Bulletin of the American Rock Garden Society

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The Bulletin

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Front Cover Picture—*Erigenia bulbosa*—William C. Dilger, Freeville, N.Y.

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ERIGENIA BULBOSA

W. J. HAMILTON JR.
Ithaca, N.Y.
Drawing by William C. Dilger, Freeville, N.Y.

Many of our small native plants add great interest to the rock garden and woodland border in late March or early April. Unless rarities, they are often free for the taking. There is one little native charmer that seldom appears in the garden; indeed, it is little known even to the field botantist. *Erigenia bulbosa*, often called Harbinger of Spring, has a wide distribution, occurring from Alabama to eastern Maryland west to the mountain uplands, and from Mississippi to Kansas, Minnesota, southern Ontario and western New York. It is not uniformly distributed through this apparently large range, but must be more common than our records would indicate. This presumed scarcity is undoubtedly due to its very early bloom and diminutive size, the purplish black flower clusters barely protruding a few inches above the ground and then often hidden by dead leaves. Thus it is easily overlooked and not often seen or collected while in flower. *Erigenia* is the earliest flowering umbellifer in the eastern United States. The monotypic genus was first described by Andre Michaux in 1803, from plants collected by himself near Knoxville, Tennessee.

Roland Harper (*Torreya*, 1932: 141) found the plant about ten miles from Tuscaloosa, Alabama in rich shady woods, on soil of weathered shale mixed with humus. This was on March 4, 1932. Six weeks later he found plants with fruit nearly fully developed, but

not quite ripe.

In his *Flora of Missouri*, Julian Steyermark states that *Erigenia* and *Trillium nivale* are the two earliest of the herbaceous native plants to bloom. Usually, however, this Harbinger of Spring precedes the Snow Trillium by as much as three weeks. Steyermark gives its habitat as rich woods, usually at or near the base of slopes, or in alluvial woods and soils along streams and in valleys, alluvial thickets and at the base of rocky bluffs.

O. E. Jennings *(Wildflowers of Western Pennsylvania)* well remembers his boyhood when he worked his grandfather's sugar bush in north central Ohio. He watched eagerly for the Pepper-and-Salt, blossoming in late February or early March, and often buried by late snow. The anthers are first a rose purple, changing to dark purplish brown against the white petals; they look like a sprinkling of pepper on salt, hence the name, Pepper and Salt. The tubers, which have a pleasant aromatic taste, are eaten raw. Jennings states that it prefers deciduous woods, particularly the climax beech-sugar maple forest.

My friend, Dr. John O. Whitaker Jr. of Terra Haute, Indiana writes that the plant appears to prefer loamy soils especially along ravines in woods where sun filters through the trees. Less often it occupies more open areas. It flowers from mid to late March, before *Claytonia*. In the severe 1976-77 winter, blossoming was not delayed, but in the 1977-78 winter, intense cold and long snow cover was cause for delayed bloom. The snow disappeared on March 27, but *Erigenia* did not flower until April 9, and all bloom was gone by April 15. All early flowers were delayed about Terra Haute, and it finally held company with *Claytonia, Dentaria, Lindera, Isopyrum, Dicentra cucullaria, Erythronium americanum* and *Sanguinaria*.

At Ithaca, the pinkish buds pierce the frozen earth usually from March 13 to 18. The leafless plant stays in good flower for about ten days. As the bloom fades the ternately decompound and airy leaves unfold. They will persist for three or four weeks, then disappear. Then no mark is left in the site which has provided the gardener with several weeks of pleasure.

Erigenia is such a diminutive beauty that I grow some in tubs, the better to observe them more closely. Others grow at the base of shrubs in fairly heavy soil. Increase is not rapid. If one would propagate this little gem, a determined effort must be made to gather seed. Do not delay until the globular seed pod has softened and lost its greenness, for dehiscence is abrupt. A jar top or petri dish should be placed beneath the ripening capsule, or the plant lifted with a generous sod of earth and brought into shelter for the ripening process.

As for the deep seated tuber, I do not know how it multiples, for no offsets have been observed. Bulbs, tubers and corms change form and appearances at different seasons. Indeed, their dependent roots may differ substantially in structure and function at the same season. It is interesting and instructive to dig bulbous plants at various times of the year, if for no other reason than to ascertain how the underground parts of the plant are functioning. Perhaps our failures with so many plants may be attributed to a lack of understanding of how these subterranean parts function. In early November, 1978 I dug six tubers of *Erigenia*. All were somewhat irregular in form, measuring 17-18 mm. in diameter and having a similar depth. A short warty neck supported the new

yellow-tipped white shoot. The tuber, then, is not dormant in autumn, but preparing itself to make quick new growth with the advent of a mild spell in late winter. The tubers were replanted in my oak barrels. When these tubs are cut in two and provided with drainage holes, they serve as ideal planters and are as durable as sinks. They bring all the little treasures of late winter and early spring nearer to the eye, and give some protection from slugs.

Thanks are due my colleagues, Dr. William J. Dress who provided several references and Dr. William C. Dilger for his drawing of a freshly dug plant.

The Mount Evans Region: Overview

STANLEY C. MAHONEY
Westminster, Colorado

In the summer of 1982 the ARGS plans to hold its Annual Meeting in Boulder, Colorado, an area about which very little has appeared in the pages of the Bulletin in recent years. The editor, therefore, plans to run from time to time articles about some of the mountainous areas and the rich alpine flora in the vicinity of Boulder. In addition we hope to publish a few stories about those who have explored and written about this botanical paradise.

The following is excerpted by John G. Worman of Boulder from a booklet Mount Evans Above Treeline *by Stanley C. Mahoney. The map was drawn by Evan Lucas and the booklet is published by Johnson Publishing Company of Boulder.*

The Mount Evans region is located about 35 miles west of Denver. There is an elevation gain of approximately 9,000 feet from Denver, which is already a mile above sea level, to the Mount Evans summit. The entire trip can be made on excellent roads since Mount Evans has the distinction of having the highest paved road in the United States.

Mount Evans itself is not on the Continental Divide. It lies about eight miles east of the Divide. However, you can go on foot from Mount Evans to the Divide without dropping below timberline at any point. The more famed Pikes Peak lies about sixty miles southeast of Mount Evans and Longs Peak in the Rocky Mountain National Park is about fifty miles to the north. These three peaks, all rising over fourteen thousand feet, can be seen from many points in the Denver area.

The Mount Evans area above timberline contains two named summits rising above fourteen thousand feet, six named summits between 13,000 feet and 14,000 feet, eight summits between 12,000 feet and 13,000 feet, and sixteen summits between 11,000 feet and 12,000 feet. The two highest peaks are Mount Evans at 14,264 feet and Mount

Bierstadt at 14,060 feet. Although these figures change from time to time because of changes both in the mountains themselves and in surveying techniques, Mount Evans currently ranks as the 13th highest peak in Colorado and Mount Bierstadt as the 41st highest. Longs Peak at 14,255 feet ranks 14th and Pikes Peak at 14,110 feet ranks 32nd. Actually the differences in altitude among the approximately fifty-four peaks in Colorado rising to over fourteen thousand feet are quite small, with the highest being Mount Elbert at 14,431.

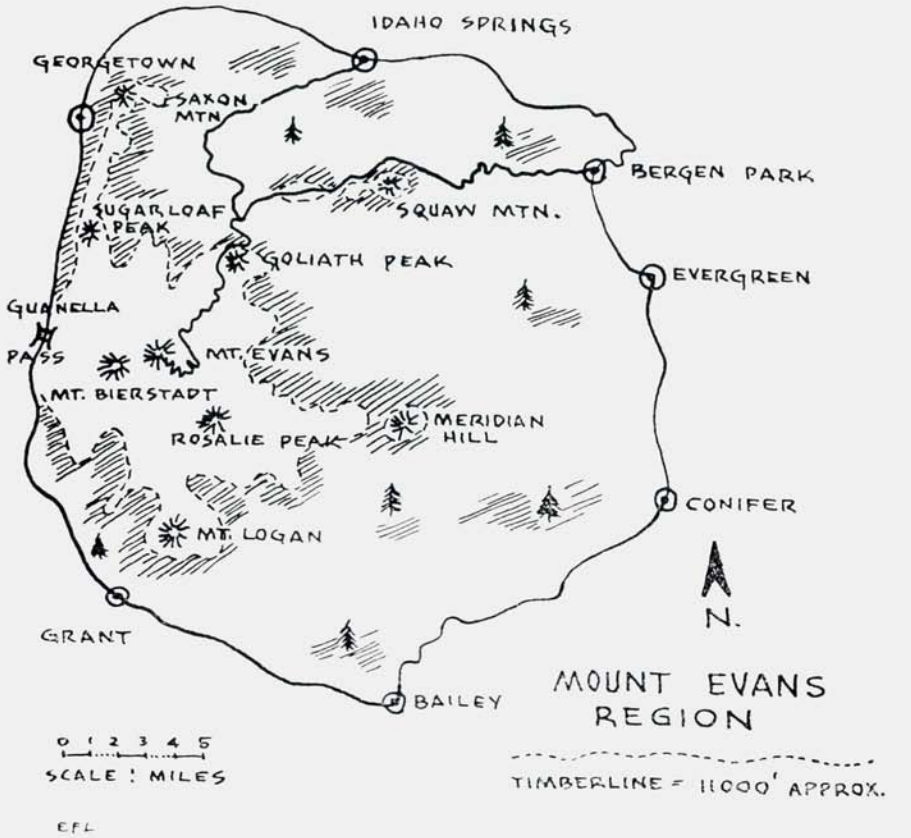
By way of further perspective, Mount Evans ranks 16th in altitude among the named mountains in the United States excluding Alaska. California's Mount Whitney, at 14,495 feet less than 300 feet higher than Mount Evans, ranks first. All fifty-four mountains above 14,000 feet in the Rocky Mountains are located in Colorado, amply justifying the state's nickname of "High Country U.S.A." When the world scene is considered, however, even the fourteen thousand footers shrink somewhat. Mount Everest, the world's highest mountain at 29,028 feet, is over twice the height of Mount Evans. Alaska's Mount McKinley rises to 20,320 feet, Africa's fabled Kilimanjaro to 19,340 feet, Mexico's Orizaba to 18,700 feet, and Europe's famed Matterhorn to 14,690 feet.

Mount Evans is not a wilderness area. This giant west of Denver rather appropriately looks stoop shouldered since it bears the shackles and scars of the ventures of man. Power lines cross its ridges, a paved road runs to its summit, trails and jeep roads abound, and there is even a restaurant on its top. Despite the marks of man, however, the Mount Evans region above timberline still exists in large part as it has for centuries. Trees dating back over a thousand years and rocks that go back millions of years still exist in its high regions. The winds and storms still blow, and the snows still fall as in times of old. Even today man is largely driven from its uppermost reaches by the harsh elements of winter.

But the Mount Evans region above timberline, because of its very accessability, does provide an opportunity for a person to experience something of the vastness and solitude of the high mountain country without having to camp out overnight to do so. It provides an intermediate choice between making a long backpacking trip or not experiencing the high country at all. Hopefully those who experience something of the country above timberline on Mount Evans, even if for only a few hours, will be more inclined to appreciate the need for protecting the little true wilderness that still exists in this country above timberline.

The Mount Evans region is bounded on the north, east, and south by paved highways. Major towns lying along these highways include Georgetown (5745 below Mount Evans at 8419 feet), Idaho Springs (6724 feet below Evans at 7540 feet), Evergreen (7224 feet below Evans at 7040 feet), Conifer (5994 feet below Evans at 8270 feet), Bailey (6514 feet below Evans at 7750 feet), and Grant (5684 feet below Evans at 8580 feet). A gravel road runs for 25 miles between Grant and Georgetown over Guanella Pass (11,665 feet) to the west of the Evans region. It is almost 100 miles around the Evans region via these roads and towns.

Two paved roads provide direct access to the Evans timberline area. State Highway 103, also known as the Squaw Pass Road, runs from Bergen Park on the east 18 miles to Echo Lake. The road runs along the crest of the northeast ridge and provides easy access



to several timberline peaks, State Highway 103 continues on from Echo Lake 14 miles down to Idaho Springs on the north and thus also provides easy access from Interstate 70 and Idaho Springs.

State Highway 5, better known as the Mount Evans Road, runs 14 miles from Echo Lake to the summit of Mount Evans. The road, which is paved all the way, climbs over 3600 feet from the 10,000 feet altitude at Echo Lake to the Evans summit. Because of weather conditions the road is open for only a few months in the summer, generally from mid-June to Labor Day. A unique drive, the road winds upward through dense timber past stands of bristlecone pine at timberline out onto the high tundra. After passing Summit Lake at 12,830 feet the road makes the final ascent to the summit up the relatively gentle but boulder-strewn south slope of Evans in a series of switchbacks. Construction was started on this road in 1922 and the final stretch to the summit was completed in 1930. The original road was not hard-surfaced and black-topping was applied in later years. Additional asphalt is needed in the paving at these high altitudes to make the surface more weather-resistant.

