because longer individual flower stems than it possesses were desired, and because its bushy form occurs many times among my seedlings, in any event. For somewhat similar reasons single forms have not been generally used, some appear in nearly every line each year, although the number now occurring is relatively few. As already stated, any new clone offering possibilities of improvement of our present lines will be tried, but for the most part, crosses are now confined to selections whose parentage is known, often through several generations.

SELECTING AND TESTING THE NEW CLONES

Each year from ten to thirty thousand seedlings are grown in the gardens and field at Lake Geneva, Wisconsin. During the past ten years more than 300,000 individual seedlings have been grown. They are as sturdy as the most vigorous Zinnias, and on any soil suited to the growth of the latter chrysanthemum seedlings will thrive provided they have full exposure to sunlight. During the summer and fall these seedling plants are inspected from time to time for desirable individuals of distinctive merit. In early autumn

those selected are lifted from the garden and brought into the greenhouse and saved along with others for seed production. After the seed has matured, the plants are set aside until spring. Cuttings are then made, and later the plants are set out in the open garden.

The following procedure is used in making the crosses. When sufficiently mature, some of the heads of flowers on each plant are pollinated each day for a series of days, with their own pollen. Others are pollinated with pollen from any other chosen variety, using caution, in the case of the precisely controlled crosses, that no variety of pollen other than that desired is introduced by bees, flies, or other means. It is necessary to pollinate the flower heads on several successive days because each consists of many flowers closely fitted into a compact group and these reach maturity at different times, generally those near the outer portions of the head maturing first. If a variety happens to be sterile; that is, it will not form seeds when pollinated with its own pollen, it is not necessary to remove the stamens from the flowers before the pollen is shed. But to be absolutely certain of the percentage of any given seed, it is necessary to remove the stamens from the flower to be pollinated before any pollen is shed, with a very fine pair of tweezers or scissors. Later, after the stigmas of the pistils have matured, the selected pollen is applied to them, and, in a fair percentage of cases, seeds are produced. This method, although painstaking and somewhat lengthy, is absolutely essential to secure crosses of definitely known parentage. Unless plenty of skilled help is available, the number of controlled crosses which can be made in this way is very limited. But if one is less demanding in precision it is entirely feasible simply to interpollinate the flowers of any given plant or of

different plants merely by brushing lightly across the entire flower head with a camel's hair brush, making certain that pollen is present and that it is brought to the stigmatic surfaces of the pistils. In this way large quantities of seed may be secured from some clones with little effort. Flower heads which are wholly double produce few seeds even under most favorable environments. Although time and patience are required in crossing the flowers, the satisfaction derived from seeing the almost endless variety of forms and colors which are obtainable is wholly adequate recompense.

After the seed has ripened, it is our practice to cut off the old tops of the plants, and then move them to the coolest part of the greenhouse in order to retard too rapid growth of the new shoots. By about late January or mid-February there will be a considerable number of fresh green shoots started, the number and vigor varying with individual seedling types. These are used for making cuttings which are then rooted in sand. In our own tests twenty-five rooted cuttings of each new selection are planted in rows in the gardens of Lake Geneva, Wisconsin, and at Chicago, Illinois, and their performance in habit of growth and flower production is critically recorded. Those which do not come up to standard, or do not offer something of value in earliness of flower which would give them potential value as parents, are dug up in the autumn and destroyed. Often more than half of the selections may be discarded after the first summer. The others are left in the open garden with no protection whatsoever other than the few leaves which may drift in from the neighboring trees or the snow which may fall and be held by the old tops of the plants, which are not cut off until the following spring. It has been especially gratifying that the U. S.

Horticultural Station at Cheyenne, Wyoming, and more recently, several interested nurserymen and many amateurs have undertaken comprehensive trials of some of the selected varieties.

The soil at Lake Geneva is a medium heavy clay loam, well drained in one of the gardens, not so well in the others. At Chicago the soil is a light, porous sand which requires the addition of fertilizers and constant attention to watering during the summer months. This point is mentioned because the growth and relative hardiness of chrysanthemums is in part conditioned by the soil upon which they are grown. In our experience, many varieties are more subject to winter killing on the light sandy soils in the region of Chicago than they are on the heavier clay loams. This is especially true when the fall of snow is light and there is continued freezing and thawing of the soil. It is for this reason that we test our clones for winter hardiness at Chicago as well as at Lake Geneva. To determine susceptibility to early frosts and light freezes the latter location is preferable because on the campus of the University of Chicago severely damaging frosts ordinarily come relatively late. The autumn of 1939 was an excellent and welcome test year at Lake Geneva, for there was a killing frost about mid-September and during the third week of the same month the temperature fell to 20° and did not rise above 27° for three days. This provided the necessary test of petal hardiness. Fully 300 clones from among the number which had been accumulated through previous years were discarded because of frost damage. A fairly large number could be retained. Again, the summer of 1942 was very wet, and the autumn also provided a test for bud hardiness. Many selections were discarded because of the blackening of the foliage during con-

tinued wet weather, and other because they did not prove hardy.

Well, we had much more room in the garden for testing those which remained after those two helpful years. In selecting for early blooming and hardiness, nothing is gained by being tender hearted or weak kneed in vigorously culling out and discarding the unfit. From all the thousands of seedlings grown during the past ten years, 1,169 original selections have been made, and I now count up from my notebooks that, exclusive of 65 new seedlings selected in the autumn of 1944, 130 of these remain to go once more through the testing garden next year. All the rest have been discarded for one reason or another. Of those remaining perhaps 50 or 60 may be worthy of eventual introduction as named clones. Some are retained because they offer something desirable as possible parent stocks. Others are too good to throw away but not good enough to keep, so they continue to occupy space which should not belong to them. Perhaps judgment has been too critical, perhaps not sufficiently so. Individuals to whom seed has been sent often report an astonishingly large percentage of fine things worth keeping. I, too, used to think some years ago I obtained many good things but time changes viewpoints. Perhaps too, others have had experience similar to my own in going over the fields, making the final selections with a resolve to make no more. Then come friends, amateurs, professionals and the list of the saved could increase ten fold, but resistance to add more remains firm. More truthfully, one should say rather firmy, because nearly always a few selections are added with the excuse, "Oh well, these things can be discarded if they really are not worthy." As a matter of fact, more often than not those selected after some hesitation do

not prove worthy. On the other hand, I have more than once discarded a numbered selection and been happy later to pick up a plant of it from some acquaintance who had more faith and persistence in trying it out than had I.

Individual preferences vary. That is why growing chrysanthemums from seed is a very interesting adventure. But one should not anticipate that first-year seedlings will necessarily appear the same when grown the second and succeeding years in the garden. No one can predict with absolute certainty the degree of winter hardiness of any seedlings until it has been tested under a range of climatic conditions and soil types. And, too, the shape, shades, and tints of flowers, the height and general form of plant vary appreciably with the environmental conditions and seasonal variations under which it is grown. If permanence in the border or garden is expected, all plants should have undergone tests for at least two or three years for winter hardiness, and have demonstrated the form they are likely to continue to show. Five years would be more desirable. But it is doubtful if in general so long a period is likely to intervene between the time of selection of a clone and its ultimate introduction. There seems very little reason or cause for the note of alarm that there are too many varieties of hardy chrysanthemums now. Certainly there is a long list, but there are not too many *good* ones. There is as much room for a range of varieties of these charming flowers as for the dahlia, the gladiolus, the rose, the iris, or many another. To me there does not seem a real need for summer blooming clones to compete with summer annuals. The chrysanthemum is at its best with the changing and heightening colors of autumn as the summer garden is fading. Clones which are sufficiently early to come into flower before severe frosts are

very desirable, but if they have a short blooming period and are wilted and sere just as the glory of all is coming to its height, much is lost. There are early flowering varieties which continue in bloom for weeks on the new shoots produced as the season advances. These are indeed choice and more of them are needed. And there is room for more of the later blooming types which are sufficiently bud hardy to withstand frosts and even freezes. This is particularly true for the darker flowered varieties whose colors blend with sumac, hard maple, the scarlet and mahogany of oaks, and the rich golds of other trees and shrubs. Among the most satisfying of all in northern latitudes are the few which even though lightly touched by frost still possess great garden value even at the end of October or during early November. Never shall I forget the thrill this past Autumn of gazing across the tree encircled test garden at Lake Geneva where the selections of many hybridizers are grown each year. Here, after several nights of frost and freezing weather, bathed in the glow of a November sun, more than twenty-five varieties gave back a full symphony of color ranging from saffron to darkest ruby; a deep, full "Song of Autumn" in the cathedral of this quiet woodland.

These are the somewhat prosaic details of the evolution of our work to date. But they tell little of our many thrills and pleasures and not a few disappointments. These must be individually experienced. We now have varieties ranging in blooming season from mid-July into November. The first period is almost too early and the latter sometimes too late. North of Chicago, in average years, frosts and light freezes occur before then. If the variety is strictly petal hardy, however, as some of the newer ones are, they often provide a good show of color up

to, and into, November, and though the flowers may no longer be of exhibition quality, the mass garden effects repay any effort. One note of warning should be given the lover of flowers—once he begins with chrysanthemums, he will find no ordinary amount of courage sufficient to enable him to loose himself from their enchantment.

My own pleasure has been deepened by the enthusiastic interest and help of three of my friends: Mrs. Barbara Small, whose infinite and painstaking care resulted in our first controlled crosses; Mr. M. J. Costello, who has charge of the greenhouses at the University of Chicago; and Mr. William P. Longland, Superintendent at Wychwood, Lake Geneva, Wisconsin. To many others, some of whom I know only through correspondence and their

reports on plants and seeds which have been sent them, I am deeply grateful for criticism, counsel, and encouragement. A few clones have been named and introduced as the Chicago Strain. Others judged worthy may be released as time goes on. I do not expect any clone either of my own choosing or that selected by anyone else to prove of equal value everywhere. Such paragons of perfection are products of wishful thinking, not realities. Since this is so, and because of the increasing interest in growing hardy chrysanthemums, let me express once more the hope that activity in selecting varieties adapted to specific needs and tastes will increase. The joyous thought of prolonging the season of color in autumn gardens is abundant recompense for whatever amount of patience and care may be required.



Carib children in Surinam on their way to school to learn the ABC of the white man.

Vanishing Plant Lore

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The white men who first discovered this continent took over only the more obvious of the plants used by the native Indians. Such things as corn, tobacco, quinine, pumpkins, potatoes, and tomatoes could not be ignored. Even the tomato was looked upon with suspicion for a long time before it came to be accepted as edible. The thousands of other plants employed by the Indians were considered to be unimportant;

medicinal plants in particular were dismissed, by and large, as mere superstition. Very certainly the Indian did nothing to dispel this conception, in fact ethnologists and botanists often experience extreme difficulty in eliciting valid information from medicine men about plants. This reluctance on the part of the medicine man is by no means always due to actual distrust of, or dislike for the "white man" but fre-



Market scene in Chichicastenango, Guatemala.

quently is merely a means of protecting "trade secrets," just as any drug company does with a patented remedy. The prestige of a medicine man depends upon his ability to dispel the "evil spirits" or illnesses of his tribe by means of secret concoctions. Often his income derives from his private prescriptions or formulas.

As generations have passed, comparatively few adequate studies of Indian plants have been attempted. True, many books and articles have been writ-

ten about the subject but in general the writers of these contributions have been satisfied merely with listing the Indian names of the plants together with the reputed uses. Very little was attempted experimentally for actual verification of the medicinal properties.

The preparation of pressed botanical specimens for permanent preservation has been desultory. The ethnologist usually manages to accumulate accurate data about plant lore but too often his specimens are poorly prepared or other-



Herb market in Concepción, Paraguay.

wise unsatisfactory. On the other hand, the professional botanist may prepare good specimens but usually ignores the economic data. As a result, our botanical institutions are scantily supplied with specimens suitable for the study of native economic plants.

A project, carried out several years ago by the United States Department of Agriculture, in collaboration with the University of Nevada, to investigate the medicinal plants of Indian tribes of the State, has led to conclu-

sive proofs that many of the plants do have the remedial values claimed by the Indians. In these studies great care was taken to authenticate the information obtained from the Indians, by repeated questioning of different individuals. Two of the investigators, Mr. and Mrs. Percy Train, traveled constantly to visit scattered settlements of different tribes, even going to distant points to locate elderly people who were particularly esteemed by tribal members for their great knowledge of

plant remedies. Mrs. Train, by learning two Indian dialects, and by using tact and understanding, obtained most of the records. These investigators made certain, also, that the information always related to a definite pressed specimen so that the botanical identity of the plant in question could be verified. Once a degree of accuracy could be assigned to a given remedy, quantities of the particular plant were collected to serve as analysis material.

The analysis material was sent to the University of Minnesota, where Dr. Raymond N. Bieter, of the School of Pharmacy, conducted the requisite experiments and tests.

These studies, made only a few years ago, very likely could not be duplicated at the present time, because most of the Indians in Nevada, who cooperated in supplying information, had reached advanced ages and undoubtedly many of them have since died. In fact, one reason for the successful accumulation of information from these old people was due to their desire to preserve such records for the future of their tribes. Few, if any, of the younger Indians were acquainted with the tribal plant lore, or even considered it of importance.

The disappearance of tribal customs with the death of old people in Nevada, is by no means unique. The identical situation exists elsewhere. Already many tribes have been exterminated, while others are in the process of being broken up or absorbed. Furthermore, the conqueror imposes his education upon the aborigenes by either formal schools or missionaries. As the Indian children trudge off to school to learn the ABCs of the dominating race, the parents of these children meanwhile continue the old ways of their ancestors. But the tribal mores cannot be imparted to the children because they are too occupied with the kinds of in-

struction, and eventually they grow up versed in the ways of the white man but with little knowledge of their own tribal lore.

An explorer seeking to learn about native uses of plants, soon discovers that the educated Indian, who can read and write, will be of little assistance. Such an Indian very likely will reply in perfect English, or Spanish, or Portuguese, or Dutch, according to the country, that, "we educated people do not believe in those old superstitions." On the contrary, the illiterate Indian, if properly approached or remunerated, will impart gladly what he knows.

It is already too late to seek plant lore where tribes have vanished or where old cultures have been displaced but prompt action would preserve much that is rapidly vanishing throughout this hemisphere. Native peoples, especially outside the United States, still utilize plants for a multitude of purposes. Unquestionably many of these plants, if properly preserved and analyzed would yield valuable products. The studies in Nevada produced an anti-oxidant of great commercial value in the preservation of fatty foods. In Brazil, Ricardo Fróes secured from an aged Indian a complete enumeration of the plant ingredients for the curare poison, which is playing an important role in medicine. The wax from a common plant in the tropics, the leaves of which are widely used by the natives as wrapping material for meat and other food, may become a possible competitor with the wax which at present is secured from the carnaúba palm. The root of an obscure plant from the Tapajós river in the Amazon basin may become an important rat killer, while a relative of the same plant may develop into an insecticide. Indians in Guatemala and the Amazon utilize certain plant products to produce a beautiful black enamel-like covering for gourd



Percy Train collecting samples for analysis of Indian medicinal plants in Nevada.

utensils. Even yet, the Ecuadorean and Chilean Indians employ plant dyes to produce brilliantly colored textiles. The examples could be multiplied endlessly. But without immediate and adequate measures most of these plant secrets will be lost irretrievably.