The Mount Evans Road has several turn-outs for viewing the peaks and lakes. On a clear day the peaks along

the Continental Divide to the west are visible as well as many peaks in the Evans area. In the Goliath Peak area there are two nature exhibits accessible from the road. The bristlecone pine stand in this area is truly superb. Summit Lake, part of the Denver Mountain Park System, is an excellent example of a high alpine lake. It lies in the cirque just to the north of Mount Evans and the cliffs rise up from the lake to both Mount Evans and Mount Spalding.

There are two eating facilities in the Mount Evans region itself. Echo Lake Lodge, located just east of Echo Lake, is a large rustic building with huge timbers and a magnificent central fireplace. It is usually open from Memorial Day to the last Sunday in September. The Mount Evans Crest House, constructed in 1940-41, is located on the summit and is usually open from mid-June to Labor Day. The Mount Evans road terminates at the Crest House. Heavy snows, as in 1969, sometimes delay the opening until early July. *(Crest House unfortunately was destroyed by fire during the late summer — Ed.)*

With few exceptions the land above timberline in the Evans region is federally owned. Summit Lake belongs to the Denver Mountain Park System as does Echo Lake below timberline. The federal lands are administered by the Forest Service of the U.S. Department of Agriculture with the northern area in the Arapahoe National Forest and the southern area in the Pike National Forest. An information and display office is maintained just south of Idaho Springs on the road to Mount Evans. The Forest Service maintains several campgrounds and many picnic grounds in the Evans region.

The Mount Evans region above 11,000 feet can be conveniently described as consisting of five areas: central area, northwest ridge, northeast ridge, southeast ridge and southwest area. We are interested in the central area. This is the high core of the Evans region, an area well above timberline characterized by tundra and rock, cirques and tarns, peaks and cliffs. Centrally located, it contains the two fourteen thousand foot peaks, Mount Evans and Mount Bierstadt, and the rugged Sawtooth ridge connecting them. Mount Evans is named after John Evans, second governor of the Colorado Territory, and Mount Bierstadt after the artist who painted many Colorado mountains.

Reprinted with the permission of Stanley C. Mahoney.

Information Wanted

Anita Kistler would like to chronicle individual results of seed germination from the Watson-McPhail Expedition to Turkey. She'd like to know the number of shares bought, results, what germinated grew on, bloomed, lived, died. Also: how they were planted, where, in what mixture, at what temperature, etc. Send the information to her at 1421 Ship Rd., West Chester, Pa. 19380.

Cacti: America's Foremost Rock Plants
Part III

ALLAN R. TAYLOR and PANAYOTI CALLAS
Boulder, Colorado
Photographs by Anthony Taylor, Boulder, Colorado

The "Prickly Pears"

One could specialize, indeed, in the genus *Opuntia* alone (although we do not necessarily advocate it) which inlcudes a vast number of bone-hardy species and varieties exhibiting a vast range of variations. The flat-padded Opuntias constitute a sort of archetypical cactus. This is the cactus which would come to mind if the man on the street were asked to draw a picture of a cactus (assuming he momentarily forgot about Saguaros.)

The variation among Prickly Pears is more than disconcerting, it beggars description. Flower color varies fantastically: straw yellow to deep lemon and gold-flushed hues, green, white, orange, copper, bi-colors, rose, purple and even deep red occur. The spines can be several inches long, produced thickly enough to hide the pad, tiny and concise or completely lacking as in most forms of *Opuntia basilaris*. This variation of flower, superficial appearance, spine and pad shape and color varies almost as much within the larger specific groups as it does within the entire genus, for the Prickly Pears are still in an active state of evolution. Not only are Opuntias remarkedly plastic genetically, but the entire genus is remarkably responsive to environmental influence. Since most members of the genus grow quickly, they are far more subject to the vagaries of weather, soil and climate. Cuttings from the same plant can assume entirely different shapes if they are subjected to different conditions of moisture, soil or exposure.

From the sand dunes of the Southeastern States, north to Canada and across to the Olympic Peninsula and everywhere to the South, the Prickly Pears have plagued livestock and careless hikers for years. This is reason enough for the crankier gardener to begin to like them. Lewis and Clark marvelled at the vast expanses carpeted with *Opuntia polyacantha* along their route. What visitor since then hasn't been intimidated by the omnipresent *Opuntia* clan that dominates so much of our American landscape? And yet, every one of the dozens of fuzzily delimited species can yield garden plants of exceptional interest. Many are decorative in all their forms — like *O. clavata*, *O. basilaris* or *O. pulchella*.

If many other Opuntias manifest themselves as floppy, b u g - e a t e n, endlessly ramifying swarms in the wild, this doesn't mean the genus is hopeless in the garden. The trick to growing Opuntias in the garden lies in selecting the proper form for the proper spot. They should be placed where the gradually growing mound will not be pressed upon by neighbors, where the pads can ripen sufficiently in the sun to remain sturdy through variable winter weather and where the roots will not be subject to rot in the winter. Although in the wild a Prickly Pear is just as

likely to be found on alkaline flats, in short-grass prairie, on sand dunes or even river benches that are periodically flooded, all members of this genus look and thrive especially well when they are elevated in the garden, placed among rocks for the swelling mound to embrace and cascade over. Properly situated, in a somewhat fertile and *porous* soil, a plant of almost any species of *Opuntia* will assume unsuspected grace and remain healthy for many years. In early summer, when such a plant produces a wealth of showy salvers, the genus comes into its own. For the flowers of most Prickly Pears are of such a size and scintillating brilliance as to challenge the descriptive powers of a poet.

When Ball Cactus or Hedgehogs are grown, they are usually massed in formidable battalions that detract from the intricate patterning of the individual plant. Opuntias, on the other hand, are never allowed more than a token appearance in the garden, and usually relegated to the dingiest and most unwholesome spot at that. We feel that for the cold climate dryland garden, the Opuntias are supreme architectural plants that should be used much in the manner of dwarf shrubs and conifers in the alpine garden: to provide sculpturesque, bold relief from a monotony of detail. Several contrasting Opuntias — upright and procumbent, shaggy spined and naked, rose and yellow flowered — planted in proximity to one another will eventually blend into a symphonic counterpoint that can greatly enhance the interest of a rock garden at all seasons.

If Opuntias incite anger and frustration, it is through no fault of their own. Of course, their armaments are the most cleverly devised of all the cacti to inflict the maximum pain. The tiny tufts of harmless-looking glochids (barbed bristles, sometimes almost invisible) at the base of each spine are a unique feature of this genus. The cactus gardener quickly learns to respect them. If other gardeners choose to reject the entire genus because of some painfully close encounter, or pretend that the whole mess doesn't exist just because their relationships are complicated, the loss is entirely his.

The Opuntias are divided by taxonomists into two large groups: those with flat pads *(Platyopuntias)* and those whose stems consist of cylindrical segments *(Cylindropuntia)*. The latter are often called by their Spanish name, "Cholla." There are numerous hardy, eminently cultivatable plants in both groups.

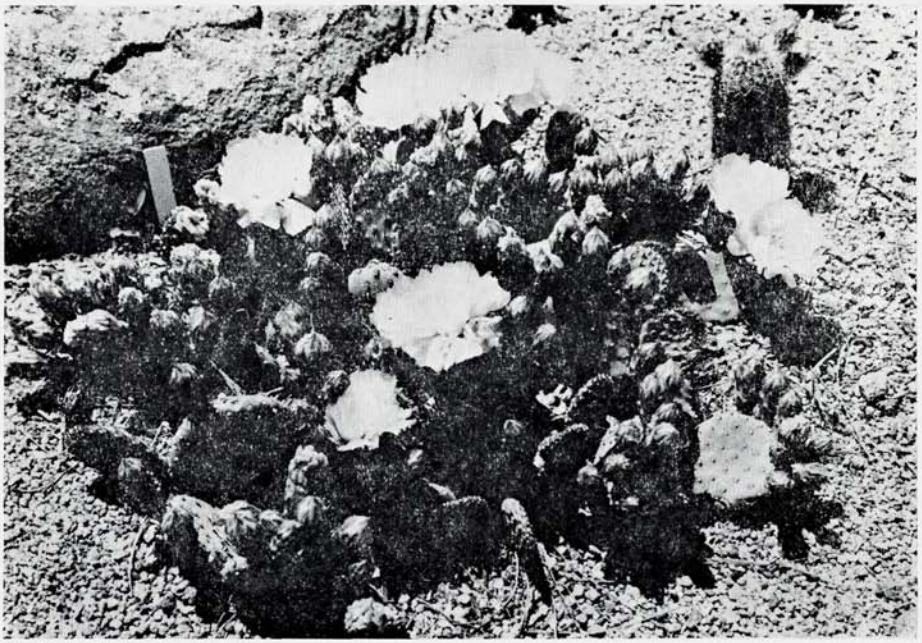
One of the most beautiful of the platyopuntias in terms of its form and flowers is *Opuntia polyacantha*, which occurs all over the Great Plains and into the Great Basin. The pads of this cactus are rather longish and covered with spines grouped in a kind of crowfoot pattern. The color of the pads and spines varies considerably over the range of the species, but the generalized "Hunger Cactus" is typically gray in the color of its pads with fine, pure white spines. The plants are low and sprawling (they must support heavy winter snows throughout much of their range) and a single plant can become a patch a yard wide. The satiny flowers can be any color in the "warm" range from pale yellow to deepest red. Most frequently encountered are yellow and purplish rose. In some individuals the stamens are also colored: brilliant yellow-flowered specimens with dark ruby stamens are among the most beautiful in the genus.

Another *Opuntia* famed world-wide for its beauty and hardiness is *Opuntia rutila*, which some authors treat as a variety of the previous species *(O.*

Opuntia polyacantha

polyacantha variety *rufispina)*, while others lump it with *Opuntia fragilis*. It may comprise a transitional phase between these two very different plants, but is distinctive in its own right. It is one of the most frequently encountered cacti in the Great Basin, growing at practically alpine elevations on some of the desert ranges. The spines in *O. rutila* are stiff and a rich, dark brown or purple. The typical flower is a brilliant rose and often measures more than three inches in diameter. The pads are quite variable in shape, although they tend to be rather small compared to other species in its range and sometimes almost cylindrical in form. It's not surprising that *O. rutila* is widely sought by gardeners in northern Europe, the U.S.S.R. and Japan where it withstands -20°F. without a whimper and blooms as lustily there as it does on the sun-drenched mesas of western Colorado.

If we had to pick a favorite *Platyopuntia* it would probably be the Mojave Desert native, *Opuntia basilaris*. Many named and unnamed forms of this striking plant are fully hardy to -10°F. As the name implies, this plant tends to branch from the base, although plants with pads stacked on pads are also common. Apart from the magnificent flowers, the outstanding feature of *O. basilaris* is its total, or near-total, lack of spines. The thick, smooth, purplish pads of the spineless varieties are very reminiscent of beaver tails, and "Beavertail" is the common name for this cactus wherever it is grown. Many varieties, while lacking long spines, nevertheless have bundles of glochids, which give the pads a tufted or quilted appearance. The flowers of this complex are large (in variety *brachyclada* the flowers are larger than the pad), very double and typically a scintillating rose, although they are an equally brilliant lemon in variety *aurea*. White flowers predominate in



Opuntia basilaris var. *aurea*

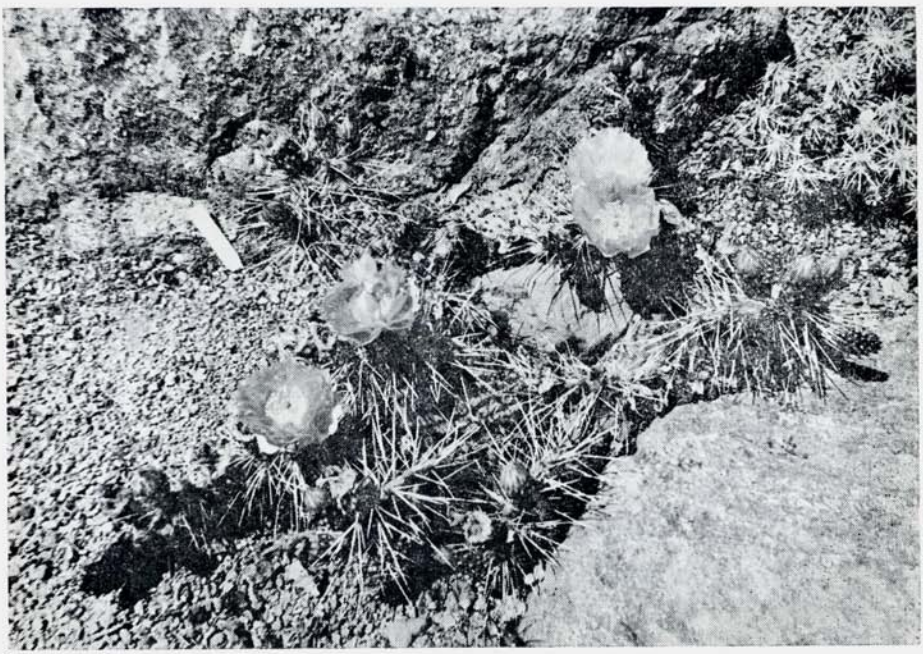
yet other populations. If you have ever wondered why the desert photographs in *Arizona Highways* are so breathtaking, the chances are good that it is because they so often include in the foreground a blooming *Opuntia basilaris.*

Opuntia fragilis may be the least loved Prickly Pear, thanks to its flimsily-jointed pads which fall apart at a touch and hitch a ride with every passing creature. (If you hate picking gumweed seeds from your socks, try the fava-bean size pads of *O. fragilis!*) This asexual reproductive strategy has spread this plant far and wide across the West, and also (apparently) selected for paucity of flower, since this species rarely blooms. One form of *O. fragilis,* variety *denudata,* native to southwestern Utah, departs from the rule for the species, for it is quite floriferous. Its large, pale yellow flowers contrast beautifully with the blunt, steel-gray, spineless pads of this variety. The consistent spinelessness of variety *denudata,* along with the fact that its range overlaps with that of *O. basilaris* var. *aurea* suggests that the peculiar traits that characterize this anomalous plant derive from a hybrid ancestry. This plant, which tightly fills crevices between rocks with its symmetrical, gray mounds, can be compared favorably with any mimicry plant, and it is certainly one of the choicest subjects for the well-drained rock garden.

Space does not permit the description of all the hardy *Platyopuntias,* but mention must be made of several forms and varieties of *O. erinacea.* This resembles the Prickly Pears so far discussed in producing a dry seed capsule, rather than a fleshy fruit. The most famous variety of this species is certainly the famed "Grizzly Bear" cactus *(Opuntia erinacea* var. *ursina)* which hails from the Death Valley area of southeastern California. Plants of

this variety, which includes both yellow and rose-flowered forms, are so completely covered by long, hair-like spines up to four inches in length that the pads are completely obscured. The white to gray color of these tousled spines would certainly have merited the specific name *senilis*, but the common name (invented by a nurseryman) was already well enough established to influence the choice of the specific when the plant was officially described. The beautiful var. *utahensis* is widespread along the eastern fringe of the species' overall range. It has a more procumbent habit and smaller pads. Its superceded appellation of *Opuntia rhodantha* neatly described its characteristically cerise flower color. Most of the members of this complex of *O. erinacea* share a rather more upright habit than others of the flat-padded cacti. This trait has been imparted to the many hybrid swarms of Prickly Pears of the Southwest evolved from *Opuntia erinacea* with other species. It has also bequeathed magnificent flowers and short, stiff, white marginal bristles to its half-caste descendants.

Some varieties of *Opuntia violacea* — *Opuntia santarita* complex ("Purple Prickly Pear") must also be mentioned, if only briefly. Besides the nearly smooth, round, lavender pad, some with magnificent long, dark brown or black marginal spines, these cacti are famous for their brilliant yellow, ruby-centered flowers. Cuttings taken from a roadside plant (var. *macrocentra*) near Carlsbad, New Mexico, have proven to be perfectly hardy in Boulder. A problem yet to be overcome with this beautiful plant is the breakage at the joint caused by the hurricane force winds that plague our area in the winter. Since the plant is upright and retains considerable turgidity all winter, it obviously needs to be grown in the lee of an effective wind shield. An-



Opuntia erinacea

other clone, from far into the Great Basin (reportely from near Wendover, Utah — far outside its recorded range) has fared better with the wind here than its southern relative.

Opuntia phaeacantha, the fleshy fruited "New Mexico Prickly Pear" is a variable complex that cannot be passed over in silence. This group is widely distributed throughout the Southern Great Plains and far into the Southwest. Plants in this complex vary in height from one to three feet. The pads are at least as large as a man's hand and are typically long-spined, with dark brown spines often bristling along the margins of the pad. Most of the members of this species have rather uninteresting yellowish flowers, but all have very attractive, burgundy-colored fruits. Unusually attractive flowers occur in local populations of var. *phaeacantha* found in certain canyons in southwestern Colorado. Although many plants in these populations have yellow flowers, others have large, dark rose flowers while still others have flowers of brilliant scarlet. A salmon-flowered variety has also been reported from the Virgin Mountains of southern Nevada.

If we have only scratched the surface of what could be said about the flat-padded *Opuntias*, much less can be said about those with cylindrical segments. First of all, there are fewer species and varieties of chollas; moreover, many of these are scarcely appropriate as rock garden subjects due to their near arborescence. For desert gardens of sufficient size to warrant the inclusion of such large cacti there are *Opuntia imbricata*, from the cold northern portions of the Chihuahua desert, *O. davisii* from much the same range, and *O. echinocarpa* from the Mojave Desert. *O. imbricata* is justly famous for its large purple flowers, while the others are largely grown for

Opuntia hystricina

their lustrous spine sheaths. In *O. davisii* these are a rich amber color, while in *O. echinocarpa* the sheathes are either straw-colored or white (in different individuals) yielding the common names "gold" and "silver" cholla. Properly grown, any of these can attain the stature of a man. Needless to say, care should be taken in placing them in the rock garden for a mature cholla does not take kindly to humans.

Probably the choicest of this group for the desert rock garden is *Opuntia clavata*, a mat-forming cholla which consists of short, prostrate, drumstick-shaped stems that are armed with wide, very stiff, bone-white dagger-like spines. A single plant can cover a large area, in time. Although *O. clavata* rarely blooms, it is not obliged to do so: it more than justifies its keep by its fascinating appearance. This is certainly one of the most threatened species in the genus, since it is restricted to a rather limited habitat mostly near the exploding city of Albuquerque, New Mexico.

Three additional, shrubby chollas are of some gardening interest, especially where heavy snowfall is not too great a threat. The most attractive of these in our opinion is *Opuntia leptocaulis*, the "Pencil Cholla". Although most forms of this lovely cactus are tender, some quite short northern populations are found far up in the Texas panhandle where the climate is rigorous. This fine stemmed plant grows by preference under and among stouter plants, such as Creosote Bush, or *Berberis trifoliata*, so that its long, slender stems find something to lean against and so remain erect. A casual glance often fails to detect the plant hidden in the center of its "host", unless the cactus happens to be in fruit. The small, berry-like fruits turn bright red after frost and it is this characteristic which has earned the plant the name the "Desert Christmas Cactus." The flowers are small and greenish and somewhat rare. We have never had any on our plants in Boulder.

Opuntia whipplei occurs widely all over northern Arizona and neighboring regions, having its center in the area of the Kaibab Plateau. Many forms of this viciously spiny plant are found, some serving as dune catchers in the Four-Corners area, others forming lovely, rather tall, candelabras on the western edge of this distribution. The plants are a dark green color, enlivened with thickly set spines that are relatively short and white-sheathed. The taller forms are highly vulnerable to damage by heavy snow, which crushes the slender stalks, as happened here in Boulder in May of 1978. One of the more interesting forms of this cactus in our garden is a nearly spineless dwarf which forms a creeping mat of tiny, erect rattails. This was found among typical plants in the Four Corners Area. The flowers of *O. whipplei* are small and greenish — of little consequence.

The third shrubby cholla which grows well in cold climates is *O. kleinii*. It, too, suffers from the affliction of slender stems that break under heavy snows. If it is to be attempted — and its purple flowers are worth the effort — it must be provided with stout support. The most naturalistic support for these weaker chollas are the sturdy canes of their robust relative, *O. imbricata*, which can bear a heavy load of snow. A mixed planting of chollas is the stratagem we have resorted to in order to beat the problem of the heavy, late spring snows of Colorado.

One thoroughly charming *Opuntia* remains to be mentioned. This is *O. pulchella*. This plant is so different from other members of its genus that one taxonomist has even set up a special section for it. This native of the Western Great Basin has tiny, cholla-like stems which sit atop a tuberous root that looks like nothing more than a large, bulbous radish. In its native habitat the neck of the tuber often protrudes from the soil and affords a perch for green and orange lichens which help, presumably, to camouflage the plant. Not that it needs this protection, for even the tuber is covered below the ground with a dense covering of painful glochids. The spines are long, black and flexible. The flowers are very large (in comparison with the plant) and purplish in color. This plant is very difficult to grow. Collected tubers are almost impossible to reestablish; cuttings are relatively easy to root, but take a long time to produce a noticeable specimen. A gardener who manages to grow *O. pulchella* in his garden is lucky indeed, for it is certainly one of the most fascinating cactus, if not the queen of the genus.

The treatment given here to the Opuntias has been scandalously brief,

and we know that those of our friends who know this genus will note that many worthy species and cultivars have not been mentioned. We beg their indulgence and forgiveness, for this is not, after all, the *magnum opus* on gardenworthy Prickly Pears! Few who come to the West with unjaundiced eyes would question the assertion that it would take a garden as untrammeled as the Western skyline and as glorious as the canyonlands to do justice to these undeservedly neglected plants.

At this point (if he has stayed with us this long) the reader of the Bulletin may yet be unpersuaded. Having progressed with us from the tiny huddled ball cacti with flamboyant flowers, through the magnificence of the Hedgehogs, around the jungle thickets of Prickly Pears, he may still harbor Reginald Farrer's sentiments about these "flattened little columns of hate." If so, (and each is entitled to his own opinion) we can only regret his contumacy and mourn, for him, his loss. But for rock gardeners like ourselves, born and bred among the mesas and canyons of the West, the perfectly adapted cactus remains the quintessential symbol of the drama and beauty of our landscape. It is an indispensable ingredient in that part of it which we weed and choose to call a garden.

Final installment of three part article

THE BOG

DEANNA K. HAGEN
Richfield, Minnesota
Illustrated by Allan Stavos, Wayzata, Minn.

A trip through a bog is an experience all its own. Once you have ventured in, it calls you back time and again.

A bog is soft, moist and spongy. A marsh or swamp is sometimes called a bog and to get directly to the center of a true bog, you usually go through an area of marsh or swamp, but a true floating peat bog consists of a thick mat of vegetation rooted in semi-decayed and living sphagnum moss or sedges, usually growing over water. This mat is completely saturated and floats upon the water beneath it, undulating like a huge water-bed as you walk across it. The term "peat", according to Webster's Dictionary, is partly decayed turf of water absorbing plant matter found in ancient bogs and swamps.

I've scouted through a number of bogs, both during severe drought and at times of normal rainfall. It is very easy to get around during a drought: in some cases all you need as footwear are street shoes; however, under normal weather conditions, rubber boots are a must. Always use caution when going into bogs. There are frequently open, very soft spots and when the bog is formed over or on the outskirts of ponds and small lakes, you can sink through the mat quite easily. In any case, never go alone.

The bogs I have visited in our area have certain similarities. They all have an overstorey of spruce, birch, Pin Cherries, alders, White Pine and Swamp Oak while the understorey consists of osmunda ferns and such shrubs

as Lowbush Blueberry (*Vaccinium angustifolium)* and Labrador Tea *(Ledum groenlandicum.)* The ground is clothed with a web of cranberries, Mud Plantain *(Heteranthera reniformis)*, and mosses, jeweled by brightly colored mushrooms. However, in addition to these, each bog has its own special plants.

One, located at the bottom of a steep hill, rewarded me with Goldthread *(Coptis groenlandica)* growing around the base of ferns, Buckbean (*Menyanthes trifoliata)*, its starry white blooms furred with crystalline hairs. Pink Lady's Slipper *(Cypripedium acaule)*, pitcher plants *(Sarracenia purpurea,)* Starflowers *(Trientalis borealis,)* Creeping Snowberry *(Gaultheria hispidula,)* and Leatherleaf *(Chamaedaphne calyculata.)* Another bog along a roadside had cotton grass and Bog Rosemary *(Andromeda glaucophilla)*, while on the verge of yet another bog site Downy Rattlesnake Plantain *(Goodyera pubescens)* raised its spikes of waxy white blossoms above mats of tessallated leaves.

These plants are much more easily discovered at the season of their blooming. In addition to those I have found, there are many other beautiful ferns, orchids, and gentians known to grow in our bogs, which I have not yet come across. When spring comes you will undoubtedly find me in a bog in the hope of locating plants I have not yet seen.

NOT ALL PLANTSMEN ARE MEN
MARY GIBSON HENRY

Part I

JOSEPHINE deN. HENRY
Gladwyne, Pennsylvania

This reminiscence about Mrs. Henry, whose explorations for especially fine forms of our native flora, particularly in the Southeast, have contributed many excellent plants to our gardens, is written by her daughter, who is presently the head of the Henry Foundation for Botanical Research founded by Mrs. Henry in Gladwyne, Pa. Here, in the extensive wild gardens and rock gardens planted by Mrs. Henry around her home, many of the plants she found and introduced into horticulture can still be seen.