The awakened interest and combined efforts of amateur and professional botanists would do much to save this interesting and rapidly disappearing lore. Very little is required in the way of equipment, other than an ordinary plant press, a quantity of blotters, cardboard ventilators, and old newspaper sheets. In all cases, the collector must prepare a good pressed specimen with flowers or fruits, sometimes both, to accompany the data so that the botanical name of the plant can be deter-

mined. The plant notes, to be reliable and complete, must give the name of the collector, the date, the place collected, as well as other information which is not obvious in the specimen itself. Additional information would indicate the local use of the plant, method of preparation, as well as the native or Indian name; and in the case of medicinal plants, the dosage is an important part of the record. Samples of plant products to accompany the data and the botanical specimen, are desirable but before contemplating any extensive activity in this line, especially for medicinal plants, it would be well to make previous arrangements with some agency or individual so that shipments would be received and given proper attention.

In foreign countries, where both the people and the language are new, the collector will have full opportunity to display tactfulness in dealing with the people and resourcefulness in learning the language. And the degree of his success will be measured in the number of plants collected and in the amount of information recorded.

Latin American markets, especially

in smaller towns, always prove to be fascinating hunting grounds for unusual food plants and strange herbs. Latin America, also, presents a rich field for studying the plant lore of Indian tribes which are still relatively untouched by the new civilization. An observant traveler with time to spare could turn up a veritable treasure trove of specimens and information.

FOUR GARDEN SCENES

FROM THE WORKS OF

MISS ROSE GREELY

WASHINGTON, D. C.

Although some of the photographs may belie the fact all of the four scenes given are city gardens, two relatively small in extent, the other two larger but so planned that some of the woodland belonging outside the property appears to belong to the garden itself.

The first, a Spring garden is conspicuous for the interplay of light and dark; with an overshadowed pool darkened still more by the use of broad-leaved evergreens, in sharp contrast to the light-filled middle and back ground, made brighter still in the Spring, by the thick whiteness of the dogwood. (See page 116.)

The second, a paved terrace in which Nature yields in trimmed evergreens or in uncertain vining to the patterns of brick and stucco. Transient notes of color come from potted plants changed with the seasons. Here plant form is frankly managed, either to conform with architectural form and pattern, or to give a maximum of contrast. (See page 117.)

Here the broken patterns of the plant materials strengthened by the vertical motif of tree trunks is again accentuated by the vigorous contrast between the flat tone of the pool, the illuminated willow, all yellow green in tone and the dark masses from which the tree trunks rise. (See page 118.)

The ultimate in contrast, a sharply geometrical plan clearly set out in color contrasts and shadow, with a completely informal use of plant material. This is the type of planting that requires the most subtle management to maintain in balance, with Nature free but never wanton. (See page 119.)



Dorothy Jarvis

"Brighter still in Spring . . ."



"Here plant form is frankly managed . . ."



Frances Benjamin Johnson

"The vertical motif of tree trunks is accentuated . . ."



Silvia Saunders

"The ultimate in contrast . . ."

Bamboo - A Must for the South

E. A. McILHENNY

To say we in America are hundreds, yes, thousands of years behind the Chinese in some forms of agriculture may seem to those agriculturists who do not know bamboo ridiculous, but it is a fact nevertheless.

In China, where recorded man has lived for a much longer time than in any other part of the earth, the natural forests, as we in the United States know forests, have been exterminated for hundreds of years, and in many sections bamboo is the only available timber. It is in China that the growing and use of bamboo has reached its greatest development, and there it is used for every phase of human existence, from food to clothing and building material.

On every farm in the south where there is rich land, and where the temperature does not fall below 15 degrees Fahrenheit, a bamboo forest—even if covering only one-half an acre—would be a good investment, and there are now 4,000,000 such farms, and the number is increasing continually. The life of such a planting is very long and its annual yield of marketable canes, if harvested properly, is continuous. Once established, bamboo goes on producing year after year, with no expense for cultivation or upkeep, and will supply almost all the timber needs on a farm, besides plenty of nourishing food.

Grasses are probably the most universal, valuable and useful of all the plants of the world. Those such as wheat, rice and the many other grasses whose seed are used for human and stock food are widely cultivated, while other grasses provide the bulk of the nourishment for our great herds of livestock, and still others have wide uses

in industry. Bamboo possesses all the essentials that mark a grass; therefore, bamboo is a tree-grass, the greatest in size, with a wider range of uses than all other grasses put together. Bamboo, a plant which has only now begun to find a place in the agriculture of the United States, is the most versatile of all plants.

To illustrate how fully bamboo can fulfill the needs of man, one must realize, houses may be built entirely of bamboo, without nails. The larger sections are strong enough for framing timbers and rafter, if mortised and held together by twisted bamboo thongs. The split canes in broad sheets are excellent boards for sidings, floors and partitions. Doors are made from the same material, and fastened in place with twisted bamboo thongs, and the sloping roof covered with interwoven bamboo twigs forms a covering entirely impervious to the heaviest rain. The larger sections of bamboo stalks are easily fitted to form water conduits and drain pipes. Sections of the larger trees, when split, are the finest of firewood, and every piece of furniture needed in a home can be made from bamboo held together by bamboo thongs. No other wood can be put to such a variety of uses. I have seen lathsheds many acres in extent built entirely of split bamboo. Young bamboo shoots are a delicious and nourishing food. Additional uses for bamboo as they are now used in Louisiana are:

- Poles for propelling boats,
- Woven articles of many kinds, including baskets, trays, etc.,
- Furniture of almost every type,
- Yard rakes made entirely of bamboo,
- Handles for tools,



A forest of timber bamboo now growing at Avery Island, La.

Buckets,
 Poles for drying clothes,
 Fencing and railings,
 Various toys and ornaments,
 Water Conduits and drain-pipes,
 Walking Stocks,
 Telephone and Radio Areolon Poles,
 Rope,
 Pipe Stems,
 Flower Stakes,
 Window Shades,
 Musical instruments,
 Mats,

and a host of ornamental objects. Bamboo is also an excellent reinforcing for concrete. Under actual shearing tests, the strength of dry timber bamboo has proven to be between 1,800 and 2,700 pounds to the square inch. The tested crushing strength of bamboo used for water pipes or drainage tiles has been determined to be approximately 766 pounds per lineal foot for the 3½" diameter canes. Two-inch diameter canes will withstand a pressure of 374

pounds to the lineal foot. Clay tile measuring 3½" in diameter has a crushing strength of only 276 pounds.

In fact, bamboo is almost unlimited in its use, and Asiatic bamboos growing at Avery Island, Louisiana, have been shipped to all parts of the United States to be used for various purposes. The shoots of some varieties, such as *Phyllostachys edulis* and *Phyllostachys Henryii*, are used for food, and are much relished not only by Orientals, but by Americans for this purpose.

Large numbers of the upper ends of the larger poles cut 12 ft. long are shipped to the Pacific Coast for use on the commercial Tuna fishing boats, while the lower three-fourths of the same poles find a ready market for various industries, and are shipped in car lots to northern markets. Great quantities of the smaller poles are used for ordinary fishing rods. The better quality large poles are used for making split-bamboo fishing rods. The canes of the



Bamboo poles cut for shipment, graded according to size.

smaller type bamboos are used for pipe stems, and are supplied pipe makers in the north for this purpose in 20,000 to 30,000 lots. Hundreds of thousands of the smaller canes are used for plant stakes, and an unlimited demand for the medium-sized canes is at hand locally for trappers' stakes, for making the set traps in marshes where muskrats and other fur-bearing animals are caught. The larger canes are used for various ornamental purposes: the making of flower vases, match-holders, and recently carloads of the largest canes were sent north to be split and laminated together for ski poles to be used by our troops for which purpose this wood is admirably adapted, as it is not only light and very strong, but will not splinter if broken.

In order to keep a bamboo planting in full health and the production of full-sized canes, it is imperative that

not more than one-third or one-half of the mature three year old and older canes are cut in any one year. If cutting goes beyond this point, the growing balance will be upset, and the next year's crop of canes will be greatly reduced in number and size. One-half of the mature canes cut during one year is the safest manner for maintaining a commercial bamboo forest.

In order to test yield of mature bamboo plantings in the Gulf Coast area, the following cuttings were made at the Avery Island bamboo forests, where more than eighty acres are devoted to plantings of 64 varieties of bamboo.

In February, 1932, a test cutting of actually measured areas of various bamboos was made in order to determine the number of canes and gross weight per acre.

First, a cutting of one acre of fourteen year old *Phyllostachys bambu-*

soides yielded 22,491 canes, which, when put into bundles of 25 and weighed, gave a gross weight of 146 tons to the acres.

One acre of fourteen year old *Phyllostachys edulis* was cut and handled in the same manner, and yielded 15,876 canes, giving a gross weight of 143 tones.

Neither of these two plantings of bamboo had before been disturbed by cutting. Both are of the rhizomatus or forest type, and produce the largest canes of any species of Asiatic bamboo grown in the southern states.

At the same time, a mixed cutting of *Bambusa argentea* and *Bambusa* Alphonse Karri, measuring 2.44 acres, from a fourteen year old planting, in which no cutting had previously been done, yielded 111,941 canes, weighing, when huddled 25 to the bundle, 349 tons gross. These two varieties are bunch-growing types, whose canes grow so closely together that even a dog cannot pass between them. It is to be understood that these cuttings were clean cuttings—every bamboo was cut and weighed from the measured areas.

In July, 1944, the same area—2.44 acres—of *Bambusa argentea* and *Bambusa* Alphonse Karri that had been first cut in 1932 was cut, two-thirds of the canes being removed, and at this cutting there was a yield of 24,600 canes, with an average weight of 6 lbs. to the cane, or 147,000 lbs., which is equal to 73.8 tons. One-third of the stand of canes in this area was left in order to encourage more rapid growth, it having been found that when a complete cutting of any variety of bamboo is made, it requires a longer time for the growth to recover and become normal than if one-third or one-half of the standing canes are left.

In order to check the previous record of the growth of the *Phyllostachys* group, a cutting was made in February,



A fifty-foot gondola car loaded with large bamboo poles

1944, of one-half of the canes from one-half acre of the largest growing variety of *Phyllostachys*. Many of these bamboos measured 4-6 inches in diameter at the base. A total of twelve hundred canes were cut, some of them having a length of 62 ft., and a weight of 76 lbs., with a total weight of 79,254 pounds or 39.6 tons. A similar cutting in this same forest, started January 29, 1945, is now in progress, and about the same number of canes, giving about the same weight, will be harvested.

The nomenclature of bamboo is in a very backward state, for the best botanical authorities have not yet agreed as to the proper classification of many of the commoner varieties; for instance, the Arrow Bamboo of Eastern Asia is listed botanically as *Arundinaria japonica*, *Sasa japonica* and *Pseudosasa japonica*. All three of these names apply to the one plant.

That Bamboo has great possibilities for making of paper has been brought to my notice by the Industrial Engineering and Chemist firm, Arthur D. Little, Inc., of Cambridge, Mass., who wrote me under date of July 2, 1920, regarding the adaptability of bamboo for the making of paper:

"Numerous experiments have been conducted at our laboratories, and we find that bamboo of certain species is a very excellent substitute for the present wood from which pulp is made. Due to the extreme scarcity of wood pulp, bamboo will, in our opinion, largely replace this material in the future, especially in the manufacture of high-grade book and magazine paper."

Again, under date of October 18, 1920, Arthur D. Little, Inc., wrote me:

"We are still very much interested in the bamboo proposition to which we had previously referred. You, no doubt, are familiar with the prices which has existed for sometime past in the paper industry, and that the discovery of some new material for obtaining pulp is of vital importance. From various tests and experiments which have been conducted here in our mill, we have obtained an exceedingly high grade book paper, using bamboo pulp. A mill operating upon bamboo would, in our estimation, be highly successful."

Again, in July, 1927, there appears in the July Number, No. 7, of the Industrial Bulletin of Arthur D. Little, Inc., the following:

"In certain tropical countries, Salvador, for instance, the bamboo growing wild along the streams is relied upon to prevent erosion and maintain the river banks. As a measure of flood prevention along the lower reaches of Mississippi, it has recently been proposed to plant bamboo along the river banks behind the levees, with the expectation that the closely entangled roots will afford a large measure of re-

inforcement, while the bamboo stems will furnish a superior and constant supply of raw material for paper making.

"Without attempting to pass upon the merits of the proposition as a whole, it may be pointed out that bamboo is in fact an ideal material for the manufacture of the better grades of book paper. It is not adopted for newsprint. The yield of fiber is about forty percent of the dry stems. It bleaches readily and makes an exceedingly close, well-formed sheet, which is unusually light for bulk.

"Species are available that will flourish as far north as Vicksburg, and on experimental plantations in Louisiana there has been such density of growth as to yield, after the fifth year, thirty tons per acre of dry stems, and the same amount every second year thereafter for a long period before re-seeding. A given acreage in bamboo may therefore be expected to yield ten or fifteen times as much high grade paper stock as the same area growing pulp wood."

It is impossible for the people of the United States who have lived among the lush forests that covered North America, and which still cover much of our land, to look forward to the time, a few hundred years hence, when our land will be as bare of forests as China is today, and for that reason, and that reason alone, we cannot visualize the value of the rapid-growing and maturing bamboo capable of producing many times the tonnage of usable wood, many times as rapidly as anything else we know of that will grow from the ground, and with but little care after planting. When bamboo becomes established here, it will be as indispensable to our existence as it is now to the Chinese.

Every farm in the South should be supplied with a small forest of these



Bamboo poles cut and stacked for shipment. No pole in this lot measured less than 4" diameter at butt.

valuable plants, in the same manner as it is now supplied with a wood lot, but a suitable location must be chosen for such a planting. A rich, well-drained soil is desirable, and the two other most important factors governing the growth of bamboo are temperature and moisture.

The United States now imports (or did before the war in the Pacific), millions of dollars worth of bamboo yearly that should have been grown at home. Now is the time for our State Agricultural Departments to see that plantings of bamboo are made wherever they will thrive, so that the people of the southern states may be ready for the time which surely will come when our forests are no more, and we will be obliged to rely on the quick-growing

timber bamboo to supply the wood for all necessities, from the making of paper to the making of houses, and the furniture for the houses.

The artistic value of bamboo for ornamental planting cannot be too strongly urged. The clump varieties (that is, the varieties of *Bambusa*) are not only beautiful as individual clumps, but are as near perfect as anything can be to screen out unsightly buildings and places. These bamboos are among the hardiest of all, and there are varieties that grow compactly, in height from 8 ft. to 45 ft., and are, therefore, useful for either low or high screen plantings. In a treeless yard nothing will give more, quicker or more permanent shade than a few clumps of bamboo.

Do You Know Tomatoes?

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Most of us have a rather definite opinion as to what is meant when we speak of tomatoes. We think of them as being red, round in shape, weighing from $\frac{1}{4}$ to $\frac{1}{2}$ pound each with four to eight seed cavities inside, produced on long vines which continue to grow more or less until cut down by frost. It has finely divided leaves, a simple blossom cluster, a mild acid flavor. The principal differences in ordinary varieties is earliness. When we look through the variety list, those which would roughly correspond to the above description are numerous. There are some who say too numerous, that we have too many varieties which to the ordinary person are practically indistinguishable from each other.