Mrs. Henry, one of the early members of ARGS, was a regular contributor to the Bulletin and her many articles about her garden and some of the native plants she particularly treasured are a delight to read. These were illustrated, in the main, with photographs taken by her friend and mentor, Dr. Edgar T. Wherry.

Among some of the better known plants introduced by Mrs. Henry are Phlox *'Chattahoochee'*, Phlox stolonifera *'Blue Ridge' and 'Pink Ridge', and* Phlox nivalis *'Gladwyne'. —Ed.*

My mother, Mary Klett Gibson was born to John Howard Gibson and his wife, Susan (nee Pepper), on August 15, 1884, at the summer home of her maternal grandparents, "Fairy Hill", near Jenkintown, Pennsylvania. From this time on she spent a portion of her early summers upon this property, which her mother subsequently inherited. Interruptions to these visits were stays at Kineo House on Moosehead Lake in Maine until the untimely death of her father on April 6, 1894. Here it was that, under her father's tutelage, she truly fell in love with the outdoors, the native plants, and particularly the exquisite wee *Linnaea borealis* which trailed contentedly upon the moss cushioned forest floor. She was also thrilled with the wonderful scent of *Abies balsamea* although she and her sister did not enjoy the sticky task imposed upon them of making balsam pillows for the older members of the family.

Phlox 'Chattahoochee' —Henry photo

Her uncle, John Pepper, bought property adjoining "Fairy Hill" and built a handsome house in the then very new Old English timbered and stone manner. The

gardens were superb. One was in the formal Italian style with pergolas, pools, seats, and gravel walks edged in box, and there was an old fashioned garden for her aunt bounded by walls and hedges with winding paths of grass and an irregular pattern. All the beds were of diverse forms in an ever constant riot of color provided by annuals and perennials. This was used in part as a "picking" garden. In the lower land there was a pond bordered with a water garden. My mother spent considerable time with her uncle wandering about the place although she felt that the plants in such formal settings were too remote. Nevertheless, it was he who encouraged her and gave her books. Without doubt, it was from one of his catalogues that she ordered her first plant by mail, a "pink" violet, *Viola cucullata* 'Pink Gem'. She was about ten, and this peripatetic *Viola* is still with me! Thank Heaven for its cleistogamous nature because we had thought it gone three or more times.

My grandmother provided my mother with a small spot for a garden upon the lawn, as well as one for her sister and an observatory for her astronomically inclined brother. I well remember these three oases. The miniscule gardens each had a different summerhouse or pergola festooned with grapes such as the Concord, a red Catawba and a green, no doubt Niagara. The gardens were not fenced, and my mother's accommodated *Hemerocallis*, *Iris fulva*, the "pink" violet and a native water lily happily floating in a half barrel sunk next to a tiny path. These were kept in order until the death of my grandmother in 1926.

My mother attended The Agnes Irwin School but never graduated because of illness. However, she obtained a superior education on her own by intensive pursuit of knowledge of plants and botany in books and through the generosity of botanical friends. Late in life she was awarded the honorary degree of Master of Science from the University of Pennsylvania.

She had a horse-drawn red dog cart which she drove until she, her sister and brother acquired a curved dash Oldsmobile about 1902. She was an early driver and was able to recall many tales of the difficulties encountered whenever they went for a drive, almost never with the intention of arriving at a specific place. I only remember her driving an auto once when my father persuaded her to take the wheel. He was afraid that she would drive off the road upon being overwhelmed with the beauty of a member of the blossoming world. From 1927 Ernest Perks, the family chauffeur and subsequent gardener, drove on many collecting trips and was with her in that capacity for thirty-nine years.

In 1909 she married my father, J. Norman Henry, M.D. Five children were born to them. Alas, the youngest, Port, lived only until the age of seven. For several years after their marriage my mother was unable to indulge in gardening although she continued to read eagerly. It was not until they bought 1906 Spruce Street in Philadelphia that she could at last lay out her garden, a continuous undulating bed all about the "green" grass center. This was backed by a tall stuccoed wall with trellises at intervals, one struggling under the weight of a 'Silver Moon' rose. All the others suffered under our feet so *Clematis* and other vines could not compete with us above the first rung. The eastern bed which received lots of sun boasted *Iris susiana;* and *Iris fulva* provided coppery brilliance next to the faucet for the hose. Some *Crocus* did their best to offer sparks of color in the grass under the one tall lilac near our swing. Against the neighboring house on the west grew *Parthenocissus tricuspidata* and *P. quinquefolia*. These in summer provided a

green curtain behind and above the small kidney shaped pond bordered with a few very large weatherbeaten boulders of Baltimore gneiss which supported pockets of soil to make a small rockery. Here the small *Dianthus deltoides* made brave efforts to outpace us. Nothing else was as willing or vigorous. The younger generation was not very sympathetic to the efforts of the plants to be beautiful or to the gardener, our mother.

There was a small greenhouse with curved glass attached to the house. Here my mother grew some choice plants and orchids, among which were *Sophronitis grandiflora* offering those glorious vermillion flat flowers and a *Choisya*, probably *C. ternata.* When various plants were in flower, she would place them upon the window sill of the sun porch, which was on the landing between the first and second floors. Against the greenhouse there was a most hazardous counterbalanced double cold frame bordered with steel where she kept many pots of bulbs for winter fragrance and brilliance and also seeds promising to germinate.

Upon her desk in the oak panelled living room there were invariably myriads of catalogues and packets of seed from Correvon, Barr, Charlesworth, Purdy and others. She habitually examined many of the tiny seeds by cutting them in half with a knife and then studying them with her Zeiss 8x loup. I can still "hear" many of the miniscule seeds striking an object or the floor as they were catapulted about the room. She was in the habit of checking all the less common seed. When there were few in a packet, it was necessary to locate these escapees on the floor!

As far back as I can remember, my mother had a great love for bulbs. She imported many kinds from Holland, Great Britain and South Africa. She was never satisfied with the usual offerings. During her thorough reading she ticked the margins of a great number of her books with a sketch of a pointing hand to indicate her "wants." Some of these she never obtained, but I did bring her a few bulbs ticked long ago of *Stenomesson viridiflorum* which I collected in Peru in 1955 — a long wait! Dr. Traub has placed this genus in *Hymenocallis.*

During the day my mother was inclined to sit in the great bay in our library upon the wide seat upholstered in burgundy velvet sewing or making lists from catalogues. She indulged in cross stitching our towels and washcloths with a mouse for my sister, a bird for me and a dog for my brother so that we were able to recognize our own before we could read. She was skilled with a needle, and I treasure a beautifully made boxed mattress, a satin bound viyella blanket with an embroidered center motif and a lace edged bedspread with my initials in the center, all of which she made for a seven inch bed for my favorite doll.

In the afternoons and early evenings, when we children were out of the way, my mother read and often sat cross-legged upon the floor next to the bookcase in which she kept many of her favorite volumes. In particular she would sit for long periods with her grandfather's volumes of *The Orchid Album* upon her knees. She read avidly and constantly of the plant world. I can remember her reading only two novels.

Another lingering memory while in this home was her playing the harp. She bought a lovely Erard one summer in Paris and took lessons there. I loved going to sleep hearing her play and occasionally sing in the library below my room. As she increased her gardening activities, she had to abandon the harp because the soil abraded the callous on her finger tips.

From the time we were tiny tots my mother eagerly played tennis and was on the Huntingdon Valley Club team. My

parents frequently played tennis on weekends and both loved swimming. They never minded cold water, even the waters off the islands of Mt. Desert in Maine whenever we spent an August in that state, and maintained a record of having been swimming every month of the year in the Upper Chesapeake Bay.

About 1915 my father and mother acquired a large farm in Maryland of close to six hundred acres skirting Piney Creek Cove with nearly a mile of shoreline. They had planned to build a home there, but World War I broke out and caused a change of plans when my father immediately volunteered for overseas duty. For the duration we stayed for long periods from spring to autumn in bungalows close to the water's edge, and my mother supervised this farm on horseback.

Mrs. Henry with *Amsonia ciliata.*
—Evening Bulletin photo

Gardening was occupying more and more of my mother's time even though there were then four of us to concern her. There was a large vegetable garden, so considerable produce was preserved for winter use. A portion of the area was dedicated to many plants from foreign shores, which were often set in the cold frame upon arrival. I do not remember many of the plants growing there, but they were for the most part ornamentals, one of which was the Glastonbury Thorn. On a north facing slope above our bungalows she attempted to make some of her beloved rock plants happy, a few natives and a few from Correvon and Purdy. There were some tiny *Narcissus, Ophrys apifera, Leiophyllum buxifolium* and some of her selections of *Epigaea repens.* These latter were my earliest recollections of her seeking superior colors and forms in the wild.

She was much interested in all the outdoor creatures and early showed us how to handle snakes. The most vivid introduction occurred one day when we spotted her walking home with a huge spreading adder dangling from her hand. There was a bulge in its middle which was obviously proving a discomfort and as we watched, fascinated, the snake slowly and rhythmically disgorged a spittle-covered toad. It dumbfounded us even further when the toad slowly hopped away.

In 1923 we spent the summer in Scotland a short distance outside Edinburgh. This gave my mother opportunities to

visit the Royal Botanic Garden a number of times, but she did not then meet the Regius Keeper, William Wright-Smith, later knighted. However, upon her return home, she began a correspondence at which time she sent some tokens of her enjoyment. From then on she and Sir William exchanged seeds and plants, and later she sent some of her duplicate herbarium specimens. It was not until the summer of 1927 that they met when we were once more in Edinburgh. From that time until his death they remained very close friends. There is no doubt that he had the greatest overall appreciation of every sort of plant among her correspondents. He and Lady Smith visited us early in the spring of 1939. There was snow upon the ground, and Sir William and my mother spent hours sitting on the edge of her six sash cold frame while she picked up each potted plant, almost every one leafless and seemingly lifeless. I checked their progress at the end of an hour and a half and found they had progressed just ten feet. I quipped that it did look a bit like a cemetery, but Sir William looked up beaming above his muffled neck and said, "It is just wonderful to see these plants about which I have heard so much". What optimists we gardeners are!

Some time after the USDA had severely restricted the importation of plants, my mother obtained a plant import permit as an "accredited experimenter". This took place just after a friend of my father's, a Washington lawyer, had replied, when asked how she might obtain such a permit, "Lady, don't ask the impossible". His response angered her enough to agitate on her own, and the resulting permit has been held and used from that time to the present without interruption. She was soon happily importing many of the plants she had noted in the various journals, catalogues and books from foreign lands. There were many "firsts" to arrive in this country but, alas, we have scant records.

By the time 1926 appeared on the calendar my parents had begun a search for a country place where my mother could indulge her great obsession. With trowel in hand they would set out. Upon finding a rather run-down farm in Gladwyne some dozen miles from the center of Philadelphia, she stuck her trowel into various spots and found her "test borings" to her liking. They promptly bought some ninety acres of very hilly land, but at that time they were unaware of all the marvelous rocks because they were submerged under honeysuckle.

The house was barely finished when we moved. The architect always claimed that it was a house built around a greenhouse because it was the growing of plants which mattered most to my mother. With heightened interest and unbounded energy and enthusiasm she set about gardening section by section as the rough spots were cleared. She imported all sorts of choice rarities from among the new Asiatic finds made by Forrest, Wilson, Rock, Farrer, Ward and others. After several years of painful and vigorous efforts on her part, it seemed impossible for these fabled beauties to provide us with their reputed glory. These treasures balked at our summer heat with scant relief at night and our often cold, naked winters.

Although the planting of shrubs was her initial occupation, she soon turned to a rocky spot high upon the bank above the house. Here there already were a fine group of large native rocks so the spaces and cracks between were dug out to give more importance to each and, too, to substitute a gravelly mix suitable for rock garden residents. For some ten years this spot was the site for the planting of an odd mix of *Monarda mollis v. menthaefolia* from the Peace River in British Columbia, Canada, *Iberis sempervirens*

A carload of treasures. —Henry photo

for an evergreen, *Clinopodium coccinium*, *Amorpha nana*, *Iris cristata*, *Penstemon grandiflora* and a select number of other beauties.

My mother had long desired *Rhododendron* native to our east coast so decided to seek our brightest deciduous shrub, *Rhododendron speciosum*. It is now being returned to its earlier name, *R. flameum*. She had sought this species for some time but had not been able to obtain it from commercial sources or any botanical garden in either the United States or abroad. There remained but one thing to do — go get it in the wild. She appealed to Dr. John K. Small at the New York Botanical Garden for assistance, and it was no doubt he who gave her the name of a knowledgeable man, J. A. Berckmans of Augusta, Georgia. She then took off in a car with spade and trowel and a great deal of hope. In due time she returned with about seven selected color variations of this glorious plant which may long ago have contributed some of the vivid color to a fine race of hybrids known as the Ghent Hybrids. This trip was the first of her many collecting trips. The result was so successful that she was scarcely home before she had another jaunt planned. From this point she set off periodically on collecting trips as her interest in native plants increased.