Nevertheless, tomatoes do not need to fit the above description. In a real collection of tomato varieties and species we would find a great many variations from the above. In the matter of flesh, they may have red flesh, yellow, tangerine or greenish white. The color of the skin may be clear like glass, it may be orange or it may be purplish. The immature fruit may have dark green stripes, it may be light or dark green, it may have a dark green base to the fruit or be uniform in color. It may have a hairy surface or it may be smooth. The size of the fruit may vary from less than one-hundredth of a pound each up to two pounds each. The shape may be flat, round, oblong, pointed or pear shaped. The locules or seed cavities may vary all the way from two to twenty. The flesh may be thick or thin, firm or soft. The vines may be dwarf or standard. They may con-

tinue to grow indefinitely, that is, be indeterminate or they may finish their growth with a blossom cluster after a short distance, thus be an annual as contrasted to a perennial.

The leaves may be finely divided as in ordinary tomatoes or they may be practically entire, known as potato leaves. There is a wide range in leaf size. They may be wilted or upright, green or yellowish. The stems of the plant may be purple or green. The stems on the fruit may be double jointed or single jointed. The flower clusters may be simple as in ordinary varieties or very much branched, with or without leaves in them. The flavor may vary from acid to sweet. The odor may be that as we know it or the sickish sweet of some of the wild species. The vitamin content may vary from 10 milligrams to 70 milligrams of vitamin C per 100 grams.

If we examine all these possible characteristics and see what combinations there could be, for instance four different colors of flesh means four different varieties based on this one thing, then each of these may have either a clear skin or an orange skin which would double the number of varieties. For each of these types we might have a flat fruited variety, a round fruited variety, an oblong fruited variety, a pointed fruited variety or a pear shaped variety. In short, if we can picture the possible combinations, we will find that it would be possible to have more than a million varieties of tomatoes, which might be easily recognized by any gardener. In fact, these millions might be much more different from each oth-

er than the numerous varieties we already find in our seed catalogues. These are things which could exist and might be produced if they were wanted. Of course, under present circumstances not all of them nor anywhere near all of them will be found anywhere. Here are some of the common variants, however, which may be found in varieties that are now available. There are dwarf varieties as contrasted to standards. Most folks, however, do not take to these heavy leaved, short-stemmed dwarf varieties under ordinary circumstances. A more practical vine difference is the determinate character found in such varieties as Victor, Pennheart, Bounty and some others. This single difference changes a tomato from a perennial plant into an annual one and limits plant size. They are generally adapted to short seasons where a heavy crop must mature in a short time. There are a few potato leaf varieties. In many of the seed catalogues we may find pear fruited varieties of various colors. The Oxheart varieties and the Cherry forms are also listed. A newcomer in the color series is the orange fruited tomatoes, Golden Jubilee being a prominent representative of this group. Newcomers in the novelty class include such things as Tiny Tim, which may be matured in a four inch pot as a house plant, and Window Box, suited to the purpose indicated and which may be planted one foot apart in a row in the garden. The various fruit sizes are represented by Red Currant, which weighs only two or three grams. The Cherry tomatoes, which are next largest in size, the ordinary varieties and finally the large Ponderosa and Beefheart types. All these common variants, however, are not the most unusual things in the tomato family. New species introduced from South America by

plant explorers have brought with them characteristics which may or may not have value. *Lycopersicon hirsutum* has a greenish white fruit with a green stripe around its middle and a light covering of hair on the surface. The odor is not to be described, but certainly can be easily distinguished from ordinary tomatoes. The plants are large and flourishing. When crosses are made with this species, unusual flesh colors result. They may perhaps have little economic value, but it is certainly something different.

The species having some probable value is *Lycopersicon peruvianum*, resembling *hirsutum* to some extent, but lacking the hairs. This is a species which apparently has a higher vitamin C content than others. From some hybrids made with ordinary varieties, it now seems probable that this high vitamin content may be introduced into commercial sorts. A botanical variety under this species is *humifusum*, which creeps along on the ground out close to the surface for several feet in each direction. Again this may not have any great economic importance, but it certainly adds variety to the tomato family.

To the person who likes to delve into unusual vegetables, the tomato is offered as a good subject. If you grow some of the unusual forms in your garden, the average visitor would not identify them as tomatoes at all. Certain it is that all that is necessary to entirely change the looks of the tomato people grow in their garden is for them to want something different. Just tell a plant breeder what would be a better combination of characteristics in the whole list given at the beginning of this article, give him a little time and he can produce it for you.

Papaver Orientale

Twenty Years of Breeding

A. E. CURTIS

Those who think of Oriental poppies as the orange or brick-red poppies of grandmother's day are missing the glories of modern hybridizing that enchant all who see them. From the deepest reds to the brilliant scarlets and from a delicate flesh pink to the deepest cerise or salmon pink, you may have your choice of any tint you desire. There are also whites and near yellows. If you like softer colors, there is a whole series of pastel shades, ranging from whites tinged pink and lavender through old rose, lilac-rose, mulberry and wine to mahogany. These pastel shades, all of which have a little lavender or purple in their makeup, fade in the sun and should be grown in full light shade (no tree roots, please) or used as cut flowers. Some still do not realize that poppies are a fine cut flower, both for the home and flower shows. Newly opened blooms are cut in the morning and the stems are burned at once at the gas range (or other hot flame) until the end of the stem is turned to charcoal. Placed in water, they will keep from three to six days and will not wilt even when placed in full sun.

Our modern *Papaver orientale* is unquestionably a hybrid, probably produced by crossing several species, though I believe *P. bractaetum* is the only one that has been absolutely identified. One research worker claims that the white Oriental came from a cross with an annual poppy, and a tendency to die after blooming is strong evidence of the claim.

There are three distinctly different root formations which, of course, have

been blended by hybridization into an infinite number of variations. There is the tap root type (probably the basic type) which grows down in one straight root and only branches when striking a hard substance. In a filled bed with three feet of top soil, a strong growing salmon pink (Lachs Konigen) produced three-foot roots in a single year. Poppy roots are as brittle as glass and break at the slightest bend, but there is one type of root in which the main root is almost woody and it produces a quantity of small roots that are quite flexible. This type of root originates in the wine colored poppies (Henry Cayeux is the best example). They are slow growing and extremely permanent and I believe this is the ideal type of root to breed into other poppies. It is just a guess but I think there was a shade-loving *Papaver* back of this parentage. These colors all fade in the sun and nature usually grows such colors in shade. They also like more moisture than the other types and do well in full light shade, though good drainage is still essential. The third root type I believe is a mutation I have only found it in two poppies—Wunderkind (the true stock) and Trilby, both of which are practically sterile. (You can find two or three large seeds occasionally in pods of Wunderkind especially if hand-pollinated.) The main root is very large and all side roots are constricted at their attachment, then immediately swell to large size and taper rapidly. The effect is that of a long carrot with several small ones attached. It is the poorest type of root we have. It is difficult to dig without

breaking of the side roots at their small attachments and it gives little stock for propagating, but they are two of our finest poppies and we cannot do without them. Part of the stock of Nancy in this country has this form of root and the growth and blooms are similar to Trilby and while I know it was imported directly from a reliable dealer, I still think it is really Trilby. I have left out of consideration Olympia and her children which multiply by underground runners. It is listed with the Orientals, but I wish a botanist with authority would settle the question. Unlike the other Orientals, it travels all over the garden and is liable to become a pest when purchased by the amateur as "a poppy anyone can grow." This poppy and several of its named seedlings are the only doubles in the Oriental poppy family.

Usually the Oriental poppy grows well without any special care, but in some gardens (and the gardener may be an expert) they refuse to grow and there seems to be no intermediate condition. It's either robust and full of vigor or spindling and dying. I have been trying for years to find the cause but so far without any definite results. I have seen them growing vigorously in heavy clay and some of the best plants I ever received were grown by a Hollander in black Michigan celery soil. They must have good drainage and I would say the ideal soil would be one with plenty of humus and some sand and the ideal location, a raised terrace. They should not be planted between tall perennials, as they need plenty of light and air in the spring. Chrysanthemums, zinnias or other annuals can be planted between the poppies to cover the bare places they leave when they become dormant in June or July, but beware of cutting the crowns if you cultivate. I prefer using a heavy mulch and pulling the few weeds that

come through. I believe that more poppies die by the hoe than from any other cause. Many poppies live for years and seem to be as permanent as peonies, but there is great variation in the length of life of the different named varieties and they also seem to vary in different localities. So any list of poppies found short- or long-lived as they have performed for me, might not only be misleading but unjust to the different varieties. The safest method is to divide your poppies when they are two or three years old so you will have some for replacements if you need them; but keep in mind the fact that an established plant may appear to be dead and yet come back after showing no surface signs of life for a year. In all of the garden books I have read, directions for propagating tell you to cut your poppy roots into inch and a half pieces. For the commercial grower with his facilities for propagation this is correct, but for the amateur gardener, it is just plain suicide. Take a poppy root six to ten inches long and at least as thick as a lead pencil. Plant it upright in good garden soil with the upper end about two inches below the surface (be sure it is the upper end) and it should give you a plant that will bloom the next spring. August and September are the best months and never replant until completely dormant in July. The best method of digging the plants is to dig a hole twelve to eighteen inches deep on one side of the plant. Take a steel rod (a stove poker is ideal) and carefully loosen the soil around the plant, exposing the roots; and remember the poppy roots are very brittle. If any of the roots break, save them, but be sure to keep the upper ends up as the new leaf buds form on that end. With care you can remove the plant almost intact. If it is an old plant, it probably has naturally divided into several crowns only slight-

ly connected which are easily cut apart. If you wish more plants, a slight upward pull on any of the large roots will detach them. If it is just one long root, you can cut it into lengths of six inches or more. If you do not care to disturb your plant, you can remove the soil from the side of the plant until you locate a good side root; then just remove this and replace the soil. Another method is to cut the plant off about six inches below the surface. Plant the crown and the cut off plant will usually come back from the roots left in the ground and bloom in the spring. In replanting, be sure to plant upright with the crowns three inches below the surface. Water them in but do not bear down on the soil as the roots are brittle. Later see that soil has not settled leaving a water-pocket. After the leaves have obtained their fall growth and the mice have settled for the winter, cover the ground and under the leaves with a good thick mulch of straw, hay or other like material. Do not smother the leaves as they stay green all winter. All that is needed is to prevent heaving.

Of all the joys of flower growing, nothing equals the pleasure of growing planned hand-pollinated seedlings and rushing out each morning at blooming season hoping some of the characteristics you were trying for, will appear. For twenty years my wife and I have been hand-pollinating flowers (mainly the Oriental poppy). During this time out of the thousands of seedlings produced, fourteen have been named and introduced. Of these fourteen, we have discarded seven and hope that they will not be resurrected to haunt us. Undoubtedly as we produce better ones, we may feel the same way about the others, but for the present we believe they are worthwhile contributions.

It is a waste of time and energy to try to grow Oriental poppies from seed

except for breeding purposes. The reversion to species (or throw-back) is very heavy and seedlings from the finest named varieties will produce (with an occasional exception) ninety percent red-orange flowers. So unless you wish to adventure in breeding, buy poppies grown from root cuttings from a reliable dealer. Don't fall for the delusion of potgrown plants sold in the spring. If you manage to keep the plants alive over summer, you will be lucky if they bloom the following spring, because a plant that should have a root a foot long has been stunted in a small pot.

While we have very few records of the earlier parentages in the Oriental poppy, it is very easy to make sure of your own parentage. Early in the morning select a newly opened flower with no trace of pollen on the petals or top of the seed pod. With a small pair of scissors, cut out all the stamens and place them on a sheet of paper with the name of the poppy. Keep these sheets spread out in a light dry room. The pollen ripens in a few hours and remains fertile for about two weeks. Take a paper of the pollen you wish to use and a small artist's water-color brush and cover the head of the seed pod with a layer of pollen dust. Draw the petals of the flower together and snap on a rubber band and they are safe from other pollen. Attach a label with the name of the parent + pollen parent. Most breeders plant their seed in the fall, but heaving is so severe in this climate that I have better success planting very early in the spring (about March 15th). Later in May when the sun gets hot, I place a frame covered with burlap about eighteen inches above the plants and they will continue to grow and stay green all summer. A small percentage will bloom the next spring, especially if they are given more room by transplanting in the fall.



Manchu's Fan

Of our earlier seedlings, Manchu's Fan is the only introduction we have not discarded. It is the only Oriental poppy we have seen where the green bracts extend well beyond the blooms (see illustration). The color is scarlet and we have been trying for years to produce this form in other colors, but it seems to be extremely recessive. We have one other early seedling that we are very fond of—we call it Crumples, for the petals are like a piece of crushed tissue paper. Many poppies have this effect when they first open but this poppy holds this form to the end. We have been able to carry this effect over to a limited degree. We have good crinkled red and several pink coming on. We have no parentage records on these early seedlings and no record on a few of our later ones, because they bloomed after we had abandoned the bed and removed the markers.

Everyone who sees Wunderkind considers it the most beautiful of all poppies. It is very large, has a fine heavy stem, good height (about three feet) and a brilliant watermelon pink color. It has absolutely no fertile pollen and with pollenization will only produce one to three seeds in a small percentage of the pods. We have grown about fifty Wunderkind seedlings, crossed with everything we have. First generation seedlings have never shown a trace of this color but it does appear in second and third generations; but we have not produced a superior one. Glowing Rose is the only one we introduced. It is a different form of bloom and a little lighter in color. This is a seedling of Curtis Giant Flame (parentage Wunderkind + Enchantress) + 21 (parentage unknown), color a watermelon pink. Curtis Giant Flame is the only first generation Wunderkind

seedling we have introduced. Tall, heavy stems and with blooms ten to eleven inches across and while a light colored red, it is a clear red free from any yellow or change tints. I believe the three best foundations for Oriental poppy breeding are Wunderkind, Enchantress and Australia—all three carry fine height, size, stem, and vigor. Mahony (be sure you get Mahony, color mahogany purple-red) or Henri de Cayeux will give odd tints in wine colors and good branching roots. Curtis Giant Mulberry (C 70) is Mahony + Enchantress. Jessie Curtis, a medium size, profuse blooming mahogany-red, is Mahony + C 21. Raspberry Queen, a red raspberry color, is C 70 + C 80 (Ethel Swete \times ?). We believe we have finally produced a red that will be grown for many years. It is only medium in size and height but the tint is entirely new. It is a deep red without a trace of orange and the color is so clear that either in sun or full shade it seems to glow as though the light came from within. The best description is a glowing watermelon-red. The parentage includes Wunderkind, Australia and (C 21) third generation from Wunderkind. We plan to name it *G. I. Joe*.

Production of poppies without a basal spot is comparatively easy, as some appear in almost every planting, but they are usually small in size and consequently it will take time to produce large ones in all colors.

It will take a lot of breeding to produce a white or a yellow poppy that will rank with the best we have in other colors. The yellows are still only near yellows and many burn in the sun. The whites are apt to have a grey appearance due to pollen dust and a dark blotch and are notoriously short-lived.

Why Did My Oriental Poppies Die?

L. W. KNAPP

Past President, American Oriental Poppy Society

There is no book to our knowledge upon the growing and history of the Oriental Poppy, although there have been a number of magazine articles in England and of late years in popular American magazines.

The Oriental Poppy is classed as a perennial though its behavior is different from that of many of the familiar perennials. The Oriental Poppy makes most of its root growth in the Fall and Winter, and like Peonies should be planted or reset in the early Fall for best results, if planted in the Spring it should be done before April first, but do not expect any great showing from the plant that season. We do not recommend spring planting.

The native home of the Oriental Poppy is Iran (Persia) and along the Mediterranean district. It was brought north into Germany and then into the other adjoining countries, later to this country. If it is planted in a suitable location it will last for a number of years.

Now how to make it last the maximum of years is uppermost in the minds of many poppy lovers, and the number has been increased since the introduction of the newer shades and the larger sizes which do attract attention, although the latter usually do not have as many blooms per plant per season. As to the life in years of the Oriental Poppy, it is just like people. Some plants do die younger than others. The medical profession after years of experimenting and study has been able to prolong human life by recommending certain living conditions, in other words assisting nature. By many years of study and observation to the grow-

ing habits of the Oriental Poppy experimenting with different ways of planting, times of planting, types of soil, etc., certain results seem to point to the likes and dislikes of this perennial.

The first I would impress upon you for your next poppy planting is perfect drainage; by this I mean that the water level of the soil should never be more than within six inches of the top soil. In a Spring of excessive rains, even on sloping ground, the soil becomes water logged and causes loss of many roots. A loose loam would seem ideal although I have found that roots grown in sandy soil and then reset in heavy soil have more of a tendency to rot, while cuttings taken from these same roots and grown to maturity make good stock. So in buying it would seem that roots grown on heavier soil while not as large as others, would be the best buy.

The second important item in planting is to have the top of the root system or crown planted from two to three inches below the soil level. Why? It seems that if the crown becomes exposed to the air it invites rot and we believe that very many plantings are lost for no other reason. A poppy root sprout will come up through a foot of soil if it must. If properly drained, you do not have to make it work that hard. It is like trying to kill a mole by burying it alive; it can't be done. I honestly believe you cannot kill a poppy root if it is planted deep enough and given proper drainage.

Now to those who say, "my Poppy did fine for three or four years and

then died" I would say it was from one of the above reasons, excessive rains that particular season or the exposure of the crown to the air. The latter can and does come about by the foliage on a plant originally not planted deep enough pressing the earth away from the crown in its spring growth leaving a funnel just above the crown to catch moisture and be exposed to the air, on plantings you now have on which this happens when the leaves wither after blooming time we suggest that you place a trowel of earth in this funnel like hole to keep the air away from the crown. Another reason for deep planting is to prevent heaving by frost the first season prevalent in some locations, we recommend covering the planting with excelsior or straw the first season after the ground freezes, we prefer the former as it brings no weed seed, do not use leaves or manure as they pack too readily and if not removed early in the spring hold the moisture too closely to the planting.

Some have recommended planting the root at an angle of 30 to 45 degrees the idea being for drainage this may seem an advantage the first season but the natural way for the roots to grow

is down and up for the leaves and crown and that is the way you will find them after the first season, have tried planting horizontal and the second season's growth will be up and down.

For best growth of roots they should be planted in full sun true, some of the delicate shades will sun burn and fade soon, better use these varieties as cut flowers cutting them early in the morning before the bees disturb the flower sear the end of the stem after you have it proper length for your vase, this may be done in boiling water or at the stove, and they will last as long as a rose giving you days of beauty.

Nature gave us the Oriental Poppy in shades of red and orange which usually stand the sun's rays, it was through hybridizing that we now have the shades now so popular which blend so wonderfully with the many other flowers of the garden.

If you have a planting of the Orange or Red shades plant among them some of the early blooming white daisies called Memorial Daisies which bloom the same time as the Poppies and the mass of white blooms will blend your colors and avoids the clash that disappoints those that prefer the pastel combinations.

A Few Guide Posts in the Production of Strawberries

FULTON W. ALLEN

A few year ago fruit of almost any kind was considered something of a luxury. More recently studies in nutrition have shown that fruit makes a valuable contribution to human diet. Strawberries are regarded as an excellent source of ascorbic acid (Vitamin C) noted as a preventative and cure for scurvy. Strawberries were retained on the U. S. government's priority list of essential foods. In addition to its essential value it is also one of the most delectable fruits known to man.

Strawberries have an advantage of a wide geographical range growing from Florida to Newfoundland and from Southern California to Alabama, and to a lesser extent in more subtropical regions. They can be produced in about fourteen months for the spring bearing varieties and in less time with the everbearers. Production is adapted to small areas as well as large, and equipment for handling the crop is less than that needed for almost any other fruit crop. These considerations recommend strawberries as probably the most universally useful fruit crop, for the small or Victory Garden.

A sandy loan soil is ideal but satisfactory crops can be grown on either lighter or more clayey soils. Any soil that will produce good crops of garden vegetables should be satisfactory. It is well to use land that has been previously tilled as grub worms will probably give trouble where grass sod has been freshly turned. However, in areas of newly cleared land, not too sandy, excellent crops of strawberries are often grown. Sandy areas of forest land are sometimes infested with root nematode. In rolling country a slight

slope is preferred in order to provide air drainage but in this case run your rows across the slope to check erosion. It is sometimes possible to select a site having some natural soil moisture. In a dry year this will be found to be a great advantage.

The more attention paid to the preparation of the plant bed, the greater probability of success. It is very helpful to have plenty of humus in the soil for successful production. Some green crop turned under in late fall or a crop of rye or clover in the spring, giving it a chance to rot, would contribute to a successful planting. If available, animal manure spread at from five to twenty tons to the acre (one to two bushels per 100 square feet) in winter or early spring and turned under, would give the crop an excellent bed. In addition to the food value of the vegetable material, it provides an excellent reservoir for the retention of moisture.

Emphasis should be placed on the importance of moisture. Summer drouths are responsible for many failures when conditions are otherwise favorable. Overhead or trench irrigation is, of course, the most dependable answer to this problem. Canvas hose or perforated hose laid along the beds has been used to good advantage. Irrigation is in many cases impractical. The selection of a loamy soil naturally retentive of moisture, the incorporation of ample amounts of decayed vegetable matter to retain moisture, frequent shallow cultivation to check excessive evaporation are all important in areas subject to prolonged drouths. It has been noted that there is more tolerance



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Fairfax

to dry conditions on the part of some varieties than others. Under comparable conditions, Fairfax and especially Dorsett have produced in excess of Premier in dry years.

Fertilizer and lime should be considered in connection with preparation of the land. As stated above, success with garden vegetables indicates a soil on which strawberries should be successful. In regard to lime requirements of strawberries the optimum pH value is about 5.5. However, with favorable conditions of tilth and organic matter they will tolerate a considerable range of pH value. Although strawberries are thought of as acid soil plants, on low black soils where the pH value is 5.0 or below, lime should prove beneficial but care should be taken that it be well distributed in the soil and applied not too near the time of setting plants. In this connection potash salts, which have a high alkaline reaction, are not generally regarded as having food value for strawberries except pos-

sibly in low fertility soils or on mature beds. On high fertility soils or where ample amounts of animal manure have been used, little commercial fertilizers may be needed. Generally, however, an application of 600 pounds per acre (1 lb. to 20 ft. of row) of 5% organic nitrogen such as tankage, fish or dissolved bone, and 8% super phosphate stirred well into the soil should prove beneficial. It should be emphasized that salts of nitrogen or potash are injurious to roots of plants if they come in contact with them. Applications of fertilizer to mature beds can be made if needed in late August or early September of 600 pounds to the acre of a 6-8-2 fertilizer, care being taken to apply when dry and to brush off the foliage immediately.

Fall planting in states below North Carolina is perhaps as general as spring planting. In the Middle states March and April; and in the Northern States above New York City, April and early May is unquestionably the best time



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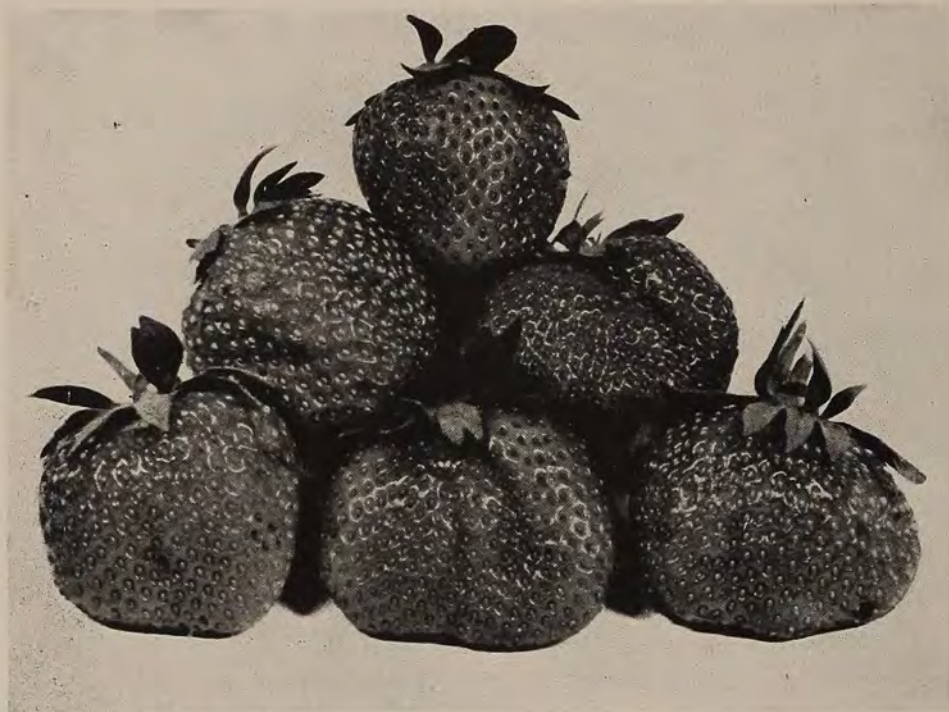
Dorsett

to make plantings.

Despite its range, the strawberry is a cool weather plant and it is important that they be well established while cool and moist weather prevails. Furthermore, young plants made early in the season are better able to produce fruit than young fall made plants.

Plants should be set soon after arrival. If that is impossible due to bad weather or any other cause they may be kept in the shipping container in

cool storage, your refrigerator if there is room, or a snowbank, but not exposed to sun or wind. In case they have to be kept for a week or more in warm weather and no storage is available it is best to dig a V-shaped trench about six inches deep. Open the bunches, wet and spread them so that soil will be in contact with all the roots, fill in soil up to the crown and soak well with water. When ready to plant, a cool cloudy day is best, at least be



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sure that the roots are not exposed to sun and wind longer than is necessary.

Plants should be set in rows $3\frac{1}{2}$ to 4 feet apart, 18 to 20 inches apart in the row. In small gardens these distances may be closed up a little. With the hill system used in the lower south, and sometimes with everbearers these distances do not apply.

The roots should be set straight down or slightly spread, using a spade or long trowel. In this operation care should be taken that the earth be well packed around the roots, using the toe of the shoe for this purpose. Sometimes where larger plantings are made by hand, the plants are "walked." After planting one walks directly on top of the plants, the crown fitting into the instep. Large commercial growers use horse drawn transplanters. It is very important that the bud or crown be set exactly at soil level and care should be

taken that bud not be covered during cultivation, or else uncovered directly.

Subsequent attention involves cultivation and training. Where the area justifies horse or garden tractor cultivation is done between the rows and should be done carefully so as to stir the ground as close to the plants as practical to save work with the hoe, but as cautioned above not to cover the plants. Hoeing should be done one to one and one half inches deep to keep the soil friable that runners may be able to root, to loosen the soil to conserve moisture during dry weather, and to destroy grass and weeds. During the operation of hoeing it is a good time to do the necessary work of removing the fruit buds as it weakens the plants to bear during the growing season. This practice in the case of everbearers is followed until about August 1st.

The training of new runners is an important part of the hoeing operation. Plant beds should not be allowed to become too thick as larger and better berries are obtained where each plant has room to properly develop. Four to eight plants to the square foot is plenty, but exact spacing is not necessary. When a satisfactory row has been attained, subsequent runners should be removed.

Too much emphasis on the question of insects and diseases may tend to discourage the prospective grower of strawberries. Part of these troubles are somewhat local in their prevalence. Root nematode and grub worms have been discussed. Cut worms which eat succulent parts of plants in early stages of their growth are controlled by the use of 10 lbs. bran $\frac{1}{4}$ lb. arsenate of lead and one pint of molasses, adding enough water to make a dough and placed near each plant as a bait and poison. The strawberry weevil may appear at blossom time or just before and cut off the fruit buds at the tender stage. Dusting as they first appear with 85% dusting sulphur and 15% calcium arsenate, repeating if necessary, is recommended. Do not dust after berries are half grown. The best possible disease control is to procure disease free stock and plant in land not recently used for strawberries. Selection and breeding of disease resistant varieties is being done by the U. S. Department of Agriculture and some state experiment stations.

Mulching is practiced particularly in the north and for the following purposes; to avoid early bud freezing; to avoid thawing too quickly thus causing plants to be lifted partly out of the ground; to discourage weed growth; to delay blossoming; and to keep berries clean. Application of straw or marsh grass is made by covering the beds lightly just before hard freezing.

Of the early varieties, Premier is doubtless least affected by late frosts, and is productive and profitable in the North, and middle States. Fairfax is of excellent quality, productive and beautiful becoming dark red when fully ripe but retaining a remarkable firmness. A northern and middle states berry. Dorsett excellent in quality, size and firmness is almost as productive as Premier. Blakemore, while of not as good quality as Dorsett or Fairfax, is a bright, very firm and productive berry, adapted to the lower middle states and the South. Firm and of very good quality is Midland a new second early.

Of the midseason varieties, Catskill is a leader. Berries are large, firm and of good quality. Adapted from north to upper South. Big Joe is a good middle states, midseason berry. Chesapeake has long been a leader among the late berries. It is firm and of excellent flavor, but needs good soil for good plant growth.

Two new late berries, firm and of good quality are Starbright and Redstar. As soon as sufficient plants are available they are well worthy of your attention.

Everbearers should really be treated in a separate article as many phases of handling the crop are different, although cultural practices are essentially the same. Mastodon and Gem are two of the standbys. Other varieties of Everbearers new to the public are being offered, some doubtless meriting a place in your garden.

No summary of the above article is being offered. The article itself is a summary, in some respects inadequate, but it is offered in the hope that it may help some to a better understanding of a few of the factors involved in the production of this delightful fruit.

Experiments With Seeds and Plants

ROBERT M. SENIOR

In recent years many experiments have been made with the view of hastening the germination of seeds, and of stimulating plant growth. An account of some of these experiments, and of the conclusions arrived at, may be of interest to the amateur gardener.

A leaflet published by the Extension Department, College of Agriculture, of the University of California, describes experiments on plants, with the use of Vitamin B¹ (thiamin). About 25 plants were chosen, and kept under greenhouse or field conditions. With possibly two or three exceptions, none of the treated plants showed any improvement over the untreated ones. Similarly the claims that watering the plants with thiamin, or soaking the roots with it, would prevent wilting, could not be verified. The conclusion arrived at was that thiamin appears at present to hold no general practical utility, and that "claims for its general effectiveness were not founded on fact."