IN A SOUTHWESTERN GARDEN

RAY WILLIAMS
Watsonville, California
Photograph by the author

Mr. Williams, a professional landscaper and nurseryman, lives on the outskirts of Watsonville, an agricultural community in the Pajaro Valley on the northern fringe of Steinbeck country about one hundred miles south of San Francisco. His is a maritime climate tending to be foggy except for four or five hours of sunlight in the afternoon. Daytime temperatures average in the high sixties to low seventies in summer, rising into the eighties and occasionally higher in the fall. Except for an occasional light thunderstorm, the Pajaro Valley is rainless from mid-May to mid-November. During this period, in order to accommodate a wide range of plants, watering is essential. Winters are wet as a rule with sunshine between storms and night temperatures averaging just above freezing, though occasionally dropping to 18 or 20°F.

One of the first books on the subject of gardening to come our way after my wife and I first acquired our property here in 1929 was the *Pleasures and Problems of a Rock Garden*, by Louise Bebe Wilder. This book was very well written and exceedingly informative to even rank amateurs, which we certainly were. One thing Mrs. Wilder stressed was that the problems could be just as rewarding as the pleasures. Getting one's hands in the soil, weeding while on hands and knees, and all the rest were far from drudgery while in the company of the cherished treasures here, whether from nearby hills or the far-off mountains of many lands.

This was a start that led to other books, such as the works of Farrer, Clay, Hills, Mansfield and many others. These and a membership in the Alpine Garden Society, along with their most inspiring bulletins, helped to keep alive a passion for the wonderful world of plants. Thus we started our garden some forty-five years ago; the date is uncertain but it was just as soon as we could clear enough of our property of the jungles of brambles, the delicious but highly invasive Himalaya Berry. One of our first projects was to build a lath house for starting seeds and cuttings and this was no sooner completed than we decided to replace the wooden north wall with one built of stone, not a masonry wall, but one built with a wide base and filled with earth with just enough cement to hold it together. This wall soon became the home of some of our most treasured rock plants, including a healthy specimen of *Ramonda myconii (pyrenaica)*, finally crowded out by more robust neighbors.

A sharp earthquake some time in the late thirties brought down a section of the northwest corner of this wall, leaving it more picturesque than before. Finally a portion of the mid-section was pried apart by the roots of a burgeoning *Fuchsia magellanica* and it too came tumbling down. The ruins are today far more attractive than the original and are the home of a most interesting plant association, though not

a single rarity.

Clinging to the almost perpendicular north face are two thriving colonies of *Polypodium vulgare occidentale* planted there sometime in the mid thirties and still vigorous and healthy. This fern is a denizen of the nearby canyon of Corralitos Creek where it covers mossy banks and damp rock faces as well as fallen logs. It is widespread and in all such places throughout the Santa Cruz Mountains.

Erodium pelargonifolium also shares this wall, its seedlings coming up everywhere they can gain a foothold. It is a rather robust but always attractive species of the easiest possible culture in climates such as ours where it comes to life with the first winter rains and is perhaps the most persistent winter bloomer in the entire garden. Like most of our own natives it goes dormant in summer drought; it comes, however, from the lower mountain region of Cilicia in far off Turkey. This erodium gets its specific name from the resemblance of its leaves to those of the well-known *Pelargonium zonale*, though in the erodium these are without the zoning. Its clusters of pure white flowers with their purplish red centers are always attractive no matter what the weather and are produced in profusion for months on end.

A thriving clump of *Heuchera maxima* has established itself at the base of the wall on the northeast corner where it gets the morning sun. *Alyssum saxatile*, an old-time garden favorite seldom seen around any more, clings to a scrap of earth on a narrow ledge above and has lived here in robust health, many times its normal life span, so long in fact that we no longer remember when it was planted. The amazing thing is that it has never produced a single self-sown seedling; no doubt because of the lush growth of *Helxine soleirolii* just below, a plant which has defied all efforts to banish it.

Felicia petiolata clings to the east facing wall, living and thriving in unbelievable aridity. *Pterocephalus parnassii* once shared an adjoining crevice, but after many years finally succumbed to the crowding of the felicia.

At the base of the wall, where a built-up section fans out into a sort of make-believe talus slope, which the helxine has not yet invaded, some of the plants requiring more moisture find a home. Among these, *Alchemilla mollis* is prominent. This Lady's Mantle is at its most attractive when its gray-green leaves are loaded with droplets of dew held captive by the fine, almost invisible hairs that cover their surface. *Carex buchanani*, a two-foot sedge from New Zealand, whose cluster of smooth, polished stems gleam with a rich amber glow when struck by sunlight, shares this place as does another New Zealander *Dianella intermedia*, a slender grassy species, generous with its brilliant blue berries in season. *Campanula poscharskyana* grows here too and tries hard to invade everything; drastic thinning takes place quite frequently to prevent this.

Perhaps the most surprising denizen of this east end of the wall is a thriving colony of *Freesia refracta* which has somehow managed to wedge its corms between the stones as high as four feet from the base and has scattered seedlings from there on down. These come up among everything and bloom with joyous abandon in midspring at which time their rich fragrance of ripe apricots pervades the air for yards around.

On the northwest corner of this north-facing wall, which receives the full force of the afternoon sun, reside two plants of no rarity at all but so undemanding and so rewarding when in bloom that their season of glory is al-

ways anticipated. The first of these, on a two-foot wide shelf of considerable aridity, is *Saponaria ocymoides*, which, confined to this frugal position, seldom reaches a height of more than a few inches and sheets itself with bright pink blossoms for a lengthy period in summer. In winter it huddles on its rocky shelf, glum and disconsolate, its foliage a dull frost-bitten red as it awaits the coming of spring. The other plant on this northeast corner of the wall is *Muscari armeniacum* growing under much the same conditions in a like area of sun baked soil at the very top of the wall. This position receives little or no water and enforces a long period of total dormancy that no doubt contributes to the brilliance of this bulb's comparatively short period of bloom at which time it becomes a glorious dome of brilliant blue, especially effective since it is viewed from below.

At the base of the wall where, even in summer, the sun seldom strikes and in winter not at all, there is less evaporation and moister conditions prevail. Here a purposely dripping faucet makes conditions ideal for quite a different type of plant. A four-foot high *Eucryphia glutinosa* commands the central position flanked by a few clumps of old fashioned *Primula veris.*, which do very well despite the competition of the helxine that carpets much of this area. Here too grows mimulus. Our original planting was of *Mimulus cardinalis* from nearby canyons, but then *Mimulus cupreus*, a Chilean plant reputed to be annual was introduced; we now have neither species, but instead a rather short-lived hybrid with a very dark red flower shading to almost black in the throat. So far no variations have occured but might well be expected.

A newcomer to this area and still awaiting final evaluation is a plant we know as *Lychnis* s. B.S.W. 5486 S.S.W. This plant was first grown by William Rawson, formerly of Los Gatos, California, now of Vancouver, Washington. Bill (as his friends know him) and his mother became frequent visitors to our garden and many were the treasurers exchanged between us. One day he brought a lush looking plant and wanted to know if we would care to bother with it. He had planted it in his choicest scree bed and the ungrateful thing was threatening to overpower everything; banishment was in order. Since I was engaged in landscaping and most of my work was not concerned with rock gardens I thought this thing might be of value to me and I was delighted to try it. It was immediately potted up and set on a bench with others on trial. It soon became evident that no matter how much water this plant was given it always seemed thirsty. It was first repotted to give it more root room in the hope this would satisfy its craving for moisture. Its happiness was short-lived, however, and within a month or so it had to be moved to a still larger container. It was not until we set the container in a shallow pan of water that this plant seemed content and sent up its first flowering stems. These were twelve to fifteen inches in height, quite sturdy, sparsely set with short stem-clasping leaves, topped by a two-inch corymb of tightly packed tiny lychnis flowers of deep currant red, of a particularly glowing quality like embers in a dying campfire. This lychnis was then set out in the garden where we might be able to keep it moist, but it is still not really happy and is now being tried where coolness and almost bog conditions prevail at the north side of the wall. It may yet be that Bill's ugly duckling of the scree will become a robust Cinderella of the bog. Experimentation is no

doubt one of the greatest joys of rock gardening (or any type of gardening) as long as it deals with plant introduction.

And now for a look at the rock garden that surrounds this crumbling ruin of a rock wall. The newest and to date the most interesting section is a series of ridges running north and south, stepping the east-facing natural slope down by way of outcrops of red lava, a comparatively cheap and easily acquired stone in this area. This is not a new, but rather a remodeled, section of the garden that contained among other things an Australian conifer, *Actinostrobus pyramidalis*, which under California garden conditions is prone to producing more top growth than its root system can support. As a result it falls easy prey to every gale blowing in from the Pacific. After a few such blow-overs it was removed and this section of garden took on a new shape. A small ledge of beautifully eroded sandstone of a subtle reddish brown coloring (caused by its high iron content) blended in very well with the lava. With a coating of coarse sand and gravel and a lusty scattering of half buried chunks of sandstone this area became the home of all the tiny treasures we could collect.

Cerastium alpinum lanatum is among these. It is a tiny clump of ashy gray wool that must have the sharpest of drainage and at no time become mud splashed lest it turn into a tiny lump of gray mold. The same treatment is required for the successful cultivation of *Festuca ovina crinumursi*. I cannot verify this name but this festuca is altogether a treasure among tiny ornamental grasses. A scant two inches in height and spreading to as much as three or four inches in width and of a silvery gray color, it is a tiny replica of the much used *Festuca glauca* and ever so much more demanding in its culture. With us it has shown no inclination to set any seed although it surely must where it grows naturally. Propagation is easy: just divide, but beware; it will stand no winter sogginess, so keep its crown high. I have it tucked in a tiny pocket at the top of the miniature escarpment which looks down on this section of make believe bad-lands. Just below, in another crevice, is *Sedum lydium*, a crowded flopping tangle of bright red thread-like stems each ending in tiny tassels of the brightest green, a scant two lines across. This does well where it has the protection of even a small rock that can give it a cool moist root run and a trace of shade from the afternoon sun. Both this and the fescue come from George Schenk's Wild Garden at Bothel, Washington. He is, indeed, a collector of rarities matched by few of our acquaintances.

Erysimum kotschyanum from the rocky alpine slopes and screes of many Turkish mountains seems a finer, smaller, and more refined version of *Erysimum pulchellum* from many places in the Near East. Both grow here and both are of easy culture, seeming satisfied in almost any sunny place protected from invading weeds and grasses. Of the two, *E. kotschyanum* is much the smaller in stature and tighter in growth. Its vivid orange yellow blossoms are set so tightly above its cushion that it appears like a jewel among pebbles when compared with so many other crucifers.

Calendrinia umbellata is a perennial portulaca with a more or less woody understock that branches at about an inch or so above ground into a loose cluster of ten to twenty curving stems, each tipped by a rosette of narrow, pointed, three-quarter-inch leaves. From these rosettes rise the wiry naked flowering stems up to five inches high and

A corner of Ray Williams' garden

bearing, in seemingly endless succession from midsummer until hard frosts, a profusion of brilliant red-purple blossoms. Although Peruvian, and perhaps, Chilean also, this plant is unharmed by night temperatures into the low twenties Fahrenheit.

Bellium minutum, the Doll House Daisy of English gardens, is a tiny composite, which also goes by the name *Bellium rotundifolium* according to Farrer. It comes from rocky slopes of Greece and eastward to the Levant. It is of easy cultivation but is in constant danger of being lost, over-whelmed by weed and grasses, unless given a place where these cannot invade. The well cared for scree of sand and rock chips is the safest place for it to spread its inch high and not too wide mats of deepest green, generously sprinkled with tiny almost stemless white daisies.

Saponaria pumilio, a reputed lime-hater, leads a precarious life here for our water cannot by any stretch of the imagination, be called soft. Nearby the tangled carpet of *Minuartia recurva* threatens to overrun its neighbors and occasionally has to be cut back to size.

Hebe propinqua makes in time a wiry little bushlet of the most distinctive aspect imaginable. Picture if you can a foot high or less shrub consisting of a tangled thicket of fine stems each clothed with tiny, almost unmeasurable scales that serve as leaves. So far no flowers have been seen. These, no doubt, are of the whipcord type and just as seldom produced. This hebe finds a place at the south end of our so-called scree garden where it merges into a jumble of red lava and *Hebe glaucophylla* (of nurseries) which I understand is more properly *Hebe pimelioides* var. *glaucophylla*. It certainly bears no resemblance to the *Hebe glaucophylla* of *Hortus I*. Our plants are of prostrate growth, mounding up to a foot in height and wide spreading. Its close-set leaves are usually less than one-half inch in length and a quarter-inch in width. It is frugal with its blossoms: fat and dumpy little spikes of white which add little to its attrac-

tiveness. Its frost hardiness is unknown to us but in really cold districts it is probably suspect.