Many of us who have planted seeds, and have had unsatisfactory or slow germination, are often inclined to lay the blame on nurserymen for sending out old seeds. Of course we know that seeds of hawthorn and holly are slow to germinate, but when we purchase seeds of herbaceous plants, we generally assume that they will come up with reasonable promptness. However there may be factors inhibiting germination of which we are entirely unaware. For example, in a study of certain *Amaranthus* and *Celosias*, it was found that the seeds of these plants had an aversion to light, and if the seed bed was kept dark, the germination was excellent. On the other hand,

with certain other seeds such as various species of *Lobelia* and *Veronica*, best results were obtained when the seeds were planted almost on the surface of the seed bed, and kept in full light. *Primula obconica*, *Ramondia pyrenaica*, and one or two species of *Draba* and *Mimulus*, almost failed completely to germinate when the seed bed was kept dark.

Even the temperature of the room in which the seed bed is placed, frequently has an effect on germination. In experiments with Juniper seeds, it was found that when the temperature was kept at 40 degrees Fahrenheit, germination was greater than when kept at 50 degrees. Even before the seeds were planted, it was found that a very low temperature was injurious unless the seeds were kept dry. Furthermore, after the seedlings appeared, those kept at a temperature of about 75 degrees grew fastest, although those kept at 60 degrees appeared most healthy.

The Boyce Thompson Institute conducted a series of experiments on the germination of seeds of alpine. As in the previously mentioned experiments with Juniper seeds, it was found that the temperature at which the seeds were kept before being planted, had a marked effect on germination. For example, the seeds of *Campanula barbata* kept at about 40° F. for three weeks, and then planted, germinated in one week. On the other hand, when these seeds were kept for three weeks at a temperature of about 70°, and then planted, the germination was very unsatisfactory. Of course, this and similar experiments only tend to confirm our actual experiences with the seeds of alpine, which we know, in the

case of many species, must have cold pretreatment before they will germinate satisfactorily. Hence the rock gardener plants seeds in pots or pans during the winter months, in order to have early Spring germination. In this connection, it might be worth mentioning that roses, dogwood, apples, pears, and conifers generally require similar treatment.

In order to hasten germination, seeds have been immersed in various chemical solutions before planting. Among these chemicals used, apparently in some instances with good results, are indolacetic acid, sulphocyanate, ammonium thiocyanate, and hydrogen peroxide.

In regard to cuttings, experiments have indicated that some plants root

faster when the stems are cut at the nodes, whereas stems of other species should be cut at the internodes. Clematis cuttings, for example, root faster when stems are severed at the internodes.

Sometimes callus forms at the base of cuttings, and yet these fail to throw out roots. It has been found that often if a small piece of the callus is cut off, and then the stem is reinserted in the sand, that roots are induced to form. Incidentally, if after making cuttings of evergreens, some resin should exude, it is very beneficial to dip the ends in water that is almost boiling, before inserting the stems in the sand. Apparently this procedure tends to seal the resin canals, and stimulate the formation of callus.

Rock Garden Notes

ROBERT C. MONCURE, *Editor*

Some Like It Hot

The kind of "hot" my garden knows is that produced by the direct rays of the sun through dry air in the latitude of Washington, D. C., 6,000 feet high in Colorado, intensely hot in summer sunshine, correspondingly cool in shade. "You may cool off in the shade of a telephone pole." It would be interesting to know whether plants which revel in this almost desert climate will behave as well in humid heat. The tolerance of plants is a never-ending surprise.

When the April, May and early June glory of the Rock Garden has dwindled out with the last flicker of primula and phlox there begin to bloom a few sturdy heat-loving things that flower literally all summer. Some of them slow up for awhile to catch their breath and go

on again till frost and after. The best of these are:

Crassina grandiflora
Melampodium cinereum
Galpinsia lavendulaefolia
Gilia nuttalli

Crassina grandiflora forms in time a loose mat about a foot in diameter and six inches high, with slender stems and leaves, beginning diffidently to flower in June; by July and August it makes a splurge of not-aggressive yellow. Individual flowers are self-sufficient looking daisies formed of wide overlapping bracts rounded at the top, the center a disk corolla of deeper yellow, the whole making an attractive plant. Its secret of long flowering is this bract business; bracts retaining their color when petals would have been dead and gone. The color varies from deep burnt orange



K. N. Marriage

Crasimia grandiflora



K. N. Marriage

Galpinsia lavendulaefolia

through sulphur yellow to creamy white. Plants have long woody roots with few fibers and resent transplanting except when quite young. Seed germinates eventually.

Melampodium, Colorado Rock Daisy, has wide white rays with a yellow disk center. Its wiry stems branch from the base, narrow silvery leaves are sparse. A mature plant may be one or two feet in diameter and six to eight inches high. Its continuous flowering is another case of bracts. Plants tend to be impermanent. Young roots are fibrous and transplant without a protest. Old roots are woody. Seed germinates rather readily.

Galpinsia lavendulaefolia while less steadily industrious is the winsome flower of this summer flock. Knowing some of the coarse, big, sticky "Evening Primroses" it is difficult to realize that this exquisite flower is their first cousin. Again stems and leaves are slender and inconspicuous, stems spreading so that the plant is not more than five inches high. The flowers borne in axils have four crinkled yellow petals of silkiest texture, softly yellow in youth and middle age, changing to apricot and orange tints as they reach senility. An attractive old age! The stamens emerging from a deep central well give to the flowers a just-wakened-up appearance. Its ease of culture is in inverse ratio to its beauty. Slender long woody roots defy transplanting except in babyhood. Seeds germinate for the patient gardener. A few dozen cuttings put in sand under an inverted battery jar last summer have rooted one hundred per cent.

Gilia nuttalli while its home is in the high, cool places is adaptable and happy even in the hot summer. Its habit and flowers are like low-growing phloxes, stems radiate from the base forming a rather symmetrical plant and the terminal clusters of white flowers

snuggle down into a tuft of foliage. The leaves are a clean, bright green giving the plant a fresh, crisp air even in the dog days.

These descriptions apply to plants grown in full sunshine in a rock garden whose foundation is gravel and chip rock with a surface of about four inches of sandy loam. *Gilia nuttalli* is the only one of the quartet whose home is in acid peaty loam. The other three are found in rocky shale and even in stiff alkali clay but always where they are assured of a dry winter. It is possible that rich food and much drink would render them lush and less desirable as rock garden plants.

KATHLEEN MARRIAGE,
Colorado Springs, Colorado.

Desmodium

Fall blooming shrubs are not too plentiful, consequently, when we find one with the fine qualities of the *Desmodium*, it is highly appreciated. As I write this, the first week of September, the plant, (one can scarcely call it a bush), is becoming a perfect mound of deep rose, with just a shading of purple. The *Desmodium* dies to the ground each fall, then in the spring sends up many slender, wand-like stems which grow head high in a well established plant and droop gracefully in all directions with the weight of its wealth of dainty pea-shaped flowers. They crowd the stems in heaps and clusters, almost completely hiding the delicate pinnate leaves.

The slender stems are thickly branched and every one of these branches and their branchlets are packed with the small rose pea-flowers. The buds next the stem open first and last for days with new buds crowding in where there seems no possible place for them. When the season suits this plant there is no more gorgeous sight in the fall garden than a mound of in

along about its second week of blooming. The big heavy sprays droop over onto the ground and simply pile up. It has two traits that is on the other side of the ledger, however, for if the season is not to its liking one thinks it not worth bothering with for there are but scattering blooms. Then it definitely is not a good cut flower for the color fades and the blooms rattle off. In spite of these two quirks, it is a grand garden brightener, and worth enduring in its few off years for the wonderful display it makes when at its best.

A hedge of this shrub as a background for low growing flowers, of just the right shades, would be a delightful garden picture. I have a big clump of it directly back of a sheet of rose verbenas, which certainly is *not* a pleasing arrangement, lovely as each are. One or the other is going to be moved before another spring.

The *Desmodium* is quite attractive earlier in the season, too, as the leaves are delicate and combine prettily with the gracefully drooping stems. As soon as the leaves fall in the autumn I cut it back to the ground, so, at no season of the year does it detract from the garden picture. If I were called upon to

pick any number of choice, perfectly hardy shrubs, I think the *Desmodium* would be among the first.

Violet "rosea"

Here is another beauty for the fall garden. The leaves are low and compact, not rampant like the blue violets. In the summer they do not do much growing and appear to be resting, but with the first fall rains there will be a wonderful fragrance to meet one some morning, announcing the first insignificant little pink bloom. You have to hunt for it to even find it. Just as soon as the days become slightly cooler it really shows its merits. The flowers come crowding up all through the dark leaves, a bright vivid, real pink, with long stems and good size. Frost, or even a pretty hard freeze does not bother them in the least. All during the winter there will be clusters of the sweet things ready to pick, if there is any good weather at all. A deep freeze kills the flowers that are open but with a milder spell of weather and a little sunshine they come on again, until the really warm spring days, then they rest for another summer.

MRS. H. P. MAGERS,
Mountain Home, Ark.

Rhododendron Notes

CLEMENT G. BOWERS, *Editor*

The Height of Kurume Azaleas

Azalea varieties called *Amoena* and *Hinodegiri* have long been known in this country. Probably both of them are Japanese, although *Amoena* was for some time assumed to be Chinese in origin, having been brought in from Shanghai about 1850 by Robert Fortune. Nearly everyone is familiar with

their compact, dwarf habit. It has been said that other dwarf varieties of the Kurume type were brought here for the first San Francisco Exposition of 1915, but these were lost to sight and it was not until 1919 that the late E. H. Wilson, on a visit to Japan, selected fifty kinds and had then shipped to the Arnold Arboretum. These came in

under Japanese names. Later Wilson renamed some of them, giving them names which bore no relation to the meanings of their original Japanese counterparts (which generally could be translated as something poetic, such as "Snow in the Evening," "Flying Dragon," "Above the Clouds," "Giraffe," etc.). These were tested, found tender in New England, but disseminated to the trade and recommended as greenhouse subjects and as garden plants for mild climates. Most of them did not prove sufficiently hardy for outdoor culture except in sheltered places on Long Island and southward. Being easy to propagate from cuttings they were extensively grown by nurserymen and today are popular where the temperature is mild. Being compact and floriferous they were used in hybrid combination with other azaleas of the "Indian" or greenhouse type and have given rise to one or more races, such as the "Rutherfordiana" hybrids of Bobbink, showing intermediate characters and good commercial pot-plant qualities. Many of Wilson's original Japanese introductions have now passed out of sight, while a good many new varieties have arisen, apparently as seedlings from Kurume parentage.

Now the original Kurume azaleas, as described by Wilson, are of dwarfish habit, "seldom a metre tall, more usually less than half of this, and quite commonly they are prostrate or hug boulders closely. The habit is normally dense and twiggy, but when sheltered a few strong shoots develop and the plant becomes relatively tall and sparsely branched." Elsewhere Wilson describes the wild form as growing on windswept mountainsides, where it extends to above the tree line. In Japanese gardens it was likely kept dwarf by constant clipping, although naturally dwarf forms, similar to our Amoena and Hinodegiri, must surely have oc-

curred and were probably the ones selected for naming. In this country, too, the belief in their inherent dwarfness was kept alive by the fact that the seedlings were all young and, being compact anyway, did not develop height for some time. So the legend has gone on that Kurume azaleas are dwarf and will not exceed three feet in height.

Recently, however, a good many seedling plants, purportedly of Kurume origin, are getting older and are growing up into bushes nine feet tall in this country. The question arises, Are they Kurume azaleas? And, if not, what are they?

In his "Monograph of Azaleas" (1921) Wilson places the Kurume Azaleas in the same species with Kaempfer's azalea, calling them merely different forms of the same species and stating that intermediate forms exist. Horticulturally, however, the differences between the Kurumes and *Kaempferi* are so significant that most other modern writers have preferred to keep them as separate species. These distinctions would seem to be somewhat parallel to those between two common American azaleas, *R. nudiflorum* and *R. roseum*, which likewise have intermediate forms.

Recognizing the extreme amount of variation which naturally occurs in both *R. Kaempferi* and *R. obtusum* (the supposed wild form of the Kurume azalea, which grows on Mt. Kirishima), it would seem that the character of dwarfness may not be a stable feature of Kurume azaleas, but that dwarf individuals occasionally occur and that these are the ones which have been selected as standard bearers for the race. The prevalent Japanese habit of clipping azalea plants, also, would tend to confuse an observer, especially if the only plants seen in the wild were growing on a high mountain where the

ecological conditions kept them small. The fact that Wilson noted wild plants growing taller in sheltered places indicates that this might be true.

One other possibility should not be overlooked. It is that the tall-growing American Kurumes might possibly be seedlings from open-pollinated flowers and are in reality hybrids with some larger species, such as *R. Kaempferi*, and hence not true representatives of the Kurume race.

Whatever the cause of the increased height of these American azalea seedlings, it would seem improper to call them Kurume azaleas until such time as it is known that the original Kurume varieties are capable of growing beyond the generally accepted height limit for the class, which would be about three feet or so. While the dwarfness may be an artificial character, nevertheless it is so associated with the appearance of this cultigen group of plants that I would rather call the taller sorts merely "Obtusum seedlings" and reserve the name Kurume for those that follow the original size pattern.

Mound-layering of Deciduous Azaleas

In one of the older nurseries in England, there was one section of the grounds given over to the propagation of deciduous azaleas by this long-known but little used variation of the familiar system of layering. The site was level, somewhat shaded by trees, with a fertile soil made rich in humus but with excellent drainage to prevent any stagnation and yet allow a relatively high and even water table. The bushes were

spaced about six feet each way and were already very old.

In the beginning, the young plants had been allowed to grow until well established cutting them to the ground as needed to cause a great number of stems to form. When there were a goodly number, the whole base of the plant was covered with a mound of loose, peaty soil mixture so that after settling some six to eight inches covered all the bases of the stems. In about two years, the bases of all these stems had made a good mass of fibrous roots and could be cut off, after the mound was cleared away to facilitate the work, and lined out in the nursery to continue life on their own roots.

The plant was allowed two years to produce a new crop of shoots and then was subjected to the same procedure. Obviously each succeeding semi-interment produced an ever-increasing number of plants since the number of sprouts was increasing.

In practical nursery work, there is the necessity of maintaining several plots of "mother" plants in order to maintain a constant supply of material ready to be removed.

For the gardener who wishes to increase some deciduous azalea which does not root easily if at all from cuttings, this is an easy method, since he need not carry it to an extreme and if he entertains doubts as to the capacity of deciduous azaleas to recover, all he need do is to look at some bit of woodland recovering after a fire and see the regeneration of the old stumps which fire has not killed by any means.

Lily Notes

DR. GEORGE L. SLATE, *Editor*

Chinese Lilies Discovered by French Missionaries

HELEN M. FOX

Nine new species and two varieties of lilies were discovered in China by French priests, the Abbés David, Delavay and Farges. These three, and Abbe Jean-André Soulié, also found lilies that had been discovered by previous explorers. The four French priests were brothers of the order of St. Vincent de Paul and called Lazarists after the mother house in Paris. Abbé Armand David was the greatest scientist among them and went on three exploring trips to collect birds, mammals and other specimens of natural history, as well as flowers. He sent back 1,500 herbarium specimens of plants new to science. Hundreds of plants are named for him besides *Lilium Davidi*, such as *Clematis Armandii*, *Prunus Davidiana*, *Rhododendron Davidsonianum* and the genus *Davidia* of which the one species *involucrata* is a tree with floral bracts like fluttering handkerchiefs. A distinguished botanist was Abbé Jean-Marie Delavay who sent back thousands of herbarium sheets, 5,300 of them species, of which 1,800 were new to science. Many of his discoveries are called *yunnanensis* because Yunnan was his territory, or *Delavayi*, as with a rhododendron, a peony, and a magnolia. An obscure priest devoted to his flock, living in the mountains of Eastern Szechwan, was Abbé Paul Guillaume Farges. Among the plants he discovered are *Lilium Fargesii*, *Berberis dictyophylla*, *Ilex Fargesii* and *Rhododendron Fargesii*, to mention only a few of the 2,000 species he sent

back home. Farges collected in order to secure money for his parishioners. There were other plant collecting priests who did not discover lilies. Among them were Abbé Guiseppe Giraldi and Abbé Bodinier.

The tradition for priests to send home plant material was an old one, the first Frenchman to do this being Father Incarville, stationed in Peking in the mid-eighteenth century, for whom the genus *Incarvillea* was named.

The priests were sent to China primarily to convert the people to Christianity but also to make friends for France. They were carefully educated and trained variously as scientists, teachers or doctors and all were taught Chinese before being sent to their stations. Since they lived in one place for a long time, they had an excellent opportunity to gather plants.

The intensification of collecting in the second half of the nineteenth century from David's first trip in 1865, to Farges' last specimens to come back in 1903, and Soulié's in 1905, was largely due to increased interest on the part of France, in Chinese affairs, from the commercial, scientific as well as the artistic points of view. In Paris there was a group of scientists who encouraged collecting by raising money and obtaining permission from the Abbé David's superiors for his explorations and by making him, as also Abbé Delavay, ministers of public instruction to help them financially.

At the Sorbonne, Pierre Étienne Duchartre was professor of botany from 1861 to 1887. He was primarily a describing botanist and wrote copiously on plants. Among his writings is the *Observations Sur le Genre Lis*, pub-

lished in 1871 and based largely on the catalogue of Max Leichtlin's collection in Baden which had been assembled with the help of Kew and the Botanical Garden of St. Petersburg. A. Franchet, a systematic botanist, was at the Musée d'Histoire Naturelle in Paris from 1880 until his death in 1900; his title was Repetiteur du Laboratoire des Hautes Études and he was interested in the geographic origin of plants. After naming collections from Japan, he was given the collection of Abbé David to determine and published this work under the title of *Plantae Davidianae*. Franchet also published two parts of Delavay's collection, entitled *Plantae Yunanensis* but died before he could complete the work. In an article, *Plantes Nouvelles de la Chine*, published in the Bulletin of the Musée d'Histoire Naturelle de Paris, Vol. IV, he described plants found by Delavay, Farges and Soulié. On the subject of Lilies his article *Les Lis de la Chine et du Thibet dans L'Herbier du Musée de Paris*, published in 1892 was highly important, of which more later. Franchet wrote with extreme clarity while Duchartre was discursive and sometimes difficult to follow.

French collectors were more interested in the science of botany than in horticulture. Perhaps they were so accustomed and so pleased with their formal gardens composed of few varieties of plants that new introductions did not entice them so much as they did the English. However, thousands of new plants were grown in the garden of the Musée d'Histoire Naturelle. Elie Abel Carrière, a great gardener, and chief of the nursery from 1852-78, wrote about the Chinese plants he grew. Not far from Paris at Verrières les Buissons was the establishment of the Vilmorin family, whose firm Vilmorin-Andrieux et Cie sold plants throughout the vast French Empire,

was keenly interested in exotics and introduced many of them. In 1906 Philip de Vilmorin published the catalogue entitled *Hortus Vilmorinianus* of shrubs, trees and herbaceous plants grown in his own garden as well as the adjoining nursery. In 1904 the Bishop Maurice de Vilmorin issued a catalogue of shrubs in his garden, *Frueticetum Vilmorinianus*, in collaboration with D. Bois of the Musée d'Histoire Naturelle. In these catalogues when the plant was a new species, it was described and there were cultural notes about it. In each of these remarkable collections over 6,000 plants were listed.

However, much of the material sent from China to be grown was destroyed or lost and with the lilies, even after they had been raised, some of them disappeared, as is their habit. Thirty years after Delavay's specimens came to Europe a group of English collectors was sent to Western China to collect the lost plants again, among them were George Forrest, J. F. Rock and E. H. Wilson, who went over the same territory as the French and found drifts of *Duchartrei* and *myriophyllum* high in the mountains and *ochraceum*, *Bakerianum*, var. *Delavayi* and *Fargesii* in the valleys. The second series of explorers sent back seeds and bulbs, some to persist and others to disappear.

The rule in botanical nomenclature, as most people know, is for the first description to be published in Latin to have priority as to name. Often there are conflicts in dates and then for a time confusion results as happened with *Lilium Davidi* var. *Willmottiae*, called *Thayerae* and *Lilium Duchartrei* called *Farreri*. Frequently botanists re-examine and reclassify species, or even move a whole batch of plants from one genus to another as happened with several of Delavay's discoveries, first classified under lilies, but since

1934 placed under a new genus, *Notholirion*. The botanist who names the plant affixes his name, so it is known who is responsible. The majority of lilies sent home by French explorers have Franchet appended to their names, but Duchartre, Carrière and Levillé also appear.

Of the four priests, all were born in mountainous or hilly parts of France. From early years they had been accustomed to long walks over difficult terrain. Abbé David wrote that if he had not been a Basque, he could never have stood the rigors of his travels. It can be imagined how delighted Delavay, Farges and Soulié must have been to find their lonely stations, far removed from companionship of their own kind, to be in surpassingly beautiful country. David travelled to these mountains and valleys.

In these high mountains of China and Thibet were all climates from mild in the valleys to above the timber line high towards the peaks. Though the valleys were high in altitude their climate was not extreme and here it was that drifts of white, yellow, orange and pink lilies grew. In the alpine meadows were quantities of new primulas, gentians, delphinium, aconites, clematis, anemones, peonies and cypripediums to mention only a few of the flowers. On the slopes were forests, some of them rich in glossy leaved magnolias and others colorful with vividly flowered rhododendrons. Along roadsides and from cliffs grew hundreds of shrubs and herbs unknown in Europe.

In his paper *Les Lis de la Chine et du Thibet*, mentioned earlier, Franchet claimed David, Delavay and Farges had discovered 24 lilies. The number, however, was reduced to nine species and two varieties by the time the sections of the *Supplement to Elwes Monograph of Genus Lilium* were published from 1933 to 1940. As a result of the

discovery of these lilies from the mountains of Western China merging into Thibet, says Franchet "it can be affirmed the mountains of China are the principal source of lilies (as they were of *Rhododendron*, *Primula*, *Lonicera*, *Rubus*, *Vitis*, etc.). Many lilies previously found have come from cultivated sources where they had been changed from their wild state, for it is well known Chinese and Japanese gardeners are masters at transforming plants." Franchet wrote he did not think the shape of the perianth a permanent character for placing lilies because cultivated forms differed in this respect from the wild. Moreover "—sometimes the direction of the perianth divisions either upright or revolute do not show themselves completely until late in the development of the flower and generally only after fecundation." The characters he used for determining species "were constant such as the filaments, smooth in most species which are however hairy papillose in others and the only character to distinguish *L. Brownii* from *L. longiflorum*; the type nectar furrow which in some species can be reduced to a median nerve, very slightly depressed but always covered towards the base with a sticky fluid, e.g. in *L. cardiocrinum* and *L. speciosum*."

Three lilies are credited to Abbé David, namely, *L. Davidi* Duchartre, *L. Duchartrei* Franchet and *L. cathayanum* Wilson.

Abbé David wrote delightfully of his three journeys. The first two were published under the title *Journal d'un Voyage en Mongolie, Chine et Thibet*, in three bulletins of *Nouvelles Archives du Musée*. The first journey in 1865 took him to Southern Mongolia, the second from 1868-70 to Central China as far as Moupin in Thibet. The account of the third journey from 72-74 undertaken in Shensi, Szechwan, Ki-

angsi, and the mountains of Foukien was published in *Troisième Voyage d'Exploration dans L'Empire Chinois*, in 2 small volumes in 1875. The discoveries and diaries created such a stir that numerous accounts appeared in scientific as well as lay journals and three articles about them came out in the *Revue des Deux Mondes*, the French counterpart of the *Atlantic Monthly*. With Dr. Oustalet, David wrote *Les Oiseaux de la Chine*, an account of the birds he had collected and in addition many articles in scientific and Catholic journals. He was a brilliant scientist, a remarkable teacher as well as a very religious and lovable man.

The following notes on lilies have been collected from French sources and were checked in H. J. Elwes' *Monograph*, the Elwes supplement by A. Grove and A. D. Cotton, *The Lilies of Eastern Asia* by E. H. Wilson and *Lilies* by H. D. Woodcock and J. Coutts.

According to Abbé David's note on the herbarium sheet, he found *Lilium Davidi* Duchartre in flower near borders of Thibet in high mountains which separate Moupin from Szechwan, on July 1869. Franchet thought this lily not distant from *L. speciosum* Thunb. Abbé David did not remember the color of his lily and told Mr. Elwes, who was in Paris getting material for his *Genus Lilium*, it was yellow and thus *Davidi* was colored incorrectly in the *Monograph*. Consequently when a deep-red, spotted lily was collected by Abbé Farges in the district of Cheng-kow-tin on the border of Shensi and also by Prince Henri d'Orléans at Tatsien-lou in Szechwan it was called *Lilium sutchuense* Franchet, and considered to be a new lily. Later the whole subject was unravelled, *L. Davidi* was known to be orange and *L. sutchuense* is now classed as a variety

of *L. Davidi*. It varies slightly from the type by having longer and broader, flat leaves, no hairs on the leaf bases, somewhat longer pedicels and a glabrous perianth.

L. pseudo-tigrinum Franchet found by Abbé David, is now known to be var. *Willmottiae*.

As for *Willmottiae* Wilson, discovered by A. Henry, it was first thought to be a separate species but now in spite of its creeping rootstock and weak stem, it too, is classified as a variety of *Davidi*.

Philip de Vilmorin grew *L. sutchuense* Franchet and notes it as a new species, says it was introduced from China ten years ago (in 1896) and that it is close to *L. tigrinum* but differs by a long catalogue of characteristics. He wrote "—it is distinct by a slenderer stem, not bulbiferous, more numerous and narrower leaves, flowers more finely dotted and smaller, is much earlier blooming and has stoloniferous bulbs. The plant is fertile and I raise quantities of seeds every year but it is difficult to bring them to flowering bulbs, which has not prevented me from extending it in the plantings." The last sentiment bespeaks the lily enthusiast.

At the foot of Mt. Moupin in Eastern Thibet on July 1869, Abbé David found *Lilium Duchartrei* Franchet. Later it was found in Szechwan on the mountains around Tatsein-lu by the Prince of Orléans and in the woods of Koutoui above Mo-so-yn in Yunnan by Delavay on July 17, 1889. Of the three specimens sent home by David from the mountains of Moupin, 2 are in Paris and one at Kew. David's label bears the words "fleur blanche pointillé de pourpe." The amount of wine purple coloring varies, some flowers are intensely spotted and there are handsome striated forms. Abbé Delavay found a lily in Yang-in-chan simi-

lar to *Duchartrei* but with purple flowers more or less spotted with brown, and the segments narrower and more pointed at the base than the type and having linear lanceolate leaves. After much speculation this specimen has come to be considered as a single different plant. Duchartre thought the lily was a form of *speciosum* and named it thus in a small label in his handwriting attached to the herbarium sheet. So when Franchet re-examined the specimen eighteen years afterwards and decided it was a new species, it was named for Duchartre and the description and name were published in *Plantae Davidianae*, part II.

Abbé David discovered *L. cathayanum* E. H. Wilson in 1868 in shaded places and glens around Kuling in Kiangsi province. Wilson named it and gave as synonyms *L. cordifolium* Franchet and *L. giganteum* Franchet. But these names do not appear in *Les Lis de la Chine et du Thibet* nor are they in *Plantae Davidianae*. According to Wilson it is the least attractive and smallest of the section *Cardiocrinum*. According to Woodcock and Coutts it is a sombre looking lily close to *L. cordatum* but dwarfer with stem leaves longer than broad and uniformly kidney shaped. They say "—it differs from *L. giganteum* in the curious arrangement of the foliage on its 2-4½ feet high stem which is generally naked on its lower part and then at mid-height has a sort of whorl of long stalked leaves and above them a few much smaller and scattered leaves."

The lily discoveries of Abbé Delavay were more numerous than of any other traveller. They were *L. myriophyllum* Franchet, *L. ochraceum* Franchet, *L. taliense* Franchet, *L. lankongense* Franchet, *L. papilliferum* Franchet, and the variety *L. Bakerianum* var. *Delavayi* Wilson. He also found the

handsome plant called *L. Yunnanensis* by Franchet but later given the name *L. Bakerianum* Collett and Hemsley, because that name had been published earlier.

The territory covered by Abbé Delavay was principally Northwest Yunnan, near Lake Tali where he was stationed for 14 years from 1882-96. Besides collecting in Yunnan he collected in the province of Kwantung, where he was first stationed and on the island of Hainan. He also gathered plants as he travelled to his post in Yunnan going indirectly by way of Hupeh and Szechwan.

Delavay often went back 3 or 4 herbarium specimens of the same plant and sometimes he would get it in flower, again fruit and would go a third time to find bulbs or roots. His specimens were known for their artistic quality and considered models for study.

Delavay's most dramatic discovery was *Lilium myriophyllum* Franchet found at Mo-so-yn in stony places amid shrubs, not far from Lan kong, about 40 miles northwest of Lake Tali. The numbers and dates of his specimens in Paris are No. 3273 July 29, 1888, No. 3817 July 5, 1889 and No. 4784 July 12, 1889. The field labels describe the flowers variously as "blanc, pâle or blanchâtre." One of the specimens shows the segments suffused with dark color outside and only one, No. 3817 has bulbils. Franchet used the name *myriophyllum* in *Les Lis de la Chine et du Thibet* two weeks ahead of "*sulphureum*" used by Baker for a Burmese specimen. Franchet said of the plant "Magnificent species similar to *Lilium Wallichianum* Schult. with numerous linear leaves but very different rhizomes, direction of flowers and wide shape of perianth." Eduard André, French landscape architect considered "it is one of the most beautiful

plants introduced in recent years and grew it in his garden near Geneva. Maurice de Vilmorin described it and published a picture of it in *Revue Horticole* in 1914. The plate in the Elwes supplement shows a breath taking lily with a racemose inflorescence of very large somewhat drooping funnel form flowers having slightly revolute segments, slender, numerous, pinnate leaves and brown bulbils in the axils. The flowers have a strong scent.

Unfortunately the lily is not hardy, but a hardy cross called Crow's hybrid of *L. × sulphurgale* (from *sulphureum* and *regale*) × *L. Princeps* shows characteristics of *L. myriophyllum*. In this hybrid there is a lot of green and red on the back of the flowers and green-yellow in the throat and a green nectar furrow at the base of each segment.