A sprig of *Selaginella douglasii* found clinging to a lusty chunk of red lava that had probably been trucked in from northern California, where it is found in abundance, was carefully watched and tended. It survived in spite of our attentions, which of course it needed not at all, and so it is still with us, a considerable patch as of now. Brown and sere in summer it revives to a vivid green with the first rains and remains so until late in the spring.

A flat topped mesa results at the top of this miniature ridge, bounded to the east by the selaginella-covered outcrop. This mesa has been given a new look by the removal of a rather ancient clump of *Coprosma accrosa.* With new soil and top dressing of sand and stone chips, it has become the home of a select few; it has only an approximate area of some seven or eight square feet. The spotlight here is held by two cushion plants of undoubted merit in any rock garden. The first is *Scleranthus biflorus,* a hard tight dome of vivid green that may attain a diameter of eight or ten inches or more in time. This comes from alpine Australia and from like places in New Zealand. Reported from bogs and fens and other such damp places on the high slope of Mt. Koscuisko in New South Wales, it also submits to considerable drought without flinching. The tiny, sparsely produced flowers are of almost no consequence and should not be anticipated; it is the tight matted dome of a remarkable solidity, smoothness and beauty matched by few others that makes this plant a treasure. The other plant that is a feature of this mesa top is *Eriogonum douglasii,* a mat-forming Buck Wheat from Nevada's mountains. It forms flat inch-high gray mats of closely packed rosettes of tiny leaves all silvery with gray tomentum. It has never yet produced its cloud of yellow flowers and in our coastal climate may never do so, but we are hopeful just the same.

Here, also, is *Thymus neicefeii,* a distinctly gray mat that looks suspiciously like a relative of the *T. serphyllum* clan. It is spreading aimlessly and happily like an inebriated starfish, taking root as it goes. It too has yet to show its blossoms but no doubt will, come spring. This is also from George Schenk's Wild Garden. A clump of *Sempervivum webbianum,* set tight against the lava at the north end of the mesa, completes this section. A tiny garden within a garden.

Among the larger sandstones at the eastern end of the garden are some of the older plants, some of truly venerable age. These include such things as *Pinus mugo,* not a true dwarf of the species, but the common mugo of much of the Swiss and Austrian alps. Even so it is no giant, but really a shrub. This one is some eight feet in height and ten or more across. *Limonium cosyrensis,* more than three decades in age and looking more like a heather than a statice, also grows here, as does *Jasminum parkeri,* a foot or less high sub-shrub from the Himalayas, which runs around underground, coming up here and there among the sandstones. *Tweedia (Oxypetalum) caeruleum,* an Argentine plant, also inhabits this section. It seems to be neither herb nor shrub but a suffrutescent something somewhere between, not twining as suggested by *Hortus I,* but floppily upright to two feet. It is scantily clothed with softly fuzzy halberd-shaped leaves and bears trusses of flowers of a blue that is as indescribable as it is startling—a blue that has to be seen to be believed. Like other milkweeds it has fat tapering pods

that open to release innumerable black seeds equipped with the purest and whitest of silken parachutes to carry them far and wide. Its neighbors are *Cotoneaster microphylla* var. *thymifolia;* mats of *Juniperus communis* collected many years ago at my father-in-law's ranch near Cascade, Montana; carpets of *Erica carnea* 'Springwood White'; and nestled just above a natural sandstone arch, a silvery clump of *Onosma albo-roseum,* a rather rare thing in gardens and, like so many of its sister onosmas, equipped with fine stinging hairs. Very nettle-like, indeed, so best observed from a safe distance, it comes from Armenia and perhaps elsewhere in the Near East. *Thymus nitidus,* aged and woody; *Hypericum orientale* from hot slopes in the Levant; *Helichrysum scapiforme* from high in the Drakensbergs; and a seeming endless list of things that represent years of collecting and experimentation, are among the many plants doing well on these ledges.

GARDEN VISITS IN CZECHOSLOVAKIA

HANS W. ASMUS
Mequon, Wisconsin

Have you ever tried to communicate with someone from another country who doesn't speak your language? You probably resorted to a variety of hand signals, phrases, and odd gestures, and made as much progress as the "Salt Talks". Some communication is easier than others, however, and words aren't needed to share an appreciation of a glowing sunset or the other delightful miracles of nature — especially flowers.

And flowers are something special. Who does not feel that he has found something wonderfully unique when he stumbles upon a patch of wildflowers on a mountainside in the wilderness far above the beaten path. Flowers are a universal language, e s p e c i a l l y, perhaps, among rock gardeners. This is what I discovered on my visit to Europe last spring with my wife, Christine.

Since I had planned to visit my relatives in Germany anyway, I welcomed the invitation of my pen-friend, Otakar Cmiral, to visit Czechoslovakia and explore the rock gardens there. After visiting with relatives, my wife and I rented a car and headed toward Prague.

This is a beautiful city. The magnificent buildings and Old World architecture made quite an impression on me, but I didn't have much time for sightseeing, I had come to see rock gardens and meet people who were just as crazy about mountain flowers as I am.

Mr. Cmiral lives in the center of Prague, but has a quaint, cozy rock garden on the outskirts of the city. His main interest is in growing sempervivums and sedums and I counted several hundred species and hybrids in his beds. We next visited a good friend of Mr. Cmiral, Dusan Pangrac. I have never in my life seen such a great assortment of Kabschia saxifrages as were in his garden. Mr. Pangrac must have noticed the gleam in my eye when I said that I, too, grow saxifrages and out came the plastic bags and labels. He graciously

made close to a hundred cuttings of various Kabschias. These were left with my friend, Otakar, who promised to root them for me and send them to America.

Before I go any further, I must mention how impressed I was with the friendliness of the Czech people. Whenever I showed the slightest interest in the plants, my hosts would insist that I take some along, politely ignoring my refusal to take such beauties from them. If only there were more rock gardeners in politics, perhaps world peace would be possible.

The next day we were off again, this time to visit Josef Halda's rock garden which lies about one hundred miles northeast of Prague in a place called Eagle Mountain. Mr. Halda has worked hard to maintain a scenic naturalness in his garden and has succeeded admirably. Though only four years old, one would guess that nature itself had crafted the landscape, constructed entirely from local rocks. These are arranged so they jut randomly from the ground as if some glacier had ripped through the area. They are not small rocks either; in fact, boulders would probably be the more appropriate word for them. *Androsace imbricata*, *A. hedraeatha*, *A. chamaejasme*, *Draba mollissima* and *Draba politricha*, *Daphne arbuscula*, *Primula auricula* and many others are among the treasures scattered in the artfully arranged rifts and crevices among the rocks.

A little creek trickles through Mr. Halda's property and I spotted several trout in a large pool. The whole scene was very peaceful — the only sound was the gush of water moving over rocks and the twirping of birds in the forest nearby. It was a scene I will never forget.

As you follow the creek downstream the water becomes more boisterous and you come to a few waterfalls, and then to another beautiful rock garden. This one belongs to Mr. Gruhlich and is quite different than that of his neighbor. Well established and parklike, Mr. Grulich's garden was inherited from his father. The variety of plants is astounding; my camera never stopped clicking. Several dwarf mountain willows and conifers highlight this garden. In the sunny dry areas grow great patches of *Draba mollissima*, raoulias, helichrysums. *Douglasia vitaliana (Vitaliana primuliflora)*, and tiny, deep rose flowered *Dianthus microlepis*. Near the creek *Ranuculus alpestris*, *R. parnassifolius*, *Gentiana orbicularis*, several forms of *Gentiana acaulis* and many many more plants make their home.

We saw many beautiful gardens in our four day stay in Czechoslovakia, but an even more rewarding experience was the forming of so many new friendships. My wife and I are most grateful to Dr. Jareslaw Kazbal, who helped arrange our tour and also served as interpreter.

An Alternative

Sometimes it is not necessary to saw off or dig out.

Suddenly we noticed that our plant of *Juniperus communis erecta*, purchased in 1968, was too tall, out of proportion to the area where it was growing. We (husband) cut off several feet, shaping the top carefully. No stub is visible. The evergreen is now in scale and looks great. —D. De V.

Seed Preferences, 1978 and 1979

BETTY J. LOWRY AND NED M. LOWRY
Renton, Washington

In the course of their arduous work, past Seed Exchange Directors have amassed considerable information regarding the popularity and supply of various species submitted to the Exchange. These records have included for each seed lot the date the supply was exhausted, the total number of packets distributed, and whether surplus remained following distribution. This information, however, fails to give a complete picture of the demand for any species *regardless of supply*.

Our original reason for undertaking this study was to assist the Seed Exchange Director in estimating how many packets of a given species may be required. A compilation of preferences made available to the general membership could also be used to advantage especially by donors in upgrading their selections for the Exchange. Finally, such data, which might be considered an unsolicited popularity poll of participating members, could also lend support to the Seed Exchange Director's Committee as it becomes necessary to limit the items listed according to rock garden suitability.

Mechanics of the Tally

This compilation would not have been possible without the cooperation of Frances Roberson, Director for 1978 and 1979, who made seed requests and certain statistics available to us. First choice requests were chosen for tally since it is always the intent of the Exchange to give applicants their preferences whenever possible. The tally was carried out for two years in order to review as large a number of species as possible, since each year the selection varies. Each tally covered the entire main distribution, from first to last order filled, but excluded any surplus distribution. The number of first choice selections tallied did not equal the number of packets distributed by the Exchange because some members did not use the seed request form as it was intended (*cf.* Table 1).

Table 1. Statistics for ARGS Seed Exchange and Tallies

	1978	1979
Seed applicants	1,308	882
Items offered	3,496	4,267
Maximum allotment	42	32
Average packets per order	24	24
Total packets distributed (excluding salvage)	31,348	20,971
Total first choices tallied	39,264	20,454

The development of the computer program for the tally on a home IMSAI 8080 computer with limited memory was a challenge in itself. After programming, the computerized count still required that each first choice selection be entered into the computer, a total of 59,718 entries over the two year

period. Woe to us when momentary power failure or defective tapes required reentry of hundreds of numbers! Lack of printing capability required that the final results be hand copied from the CRT screen. Apart from these difficulties, computerization greatly accelerated the count process. Tally in 1979 was more difficult since underlined preferences were scattered throughout a single grid request format, whereas a separate grid contained first choices in 1978. As in any such operation human errors are possible, but a special problem was the difficulty in interpreting illegible numbers, a problem shared with those filling requests.

Using the Tally

Since the 1978 and 1979 tallies are too voluminous to publish in the Bulletin, copies have been sent to the ARGS Library as well as the Seed Exchange Director. Each of these consists of a photocopy of the two seed lists with the number of first choice requests handwritten to the left of the item number, with a brief explanation and directions for use, and are entitled *Tally of First Choice Requests, ARGS Seed Exchange, 1978 and 1979.* We encourage all interested parties to look these over and hope they will be informative. Our own examination of the results revealed several desirable species previously unfamiliar to us.

The 1978 and 1979 tallies are best not compared directly with each other without considering the statistics in Table 1 for the two years. Consider a typical example, *Erigeron aureus,* which received 65 requests in 1978 and 32 in 1979. The major factor influencing the relative number of requests was the much larger number of seed applicants in 1978. This difference was the result of mailing seed lists to the entire membership in 1978 and only to those specifically requesting lists in 1979. More pertinent to normalization of the tallies is the comparison of the total items tallied: 39,264/20,454 or a factor of 1.9. This factor takes into account not only the larger number of applicants in 1978, but also the irregularities reflected in the tallies caused by improper filling out of request forms. Thus on the average, one could expect 1.9 times as many requests for 1978 as 1979 disregarding any other effects. The actual average ratio of popular and strictly comparable items for 1978 and 1979 was in fact greater (2.2), which reflects the influence of other factors. The especially large number of choice items offered in 1979, which distributed the demand over a larger variety of species, may well have had such an effect. Likewise, some reduction in demand for preferred species might be expected when offered for two consecutive seasons.

Significance of Tally

Ten items received more than 100 first choice requests over the two year period, the highest being 153 for *Aquilegia jonesii* x *saximontana* in 1978. *Paraquilegia grandiflora* led the 1979 poll with 114, closely followed by *Aquilegia jonesii* with 112. Since well over 100 members may vie for a tiny bit of choice seed, applicants *must* recognize the necessity of listing alternates and for best results returning their requests promptly. In 1979, about *three-quarters of all first choices involved only the top 30% of the items offered!* Sometimes only one or two packets of these are available, so requesting only the most popular kinds is bound to result in disappointment.

What are the attributes of the most popular items? They are small plants highly desirable for rock garden or alpine house. Most are either rare or

difficult in cultivation, or otherwise seldom offered because seed is difficult to collect or scantily formed. Special forms of such plants receive particular attention. On the whole it is a matter of supply and demand — the more precious the seed, the higher the demand.