L. ochraceum Franchet was discovered by Abbé Delavay in the shrubbery of Kan-hay-dze July 29, 1883. He found it again in mountainous woods above Tapin-Tze and a third time four years later, on August 20, 1887, at the foot of Tchang-chan at an altitude of 9,000 feet. He sent back three specimens. Franchet wrote ". . . *speciosum*, *ochraceum*, *taliense* and *polyphyllum* are the only four of the Asiatic Martagon Group where the nectar furrow is bare of papillae. This lily is characterized by a long, narrow bulb, the other three and *Duchartrei* have the bulb of *L. Martagon*." It grows around Mengtze in Yunnan where heavy summer rains prevail, the temperature is not excessive and frosts are unknown. Stems 4-5 feet high carry a few nodding fairly large flowers 3¾" across yellow-tinged-green and marked with red magenta on the lower third of the segments and spotted all but the tips with the same color. Though it sounds strange and even ugly, yet it is odd and attractive, but not hardy. It is

said to have a pleasant fragrance in the evening.

Two specimens of *Lilium taliense* Franchet were sent home by Abbé Delavay both from Yunnan. One was picked at the Col de Koua-la-Po at a point where the road culminates from Tali to Kohin on July 24, 1883, and the other above Mo-so-yn at Koutsou an open rocky hillsides on July 17, 1889. The lily is very like *L. Duchartrei* but differs in stamens and nectary sacs. Grove, also the stem of *L. taliense* is brown and not green, the leaves narrower and more numerous, the flowers are white or tinted and it is known as "the other Chinese white flowered martagon." It has been grown in England.

A second lily very like *Duchartrei* is *L. papilliferum* Franchet discovered by Delavay in Yunnan amid rocks of Choui-a-ouan above Tapintze on August, 1888, at an altitude of 5,400 feet. Franchet says it is fairly close to *L. Duchartrei* but differs in narrower leaves, hairy papillae, and the intense crimson-maroon color of the flowers. The unusual character is a papillose stem, whence its name. Wilson thought it a charming lily and said the flowers are fragrant, solitary or racemose and that he found it in dry situations on ledges of cliffs and in open stony pastures at 10,000 feet which is higher than Delavay reported. Wilson says it is not as hardy as *L. Davidi*.

Delavay sent back three specimens of *L. lankongense* Franchet from Yunnan. He discovered the lily in the woods of Hee-chan-mem August 3, 1886, at an altitude of 10,000 feet and saw it again on the eastern slope of Lopin-chan at Lankong September 1, 1888, and a third time in the woods of Mo-so-yn of Koutou July 17, 1889. Delavay described two of the specimens as "rougeatre." The amount of white along the margins of the perianth segments as well as depth of pink are said

to vary. Judging from the plate in the Elwes supplement, *L. lankongense* is a beautiful lily, pink with dark spots on the segments. The 2 feet high stem carries a racemose inflorescence of fragrant nodding, medium sized flowers with pointed segments. The lily has the stem clothed with leaves to the base thus differing from *L. Duchartrei* and *L. papilliferum*.

It seems a pity there is no species lily named for Delavay. For the lily Franchet called after him is now considered a variety of *L. Bakerianum*. Delavay sent home four specimens of this lily. The first he found June 20, 1888, and his field note on this specimen reads, "the flowers are vinous red, stems as usual, amid calcareous rocks above Lake Lankong." The other two he described as "fleurs roses" and "fleurs verdâtres," so the color must be variable. This variety is not thought handsome but var. *aureum* supposed to be a mutation from the type, is said to be very beautiful. Franchet wrote "The flowers have the form of *L. candidum* but the divisions are less recurved and the color is red-brown recalling *Fritillaria meleagris* and the dark spots are disposed as in that plant."

Abbé Farges discovered *L. Fargesii* Franchet and *L. Davidi* var. *sutchuense*.

The territory where he was stationed from 1873-1903, and where he explored and found the lily was the mountains of Eastern Szechwan in the district of Cheng-Kow-Tin. Franchet thought the lily was pretty, close to *L. Davidi* with the same leaves but differing in its perianth, smooth outside and with little-fringe-like scales extending parallelly to the nectar furrow and bordering both ridges of it.

By collecting many already known lilies the priests increased material

available for study and made known a wider distribution of the plants.

Several of the lilies they found are hardy and it is to be hoped they will soon appear in the borders along with the other beautiful plants from the mountains of China. Now thriving happily in our gardens.

CHINESE LILIES DISCOVERED BY FRENCH MISSIONARIES

Lilium Davidi, Abbé David, on borders of Szechwan and Moupin, July, 1869.

Lilium Duchartrei, Abbé David, Mt. Moupin, Thibet, July 1869.

Lilium cathayanum, Abbé David, Kuling, Kiangsi, 1868.

Lilium ochraceum, Abbé Delavay, N. W. Yunnan, August, 1887.

Lilium taliense, Abbé Delavay, N. of Lake Tali, Yunnan, July 24, 1889.

Lilium lankongense, Abbé Delavay, Lankong near Lake Tali, Yunnan, August 3, 1886.

Lilium myriophyllum, Abbé Delavay, Mo-so-yn, N.W. Yunnan, July 29, 1888.

Lilium papilliferum, Abbé Delavay, Choui a ouan, Tapin tze, Yunnan, August, 1888.

Lilium Bakerianum var. *Delavayi*, Abbé Delavay, Lake Lankong, Yunnan, July 20, 1888.

Lilium Fargesii, Abbé Farges, E. Szechwan, Cheng-kow-tin, undated, described, 1892.

Lilium Davidi var. *Sutchuense*, Abbé Farges, E. Szechwan, Cheng-kow-tin, undated, described, 1892.

LILIES FIRST THOUGHT TO BE DISCOVERIES AND PLACED UNDER HEADINGS LATER

Lilium pseudo-tigrinum, now *Davidi* var. *Willmottiae*, Abbé David.

Lilium mirabile, now *Giganteum* var. *yunnanense*, Abbé Farges, Abbé David, Abbé Delavay.

Lilium speciosum, now *Lilium speciosum* var. *gloriosoides* Baker, Abbé Farges, Abbé David.

Lilium formosanum, now *Lilium leucanthum* Baker, Abbé Farges.

PREVIOUSLY DISCOVERED LILIES
FOUND AGAIN BY THE FRENCH

Lilium giganteum Wall. Abbé Delavay, Abbé David, grown at Vilmorin's.

Lilium speciosum Thunb. Abbé David. Franchet says this specimen is the

only one of a wild plant in the Paris herbarium.

Lilium tenuifolium Fisch. now *Lilium pemulium* De Candolle, Abbé David.

Lilium tingrinum Ker Gawl. Abbé David, Abbé Farges (in E. Szechwan where it was cultivated to extract chlorophyll for medicine).

Lilium concolor var. *pulchellum*, Abbé David.

Lilium Brownii, Abbé David, grown at Vilmorin's.

Lilium cordifolium Thunb., Abbé David, grown at Vilmorin's.

Lilium Davidi, Abbé Farges, Orléans.

Lilium Davidi var. *Wilmottiae*, Abbé Farges.

Narcissus Notes

B. Y. MORRISON, *Editor*

By the time this reaches our readers, the daffodil season will have passed for some, will be at its peak for others and will be still to come for the rest of us. Whether it is, therefore, a matter of retrospect, of actuality or of promise it remains one of the most thrilling times of year. That this is so, is easily shown by the editor's correspondence, for an inquiry at almost any time of year will evoke an enthusiastic response. With the privilege of quoting having been granted, the following passages are chosen, one from the letters of the owner of a garden collection, the other an inspiring account of how one group of amateurs have started the narcissus fever in their town.

From Michigan writes Mr. Albert E. Greene: "I have a small collection of daffodils many of which I grow in my flower border in front of my hemer-

ocallis. This combination is very satisfactory for, by the time the daffodil leaves have died down, the day lily leaves cover the bare spots. Among the too many varieties that I have acquired, I particularly admire the following: Lord Wellington, *pallidus praecox*, Beersheba, Mrs. R. O. Backhouse, Dick Wellband, Lady Diana Manners, John Evelyn, Gertie Millar, Pearly Queen, Lady Hillingdon, Cheerfulness, Actea. I hope to get bulbs of a few of the newer varieties every year although there is always the problem of where to plant them.

"I first got the daffodil craze some forty years ago and I used to read the articles of the Rev. Joseph Jacob in *The Garden*, with great interest, but my garden at that time was on gravelly soil and the bulbs soon became too weak to bloom. * * * Six years ago I acquired a garden with a heavy clay

soil in which daffodils thrive. I have been planting my bulbs in a mixed border, particularly in front of hemerocallis but I fear that the location is not a good one for the bulbs. When I lifted some of them in early September, the basal plates showed signs of rotting, which, I suspect, is due to summer watering in the border. * * * Most daffodils seem to be of easy culture requiring little care and needing no winter protection except perhaps the poetaz varieties which are not hardy here. I plant my bulbs with the base about six inches below the surface and sprinkle them with a little leaf mold and farmer's fertilizer in the spring. I like to plant them early in September, to give time for root growth in the Fall."

From Kansas Mrs. W. B. Mills who has been instrumental, together with her friends in forming the Topeka Daffodil Club: "In 1933 I invited some friends to my home to organize a Daffodil Club. Today we are going strong and now have 110 members. We meet twice a year. In the Spring meeting we plan our annual daffodil show, which has been very successful. At the Fall meeting, our bulbs are distributed. Each member pays fifty cents a year. This money is used to buy bulbs at the hundred rate. Each member receives one of each kind, this year it happens to be five. We usually order a few extra bulbs to sell at a very small profit, which leaves us with a few cents to buy award cards or ribbons for our show." Mrs. Mills also sends the record of the varieties bought with a note of the increasing number of members. "1933, 38 members, buying 266 bulbs of Tresserve, Van Waveren's Giant, Nannie Nunn, Spring Glory, Gloria Mundi, Jonquilla simplex, odoratus campernelle; 1934, 58 members, buying 406 bulbs, Bernardino, Early Surprise, Orange Cup, Cheerfulness, King Alfred, Sir Watkin, Hera; 1935,

58 members buying 406 bulbs of Diana Kasner, Croesus, Glory of Sassenheim, Red Chief, Evangeline, double campernelle; 1936 with 52 members buying 345 bulbs of John Evelyn, Will Scarlett, Eagle, Hera, Golden Spur; 1937 with 43 members buying 251 bulbs of Alasnam, Silver Phoenix, Elvira, Bath's Flame, Queen of the North; 1938 with 41 members buying 263 bulbs of The Pearl, Silver Star, Olympia, Helios, Alcida; 1939, 42 members buying 411 bulbs of The First, Beppy, Nette O'Melveny, Franz Hals, Dante, Golden Beauty, Liberty; 1940, 45 members buying 479 bulbs of Aerolite, Stella Tidd Pratt, Sunrise, Lord Kitchener, Medusa; 1941, 48 members buying 432 bulbs of Red Cross, Tresserve, Twink, Mrs. Barclay, Klondyke, with extra sale bulbs of Cleopatra and Bernardino which raised the total sales to 725; 1942, 60 members buying 1,042 bulbs, Warwick, Alice Knights, Yellow Poppy, Abundance, Shackleton, Mae West; 1943, 70 members buying 435 bulbs of Gallipoli, Phyllida, Lucinius, Milford Haven, Early Perfection and Klondyke; 1944, 110 members buying 628 bulbs of King Alfred, Lovenest, Walter Hampden, Anna Croft and Conqueror, with extra bulbs bought for sale of Spring Glory, Orange Queen and *caniculatus*." Mrs. Mills writes further that this does not include all the bulbs bought by individual members aside from the club orders. "Up to last Autumn, the Club had bought about 6,875 bulbs."

What sort of a difference would such a purchase as this make in your town?

As this is being written or copied in mid-February in lower Mississippi, Paper Whites have finished their precarious winter flowering which means always a race with the occasional freeze, but Soleil d'Or is in fine flower and two locally grown tazettas are in

good flower, the one a beautifully modelled bloom with white perianth and yellow cup, the other a somewhat wingy white perianthed thing with a lemon

cup. What other tazettas do you have or know? The editor would like to hear from Southern and Pacific Coast gardeners.

The Gardener's Pocketbook



Bignonia capreolata

Bignonia capreolata

This beautiful evergreen vine, according to Britton & Brown, in their *Flora of the Northeastern States*, is found growing wild from Florida to Ohio and southern Illinois. The writer first saw it in full bloom some years ago, on the edge of a wood in northern Tennessee, where it was climbing over trees and shrubs. We were immediately struck by the size and beauty of the flowers, with their lobes of a rich orange yellow color, and the tube of a paler yellow shade. The accompany-

ing photograph was taken after breaking off a sprig, and draping it on some rocks. Incidentally we dug up a young plant, and succeeded in establishing it here in southwestern Ohio, where it has grown up the trunk of a tree, and has attained a height of more than twenty feet. For some unaccountable reason, it has never put forth a single blossom. Possibly Bailey, in his "Encyclopedia of Horticulture," hints at the cause, when he mentions that the plant will only survive in Massachusetts as a creeping vine. This would

rather indicate that cold northern winters tend to inhibit bloom. It would be interesting to know, therefore, whether any reader has seen the plant in flower north of the Ohio river.

ROBERT M. SENIOR.

Neillia sinensis Oliver (See page 159)

The literature of this charming Chinese shrub had its rise in the late 1800s but its press, at best, is scanty and scattered as befits a plant of secondary importance, if one measures it against such opulent charmers as lilacs or even its nearer relative the spirea.

As far as we North Americans are concerned its nearest native relative is *Physocarpus* of which as Mottet says, speaking of *Physocarpus opulifolius*, in his article published in *Revue Horticole* (1919), "the most generally cultivated and often in its form with golden leaves."

More nearly related and more commonly cultivated is its other near relative, *Stephanandra* particularly its species, *flexuosa*.

As yet the Chinese *Neillia* has not settled down to completely familiar living at the base of the hillside where it has a spot in morning shade and afternoon sunshine, the sort of spot that one may safely chose when the tastes of the subject are not completely known. Here it is beginning to show signs of making a loose thicket, a useful bit of knowledge for the gardener even if the taxonomist passes it by.

According to Mottet (l.c.), it is native to western Hupeh in China and was introduced in cultivation by Wilson in 1901.

The illustration shows the leaves and flowers natural size and suggests as well, the twiggy character of the overarching branches. The picture was taken looking down on the branch, but the profile can easily be imagined.

The flowers when first seen brought

vividly to mind the beautiful shrub which the writer knew as wild currant in California (*Jamesia* sp) although the color of *Neillia*'s blooms is paler, more a pink-tinted white deepest on the reverse and in the bud state. It was interesting, therefore, to see that Mottet wrote, "thanks to the rose color of its racemes of flowers which resemble a little those of the red currant" and to note that there is another species, *N. ribesioides* whose name commemorates its likeness to the flowering currants.

Forced to an issue one might not care to give up any one of a number of flowering shrubs that cover themselves more lavishly with spring bloom, but where there is ample space, this is well worth the trouble and cut sprays of *Neillia* flowers always attract attention. Near Washington, D. C., it flowers in mid-May, just before weigelas and kolkwitzia with which it could not compete.

The Queen Palm—Arecastrum Romanzoffianum

Throughout the central part of the State of Florida, one of the most widely used palms for planting in avenues and on lawns as solitary specimens is the Queen Palm, *Arecastrum Romanzoffianum*. Here in southern Florida, its place is for the most part taken over by such tropical species as *Roystonia regia*, *Cocos nucifera*, and *Eupritchardia pacifica*. Only occasionally is *Arecastrum* seen in the vicinity of Miami, but when it is grown here it forms a tall and magnificent palm in a very few years.

The Queen Palm was originally described by Chamisso in 1832 as *Cocos Romanzoffiana*, his specimens having been collected in 1815 on the island of Santa Catarina, off the coast of southern Brazil. In 1860 Hooker described and illustrated this plan under the name of *Cocos plumosa*, the one by which it



R. L. Taylor

Neillia sinensis
Natural Size

is most widely known today, however erroneous it may be. The great Italian palm specialist, Odoardo Beccari, when he revised the genus *Cocos*, created a new genus for the Queen Palm, naming it *Arecastrum*, which means *Areca*-like. This nomen was given in reference to the similarity of the arrangement of the flowers on the inflorescence

by several vernacular names, among them being "gerivá," "côco babão," "côco de cachorro," and "côco de boi." The species is widely grown in Florida and southern California, in the former state being particularly utilized as an avenue tree. It is a very rapid-growing palm, forming an imposing specimen in only a few years when cultivated under suitable conditions.

The Queen Palm eventually will attain a height of about forty feet, with numerous long, beautifully arching leaves many feet in length. The leaf-pinnæ are suddenly bent downward near the middle and give the palm a most pleasing and graceful appearance. From among the old leaf-bases appear the great woody spathes, often four feet for more in length. They



The Queen Palm. Washingtonia and Phoenix in background

branches to that of the paleotropical genus *Areca*.

Arecastrum Romanzoffianum is a native of a large area in South America, ranging from the southern part of the state of Bahia in north-central Brazil, throughout the central and southern parts of that great nation, all of Paraguay and Uruguay, and much of northern Argentina. In Brazil it is known



The Queen Palm, trunk leaf bases and immature fruit cluster

soon split, liberating the great pendent mass of yellow flowers, which are greatly enjoyed by the bees and wasps. The fruit is usually produced in great abundance and becomes orange-yellow when ripe. It is edible, but has a rather peculiar flavor, a not too enjoyable one.

There are several varieties of *Arecastrom Romanzoffianum* generally admitted, only one of which apparently is cultivated in this country. Var. *australe* has smaller and narrower fruits than the typical species, and is said to be a more slender tree.

The accompanying photographs were taken at the Fairchild Tropical Garden, Coconut Grove, Florida, where some very good examples of this beautiful palm are to be found.

Strelitzia Augusta

Although its small sister species, *Strelitzia Reginae*, is widely cultivated for use as an exotic cut flower, *S. Augusta* is very uncommon in this country. Probably the main reasons for this rarity are that the plant is fairly tropical in its requirements, and that it grows much larger than *S. Reginae*, thus not being so easily grown in such a limited space as that afforded by most greenhouses.

The genus *Strelitzia* is one of a very few placed in the Musaceae, the Banana Family. It consists of about a dozen or so species, natives of South and Central Africa, of mostly rather tall, frequently woody plants with banana-like leaves and showy white, blue or green flowers borne in one or more boat-shaped bracts. *S. Augusta* was first described in 1781 by Thunberg from material collected in South Africa. It is very closely allied to *Strelitzia Nicolai*, another South African species, which it greatly resembles both in habit and foliage, but it has smaller flowers



Strelitzia Augusta with inflorescence at right center and an old flower cluster at left center

borne in a spathe not reaching the dimensions of the other species, and the petals are all white, instead of a couple of blue ones, as those of *S. Nicolai*.

Strelitzia Augusta eventually attains a height of about twenty feet. At that time, it has an erect or leaning, woody trunk marked by the scars of the old-leaf bases, and a large fan of leaves at the apex. These leaves have thick petioles from three to six feet long, and the leaf-blades are usually about as long. They are oblong and acute in shape, and soon become split and torn transversely by the wind, much in the way of banana leaves.

The flower-spathes are borne from the axils of the leaves, on a short thick peduncle. They are boat-shaped,



Warren C. Wilson

Trillium sessile: Stemless-flowered Wake-robin

usually two in number, one above the other, become hard and woody with age, and are usually about a foot long. Generally they are of a deep purple color, and they have a sharp point at the apex. The flowers open singly or occasionally in pairs and are pure sparkling white.

In the illustration may be seen a group of three spathes, the upper pair being turned toward the back of the scene. A fresh flower is evident in the lowermost spathe, and a faded one just behind it. At the left of the leaf-fan is an old inflorescence, with the now woody spathes and the parchment-like withered flowers.

ALEX D. HAWKES,
Coconut Grove 33, Fla.

A Curious Wake-Robin

Most of you have seen in the Suring the lovely White and Painted

Trilliums and smelled (just once!) the ill-scented Red Wake-robin. The Stemless-flowered Wake-robin, *Trillium sessile*, as its awkward name suggests, is unusual. The more common and showy species, at least in the northeastern section of the country, bear their flowers above the leaves on slender stems. *T. sessile* is entirely stemless.

This Trillium has a stunted, ungraceful appearance that sets it apart from its northern relatives. Even the flowers give it no distinction; they are muddy purplish red or sometimes greenish. They do not have an offensive odor, if my memory serves me, but they look as if they well might. What, then, are its attributes?

The Stemless-flowered Trillium is rather uncommon in the East. It grows in rich, moist woods and bottomlands from western New York to Mississippi and southward to Florida. There are



Warren C. Wilson

Cystopteris montana: Mountain Bladder Fern

a few other species similar in appearance in the southern part of its range. In the north it is always an interesting "find" on a nature walk. This species is a good example of the derivation of its generic name, *Trillium*, from the Latin *tres*, three. The leaves, sepals and petals are in threes. In the wildflower garden it usually arouses the curiosity of persons familiar with the more abundant trilliums.

WARREN C. WILSON.

The Mountain Bladder Fern

Finding the Mountain Bladder Fern was an accident. I had stopped to adjust my knapsack straps and noticed a fern new to me at my feet. On two previous trips I had long but unsuccessfully searched for this species. After passing this particular colony five times on my way to and from Mt. Albert in the wilds of the Gaspé Penin-

sula, Quebec, I finally recognized this rare fern.

Cystopteris montana is its very descriptive scientific name. From the Greek comes *kystis*, bladder, and *pterus*, fern. This refers to the inflated cover over the tiny fruiting bodies on the underside of the fronds. *Montana*, from the Latin, means "of the mountains."

This little fern is rare in the Gaspé region but is more common northward from Labrador to Alaska. It occurs locally south to the north shore of Lake Superior and Colorado and is also found in northern Europe and Asia. The Mountain Bladder Fern frequently grows in a rocky, organic soil on the wooded banks of mountain streams. In some sections it inhabits rock ledges at high elevations. The rather triangular, finely cut fronds, some ten inches in height, distinguish

it from the other two species of Bladder Ferns. It might readily be confused at first glance with the Oak Fern, its companion in some areas.

WARREN C. WILSON.

From the Midwest Horticultural Society

Bittersweet

The native American bittersweet (*Celastrus scandens*) is a plant that is universally admired when seen in the fruiting stage. One of the familiar roadside scenes is the festoons of bunches of the orange and red fruits being vended from fruit stands, filling stations, farm houses, and stores in the fall. That the plant is rather easily grown and a reliable bloomer even in fairly poor soils is not realized.

The plant is a twiner and should be grown on support in much the same manner as *Wistaria*. The perennial woody stems spread out and cover quite an extensive area. The foliage is attractive and the fresh twining stems growing among the older ones are ornamental. The great beauty of the plant is in the fall when the fruits turn color and split to expose the inner portion. The combination of red and orange is striking. These fruits remain on the vine for a long period and if seen in the barren fall and winter are much more attractive than the dried ones inside. A good sized vine should produce several branches for inside decoration and still retain many for the outside effect.

While a few years may be needed to grow the vine to fruiting size the permanence of it more than repays the initial wait. For naturalizing it may be underplanted among small trees or just planted in the open and allowed to intertwine. A little planning will probably disclose many places where this can be planted and which will furnish many fruits for winter decoration

as well as an attractive vine for summer.

Malus ioensis Bechtel's

While there is much interest in the crabapples as ornamentals most of the emphasis has been placed on the oriental species and their derivatives. The native crabs in the wild are fully as beautiful in flower as most of these exotics. However, being wild and rather common they are admired only as seen in the spring landscape. Some landscape men, notably Jens Jensen, have stressed the value of these species in ornamental plantings. The only variety that has so far achieved widespread fame is the double form which originated as a sport near Staunton, Illinois sometime around 1840. This was propagated by E. A. Bechtel and introduced to the trade around 1888. Thus having been in commerce for more than fifty years it has become well disseminated.

In general appearance the variety differs little from the species. It has the same growth habits, same foliage, and same indifference to soil and exposure. The great difference is in the flowers which are quite double and several weeks later than the species. The double blooms appear after the foliage is nearly mature and unless as well as the single ones which appear while the leaves are still small. Bechtel's crab does have the trait of being a profuse bloomer when the tree is established. As in many fruits the time of maturity for the tree would vary with the site. A rich soil delaying full flowering until the tree is larger and older. A mature Bechtel's in full bloom is one of the most beautiful small trees for this region.

White Fir (Abies concolor)

Among the evergreens commonly used in this region the genus *Abies* is

seldom seen. Why this genus has been so overlooked is rather puzzling as the balsam fir is native but a short distance north and is the most popular of the yuletide trees. Probably lack of the native material and bad experiences with collected stock has limited the interest. The white fir which is a native of the Rocky Mountain area at first glance does not show some of the conspicuous characters of its relative. The aromatic resin is lacking, the needles are long and rather limber instead of short and compact, the color is a blue green rather than a dark green.

The white fir is listed as being hardy over most of the country. Here it is hardy and will succeed on a variety of soils. While said to be able to withstand hot weather it probably will benefit by being partially shaded especially from the noon sun in summer. The plant grows quite conical and should be used as a specimen where a large plant can be used.

According to the literature there are some rather silvery forms of this but so far most of the ones in this region do not have any noticeable tendency in this direction.

Silver Lace Vine (Polygonum Auberti)

The Silver Lace vine is an herbaceous vine that is excellent for covering pergollas, arbors, garages, or for screening good sized objects.

Once established the shoots of the plant grow with rapidity in the spring and may reach a height of twenty feet. On low support the stems droop over. As the stems are twining they need some open work so that they can have support. Wires, twine, or ornamental open woodwork are satisfactory.

As this is a *Polygonum* the resemblance to some of the native ones can be discerned as well as the relationship to some of the coarse exotics. The soil

should be a good loam not heavily fertilized as the presence of too much food may cause an undue growth of foliage and dearth of flowers.

The flowers are white and produced in small drooping clusters. These small flowers when seen from a short distance have a lacy appearance which accounts for the common name. The clusters bloom for a long period and, of course, the older flowers keep fading and dropping. This would mean that a walk directly under the vine would need frequent sweeping to preserve a tidy appearance.

This is probably too robust a vine for the small garden except as a background or screen plant.

ELDRED E. GREENE.

Annuals

Although there may be some who will object to the idea of too much space given over to annuals, the fact remains that many of the plants in this category give a very large return for the effort expended. They are also particularly welcome in areas where summer heat is trying to more permanent material but which is quite to their liking. This is not true of all annuals and no one should imagine them a panacea for summer trials.

In the years that have gone by, the Magazine has not devoted much room to annuals, believing that each person would find them out as he or she cared to, but from now on, there will be more space given over to this class of plant.

Only a few of our reader-members have given any suggestion that they would like to participate in trials, so the idea has been abandoned. The editor, however, and a few members are risking the effort of gathering materials, both in notes on pictures from which eventually magazine notes and perhaps, a yearbook will be evolved. Any one who will is cordially invited to write

to us, of their particular interests, failures and successes. A wide geographical reporting would be most welcome, since dates of sowing and span of usefulness are almost never the same.

In looking through seed catalogues one is struck with the modern tendency to reduce the old-fashioned list to relatively few genera and to present these in a wide range of forms, colors and seasonal uses. One is struck also with the developments that are going on among composites. No one thinks any more with surprise of the variety of forms that one finds in the dahlia, the moderate number of variations that occur in sunflowers, the infinite variety that appears in chrysanthemum, but one is impressed with the changes that are overtaking the zinnia and the marigold, changes which are producing a variety of forms already more familiar in the chrysanthemum, alterations in the form, shape and carriage of the ray florets, strange developments in the character of the disk florets.

In the marigold, it is interesting also to notice the progress achieved in bringing into the so-called African types the colors and hues which until lately have been the exclusive property of the so-called French marigolds. When the time comes that we shall have strains with the size of the pres-

ent day African forms in the rich colorings that remind one of wall flowers as well as of dwarf marigolds, there will be added pleasures to the many already to be had from a few packets of seed that cost so little.

It would be interesting also to learn from member gardeners how many annuals they can and do grow as winter annuals, some in autumn for early flowering. In a recent February visit to Mississippi, a garden showed the first flowering of the beautiful California annual, *Nemophila insignis*, with white-eyed clear lavender blue flowers as lovely as the spring bulbs in the North. They made a strip of color on the border edge that will be replaced in summer by the pansy colored *Torenia* which self-sows in that milder clime.

Who, in time, will turn a calculating eye on the four-o'clock? This is now an escape in many parts of the South, not too well thought of with its perennial fleshy roots that make it a permanent feature of some gardens. Who will try to sort out and keep sorted out and fixed the color forms of portulaca? There was a time when one could have seed of these.

And who will decide which may be the annuals that the American public can be persuaded, cajoled into buying largely? The seed dealer or ourselves?

The American Horticultural Society

INVITES to membership all persons who are interested in the development of a great national society that shall serve as an ever growing center for the dissemination of the common knowledge of the members. There is no requirement for membership other than this and no reward beyond a share in the development of the organization.

For its members the society publishes *THE NATIONAL HORTICULTURAL MAGAZINE*, at the present time a quarterly of increasing importance among the horticultural publications of the day and destined to fill an even larger role as the society grows. It is published during the months of January, April, July and October and is written by and for members. Under the present organization of the society with special committees appointed for the furthering of special plant projects the members will receive advance material on narcissus, tulips, lilies, rock garden plants, conifers, nuts, and rhododendrons. Membership in the society, therefore, brings one the advantages of membership in many societies. In addition to these special projects, the usual garden subjects are covered and particular attention is paid to new or little known plants that are not commonly described elsewhere.

The American Horticultural Society invites not only personal memberships but affiliations with horticultural societies and clubs. To such it offers some special inducements in memberships. Memberships are by the calendar year.

The Annual Meeting of the Society is held in Washington, D. C., and members are invited to attend the special lectures that are given at that time. These are announced to the membership at the time of balloting.

The annual dues are three dollars the year, payable in advance; life membership is one hundred dollars; inquiry as to affiliation should be addressed to the Secretary, 821 Washington Loan and Trust Building, Washington, D. C.