On the other hand, some 121 kinds in 1978 and a dismal 637 in 1979 received no first choice requests at all. Some of these, however, were distributed as alternates. Here we find a considerable quantity of trees and larger shrubs and other tall kinds not suitable for the rock garden. Another low-demand group consists of unknown quantities — species with unconfirmed names, questionable identification or no identification other than genus, and seed mixtures. Such questionables are seldom requested even though some may well be desirable plants. Numbered collectors' species are usually exceptions. Others not reqested simply suffer from name unfamiliarity and deserve to be much better known. Many other suitable kinds do not make the grade because so many species are listed. It is hoped that donors reviewing the tallies will not be discouraged by low ranking of some of their favorites. *Suitable* unusual species are always needed by the Exchange for those with extensive collections who wish to try something different.

Analysis of tally results shows that 61% of items in 1978 and 87% in 1979 received less than ten requests. Therefore for most kinds, the large quantities of seed (sometimes ounces) sent by donors are not only unnecessary, but wasteful of time and postage as well as of the seed. High-preference items should be sent in whatever quantity is available as they are seldom collectable in sufficient quantity to satisfy demand.

Donors may further conserve their own effort and that of the Director and Staff by being selective in their donations. A few well-selected species are often more valuable than a long list of borderline kinds. There is no prize for maximum number of donations. To reiterate, this study suggests avoiding trees, tall shrubs and perennials, unspecified or unverified species or those kinds otherwise in question, or mixed seeds. If the plant is common in rock gardens and seeds copiously, think twice about including it or at least show restraint in the quantity sent; there are likely to be many donors of such a species. However, even a few seeds of rare or difficult plants should be saved; we can hope they will add to the seeds of other donors. By all means include choice low-growing species which are shy seeders in cultivation *(e. g. Viola pedata)* or whose seed is difficult to collect (Phlox, Geraniaceae, some Boraginaceae, Labiatae, Violas, etc.) Appropriate species collected in the wild are generally well received, especially if the species hybridizes freely with others of the same genus in the garden. Previous seed lists can also be helpful in deciding which species to save for the Exchange. Desirable species not offered previously or by only one or two donors are good candidates. When no donor numbers are listed, this often indicates many donors. Send your best!

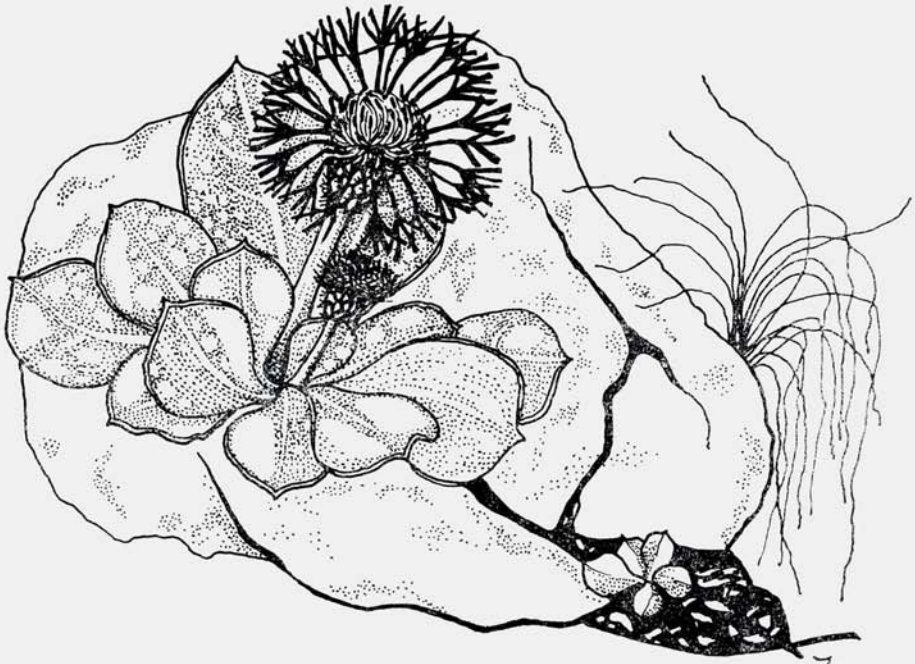
Most Popular Items

The top fifty items for 1978 and 1979 are combined and summarized below along with the number of first choice requests for each year. Top fifty corresponds to a minimum of 60 requests in 1978 and 34 requests in 1979. An asterisk denotes seed collected in the wild. Of these 80 items representing 60 species, 20 made the top fifty both

years. Some species qualified for the list several times because more than two seed lots were available over the two year period and each was individually very popular. *Lewisia tweedyi* and *Shortia (Schizocodon) soldanelloides* are examples of such popularity. The select items on this list (Table 2) represent little more than 1% of all items offered, and have been voted cream of the crop by *you*, the 1978 and 1979 Seed Exchange participants.

Table 2. Fifty Most Popular Items

	1978	1979
Adonis vernalis	33	34
Allium narcissiflorum	62	15
Androsace helvetica	102	
muscoidea		34
Anemonella thalictroides	63	32
Aquilegia jonesii		49
*jonesii**		112
jonesii x *saximontana*	153	45
scopulorum	62	23
*Arisaema japonicum**	65	
sikokianum		46
Calceolaria darwinii	134	78
*Calochortus kennedyi**		37
Campanula piperi	130	
*piperi**		106
portenschlagiana	69	29
raineri	94	42
Cyclamen cilicium 'E. K. Balls'	69	20
fatremse		57
mirabile ACW 2426		38
Daphne cneorum 'Eximia'	73	
*petraea**		85
Dianthus callizonus	63	39
*microlepis**		34
*Diapensia lapponica**	73	
Dicentra cucullaria	64	38
peregrina v. *pusilla*	95	26
peregrina v. *pusilla**		57
peregrina v. *pusilla* f. *alba*	78	22
*Dionysia involucrata**		76
Douglasia laevigata v. *ciliolata*	61	
laevigata v. *ciliolata**	75	41
nivalis v. *nivalis**		49
Edraianthus pumilio	76	49
Erigeron aureus	65	32
Eritrichium nanum ssp. *jankae**		87
sibiricum		35
Fritillaria michailovski		41
Gentiana ornata	68	
verna	82	
Geranium argenteum	87	
Glaucidium palmatum	68	22
palmatum 'Album'	66	28
Iris gracilipes	62	
Jeffersonia dubia	95	47
*Kalmiopsis leachiana**	44	34
Lewisia cotyledon		
'Sunset Strain' (apricot)	62	
pygmaea	68	33
rediviva	63	36
rediviva 'Alba'*	61	39
sierrae	57	35
tweedyi	114	48
*tweedyi**	131	75
tweedyi 'Rosea'		65
Meconopsis bella		49
Narcissus cantabricus v. *petunioides*		57
Paraquilegia grandiflora		114
? grandiflora	86	
Phlox bifida (miniature)	86	
Phyteuma comosum		57
Polygala calcarea		36
Potentilla nitida 'Rubra'	67	35
*Primula minima**	72	41
*parryi**	75	28
reidii v. *williamsii*		40
rosea x *clarkei*	74	
*Rhodothamnus chamaecistus**	78	42
Saponaria ocymoides		
'Rubra Compacta'	73	39
Shortia galacifolia	108	65
soldanelloides (Schizocodon s.)	92	50
soldanelloides 'Alba'		51
soldanelloides v. *ilicifolia*	61	
soldanelloides v. *ilicifolia**		54
*soldanelloides v. magna**		60
uniflora		64
*Silene hookeri**	63	33
*Soldanella pusilla**	60	34
Thalictrum kiusianum	61	21
Trillium grandiflorum 'Roseum'	71	
Viola pedata	83	55



A SUPERB HARDHEAD

ZDENEK ZVOLANEK
Prague, Czechoslovakia
Drawing by the author

The limestone section of the North Pirin Mountains in Bulgaria is very rich in alpine plants. It is warmer and drier there in summer and fall than in most alpine regions. Among the many outstanding plants I have observed in this area over the years is the endemic *Centaurea achtarovii*.

This superb Hardhead grows on the east slopes of the Palasica Range at an elevation of about 2200 to 2500 meters (7200 to 8200 feet.) The plants grow in horizontal fissures and in deeper holes that contain a limy grit mixed with humusy soil. It forms a decorative, nearly symetric rosette of thick, gently felted leaves that are silver-grey over the basic green but turn black in the fall. The rosette is some three inches across and from its center arises only one stalk with the wonderful flower at its apex. This blossom is about one and a half to two inches in diameter and I would describe the color as being a vivid violet-red with an orange center. The stalk is only about one and a half inches tall. This is a perennial plant with a few strong roots about eight inches long.

Centaurea achtarovii grows in association with *Linum capitatum, Viola grisebachiana* f. *lutea, Gentiana or-*

bicularis, Saxifraga ferdinandi-coburgii, S. sempervivum, Genista subcapitata, Sempervivum erythraeum, Androsace villosa v. *arachnoidea, Helianthemum canum balcanum, Daphne oleoides* v. *glandulosa* and *Daphne velenovskyi* (a new species related to *Daphne cneorum.*) Pretty neighbors, indeed.

When I collected its seed in September, 1978 I usually found only one or two fertile seed in its seed head and some had none at all. The seed is relatively big (four millimeters by two millimeters) and we are looking forward to its germination. My friend, Dr. Kazbal, has planted a few plants out of doors and at the moment they are a first class delicacy for our robust Czech slugs.

MOUNTAIN FLOWER HOLIDAYS IN EUROPE

by Dr. Lionel J. Bacon, The Alpine Garden Society, England

How satisfying for the enthusiast when a longed-for book finally is published and can be read and absorbed at leisure. Such a work is Dr. Bacon's most useful compendium of information on the principal alpine plant habitats of Europe. It will be an indispensable reference that will not only accompany all who search for alpine treasures in those beautiful environs but that also will transport the rest of us from our armchairs at home to the highest aretes and pinnacles from Spain to Bulgaria. It is rich and heady fare and needs to be digested slowly, the ideal bedside companion for the lowland-bound rock gardener.

Dr. Bacon avoids redundancy by first giving a description of the basic flora that one can expect to find from the Pyrenees through the numerous ranges that make up the Alps, to the High Tatra, which separates Poland from Czechoslovakia. The flora is decribed by habitat — the lower and upper alpine pastures, the mountain woodlands, rock faces, marshes and stream-sides, turfy screes, snow valleys, acid heaths, screes, moraines and rock-fissures.

With this background, and after some judicious advice on how to travel in the mountains and how to behave if one is compelled to collect plants, Dr. Bacon leads us country-by-country through the high Alps, the mountains of the Mediterranean countries and the Balkans, with a fleeting glimpse of

Scandinavia.

In the chapter devoted to each country there again is general background information covering its geology and geography, its travel accommodations and other useful information such as when the mountain passes are usually closed to traffic or guidelines on the best time for a visit. Then Dr. Bacon *selects* several principal areas where the plant hunting is known to be of the highest quality and proceeds to describe them in detail: where the best centers are to use as a base for one's rambles and the special plants (as opposed to the basic flora) that one can expect to find in each valley, with suggested walking routes and key spots that one should not miss. A small and rudimentary map is included for each area showing only the relationship of the towns to the mountain masses. In addition to two sections of photographs, one in black and white and one in color, there are also charming line drawings of plants, executed almost entirely by Dr. Bacon, with an extremely helpful guide to the scale of each drawing indicated by a line representing one inch.

Dr. Bacon stresses the selectivity of his description and the impossibility of including more than a sample of what is there for the plant hunting. While he hopes his book will inspire readers to visit the mountains he urges them to leave the sometimes well-worn paths that he describes and seek new fields and hills. Readers are also urged to consult specific articles on a given area in back issues of the AGS Bulletin, which are listed handily at the end of each chapter, along with other suggested reading.

Mountain Flower Holidays in Europe is the successor to Dr. Hugh Roger-Smith's *Plant Hunting in Europe,* which was published by the AGS some thirty years ago. With the exception of a few contributions from other AGS members (notably Mr. and Mrs. B. E. Smythies and H. L. Crook and Messrs. I. B. Barton and G. E. Barrett) the primary source of material has been Dr. and Mrs. Bacon's own "logs" of their plant-seeking holidays in Europe over the past thirty years.

Inevitably descriptions of some areas are more complete and better than others. The Dolomites and Pyrenees are described in great detail and with devotion, while the Gran Paradiso area of the Graian Alps (one of the very few areas this writer has walked around) is fleetingly referred to with no mention of the best village from which to explore, nor of the many valleys that one can fruitfully spend time in nor of some of the interesting plants that abound there such as *Saxifraga tombeanensis* that is more usually found in the mountains to the west of Lake Garda.

The most intriguing descriptions deal with areas off the beaten path, the many Sierras of Spain and northeast Portugal, the Algarve, Corsica, Montenegro in Yugoslavia, Macedonia and the Peleponesus in Greece, the Bucegi range in Roumania and the Rhodope mountains of Bulgaria. The reader finds himself yearning to take them all in, but how?

The book on the whole is excellent. A someday second edition would permit the upgrading of area descriptions that could be improved. An extremely useful complement to the book would be a supplement with *detailed* maps of the areas described. One longs for good maps to refer to as one reads along. And let us hope that Dr. Bacon's fine example will result in a companion volume that describes some of the areas left out of *Mountain Flower Holidays* — the Atlas Mountains, the British

Isles, the Caucasus, Turkey, etc.

In fact, Dr. Bacon's book should inspire similar publications on alpine habitats the world around, the accessible Himalayan valleys, New Zealand, the Japanese Alps, Alaska and even our own backyard. What could be more useful to the members of the ARGS, as well as other societies, than to publish a comparable volume on the key mountain and wildflower areas of North America. If any reader has a background of plant hunting all over the U.S. and Canada with the "logs" to back him up he has Dr. Bacon's example of what should be done and how to do it. Any number of ARGS members would undoubtedly be glad to help.

An interesting point is made by Dr. Bacon (who incidentally is the President of the AGS) when he mentions that publication of his book benefited from bequests from AGS members including the late Mrs. Anna N. Griffith (author of the excellent *Collins Guide to Alpines)*. What a marvelous legacy for the rest of us and what better way to be memorialized.

Mountain Flower Holidays in Europe should grace every alpine plant enthusiast's bookshelf and provide him (or her) with many hours of good plant-hunting. —Francis Cabot

Seed Storage

Eloise Garcia of Brookings, Oregon sent in a clipping about a new method of seed storage developed by James Harrington at the University of California. He puts them in canning jars with two heaping tablespoons of freshly opened powdered milk wrapped in four thicknesses of facial tissue secured with a rubber band. The tissue keeps the milk from sifting out and prevents seed packets from touching the moist dessicant. The jar should be tightly sealed with a lid and rubber rings and kept in the refrigerator and the milk packet should be replaced with a fresh one once or twice a year. Seeds stored by this method should be sowed promptly after removing them from the jar.

ROCK GARDENING IN THE SOUTH

PART 3 — DWARF AND PYGMY CONIFERS

ELIZABETH LAWRENCE
Charlotte, N.C.

This is the third installment in a series of articles by Miss Lawrence. The first two parts dealt with the gardener and the garden. The remaining articles will deal with some of the plants for the Southern rock garden. —Ed.

When I first became interested in dwarf conifers, few Southern nurseries were growing them, and only two nurserymen, Henry Hohman at Kingsville, Maryland, and Mr. Tingle at Pittsville on the Eastern Shore, grew a variety; neither of these nurseries is still in business. In order to find out what is available now, I sent for Joel Spingarn's catalog, *Dwarf and Pygmy Conifers*, which lists the more than four hundred that he is growing on his grounds in Baldwin, New York. Price and size, he says are not shown, as they are not all available at a given time. In our Bulletin (April 1966) he describes and gives the rate of growth of about a hundred species, varieties and cultivars that can usually be found in one nursery or another, though some grow so slowly they cannot keep up with the demands of collectors. Plants called *nana* or *pygmaea* or even *minima*, may in time outgrow their allotted space, for some make up for their small stature by growing in girth. Mr. Spingarn says 'Cole's Prostrate' hemlock and *Chamaecyparis obtusa* 'Juniperoides' would never grow more than a foot in height. The chamaecyparis is small enough for a trough, but the branches of the hemlock continue to grow in length although they lie flat on the ground.

In the Brookland Botanic Garden's Handbook, *Low and Slow-growing Evergreens* (Vol. 21 No. 1), three hundred varieties of dwarf conifers are described, among them a twenty-five year old specimen of 'Cole's Prostrate' hemlock, growing at Raraflora, the country place and nursery of its guest editor, Helene Bergman at Feasterville, Pennsylvania.

I find H G. Hillier's *Manual of Trees and Shrubs* (Third Edition 1973) the most useful reference for dwarf conifers as he has had so many years of experience growing them in the great English nursery which his father inherited from *his* father who established it in 1864. I have also made use of Welch's *Dwarf Conifers* (1966) and Den Ouden's *Manual of Cultivated Conifers* (1965).

When I came to Charlotte to live, in 1948, there were no real rock gardens in this part of the country, and few people grew saxatile plants; but now, two of the most ardent members of the ARGS are Dr. Ernest Yelton in Rutherfordton, N.C. and Dr. Donald Kellam in Charlotte. I have asked them to list the dwarf conifers that they have found satisfactory.

"I must tell you," Dr. Yelton wrote, "that my experience only goes back about fifteen years. Several of the so-called dwarfs have since become small trees and have been moved or chopped

down because they do not fit in the rock landscape any more. Among these have been *Chamaecyparis lawsoniana* 'Fletcheri'; *C. l.* 'Ellwoodii', now about six feet; and *Chamaecyparis lawsoniana* 'Nidiformis' to four feet. *Chamaecyparis obtusa* 'Gracilis Nana' is a lovely bushlet but it is now about three feet, only good for large rock gardens. *C.o.* 'Torulosa' is too big. *Juniperus horizontalis* 'Wiltoni' invaded every thing around it as did *Juniperus conferta;* neither has gotten more than four inches high, but both make thick rugs of foliage, which is death for anything in their paths. *Juniperus chinensis* 'Torulosa' is too big for the rock garden. *Juniperus squamata* 'Loderi' is too tall at five feet, but makes a lovely Irish juniper shape."

Abies

Dr. Yelton considers the Balsam Fir, *Abies balsamaea* 'Hudsonia', one of the indispensable plants in his rock garden. It has been recorded as growing ten inches high and twenty across in fifteen years; thirteen by twenty-three in seventeen years; and by Mr. Hillier as less than three feet tall and more than three feet wide in thirty years.

The true balsam of the Southern Appalachians is *Abies fraseri,* which grows in the boreal forest at altitudes of five thousand feet and more. A cultivar, *A. f.* 'Prostrata', a low wide-spreading shrub "rarely exceeding four feet", was introduced into the trade in 1938 by the Kelsey-Highlands Nursery. I wonder whether it is to be found anywhere now.

Cedrus

The Atlas Cedar, the Deodar, and Cedar of Lebanon are all trees that flourish in the South, and I should think their dwarf forms would do as well. Mr. Spingarn lists several small cultivars of all three, but the only one I have ever seen was in the old Fruitland Nursery in Augusta, Georgia. The nursery was acquired in 1857 by Prosper Jules Berckmans who spent the rest of his life introducing and propagating fruits and ornamental trees and shrubs for Southern gardens. In January 1937 my mother and I spent a warm sunny afternoon with Towne Hall, the nursery's horticulturist. The Yulan was in bloom, though it normally blooms in March, and the fragrance of the large white flowers mingled with the perfume of Sweet Olive and Japanese Apricot. We saw many rare shrubs in the arboretum, and in the fields there was a row of little cedars, *Cedrus atlantica* 'Pygmaea', which had been growing there for a long time. They were sturdy little shrubs, oval in shape, and about two feet tall, with a stout trunk and bristling gray-green needles. Mr. Towne said they could be propagated only by grafting. I have never seen this cedar elsewhere or found any reference to it.

Cedrus deodara 'Pygmaea' was found in a California nursery by Mr. Gotelli, and the original plant is now in his collection in the National Arboretum. Mr. Spingarn is growing it. It is reported as twelve inches tall and seventeen inches wide in seventeen years.

Chamaecyparis

"As to the dwarf conifers I would not want to be without in my rock garden," Dr. Yelton said, "my first choice must go to *Chamaecyparis obtusa* 'Nana,' the true form, which is a green tennis ball of tightly packed foliage. It reaches about six inches in fifteen years. *Chamaecyparis pisifera* 'Plumosa Minima' is apt to revert to non-juvenile foliage, and must be constantly manicured; it is very lovely and will stay in scale if given a regular haircut."

Dr. Kellam has *Chamaecyparis ob-*

tusa 'Pygmaea', a low spreading shrub, and *C. o.* 'Reis' which is upright. He also has *Chamaecyparis pisifera* 'Squarrosa Aurea Pygmaea', twelve by fifteen inches in ten years — (the smaller the plant the longer the name) which has yellow-green juvenile foliage, and *C.p.* 'Squarrosa Pygmaea', which I had in Raleigh. It came from Carl Starker, and in an unusually dry summer was the freshest looking shrub in the garden. It is a plump little ball of fine blue-gray needles.

Cryptomeria

"I am unhappy with *Cryptomeria japonica* 'Vilmoriniana'," Dr. Yelton said, "because it is now approaching the exile stage, *C. j.* 'Lobbii' was removed long ago." 'Vilmoriniana' was brought by Philippe de Vilmorin to France from Japan about 1890, and in his garden near Paris it grew twenty years to be a perfect globe two feet in diameter. I had it in Raleigh from the old LeMac Nursery in Hampton, Virginia, but I left it behind four years later. Mr. Spingarn gives it ten inches by twelve in ten years; Mrs. Bergman gives it about two and a half feet in height in forty years. In Dr. Kellam's garden *C. j.* 'Lobii Nana' has grown to fourteen by sixteen inches in two years.

Juniperus

"In spite of many opinions to the contrary," Mr. Spingarn said thirty years ago, "I cannot detect any appreciable difference between *Juniperus procumbens* 'Nana' and *Juniperus squamata* 'Prostrata'. Undoubtedly time will prove me wrong." Time must have done so, for he now lists them as separate plants, and as such they are grown in Charlotte, although I am not convinced that they are properly named. In Dr. Kellam's garden *J. prostrata* 'Nana' is four inches tall and three feet wide; in mine *J. squamata* 'Prostrata' has grown to a height of ten inches in eighteen years, and there is no telling how far it would have crept, rooting as it goes, if I had not cut it back frequently and drastically to keep it from covering a gravel path as it fans out from the foot of a tall pine tree.

Juniperus sargentii used to be grown in the Fruitland Nursery (as a variety of *J. chinensis)*, but I have seen it listed lately only by West Coast nurseries.

Picea

"*Picea abies* 'Pumila' is the best spruce for me," Dr. Yelton says, "reaching one foot in fifteen years. *Picea abies* 'Pygmaea' is a lovely little bun about six inches tall. *Picea abies* 'Nidiformis' makes a bush four feet in diameter over three feet high, but is excellent and will withstand our climate. *Picea abies* 'Remontii' is a better form for me. *Picea pungens* 'Montgomery' is a lovely soft blue plant about a foot in height, and is not greedy; *P. p.* 'Moerheimi' is slightly larger and less beautiful. *Picea glauca* 'Conica,' in spite of getting larger with the years, is wonderful as a peripheral plant for the rock garden."

Some plants grow very slowly at first, Dr. Kellam says, but when they find they like it here they begin to grow rapidly; one of these is *Picea abies* 'Mucronata', a compact globe when young, but eventually becoming a tree.

Pinus

"Among the Pines," Mr. van Melle said in our Bulletin, in 1949, "the nicest thing known to me is *Pinus strobus* 'Nana,' an utterly dwarf, compact mass of grey White Pine foliage of irregular form and indefinite width. Not many nurseries have it." This is still true; Mr. Spingarn's is the only one I know of now, but I saw it at the Tingle Nursery long ago. The tallest of a row

of eight year old specimens was eighteen inches, and most were not over twelve inches.

Dr. Yelton says, "*Pinus cembra* makes a very soft small tree but eventually gets out of scale. I have a lovely dwarf pine in an elongated shape which I have lost the name for; it was obtained from the Raraflora Nursery near Philadelphia, and has stayed in scale on the top of a tufa ridge for three years."

Thuja

The Oriental arbor-vitae is better suited to the South than the American one. *Thuja orientalis* 'Aurea Nana' was raised by Mr. Berckmans, and is still listed by John Mitsch as Berckmans Golden Arbor-vitae. "It is popular on the West Coast, deservedly so," Mr. Welch says, "and should be in every collection, however, small; it is seldom over sixty centimeters high." In the Fruitland catalogue for 1952 its mature height is given as eight feet, though it is "ideal for small gardens, window boxes, and vases."

Thuja orientalis 'Juniperoides', a compact and columnar form, may grow to a height of eighteen inches or more in seven years. Mr. Welch gives its mature height as less than a meter.

Tsuga

Dr. Kellam gets all his dwarf conifers from the Mitsch Nursery in Oregon. He has some interesting small hemlocks, cultivars of *Tsuga canadensis:* 'Gentsch White', with silver white tips, new and rare; 'Jeddoloh', very fine, stays low; and 'Nana' — Mr. Mitsch is not sure of the name, as the same plant is listed as 'Nana' and 'Gracilis', but it is a beauty; 'Pendula' is a weeping form for large gardens.

Tsuga diversifolia, a forest tree in the mountain of Northern Japan, is a puzzle. In cultivation, Mr. Hillier says, it is a small horizontally-branched tree. I first saw it in Mr. Tingle's collection as a very small dense mass of foliage; Mr. Mitsch describes it as "semi-dwarf, irregular, upright. Ends of branches somewhat twisted showing silvery reverse." In Dr. Kellam's garden it has grown to a height of two feet in seven years.

The one in my garden came from Kingsville as "a very graceful Hemlock with crowded branches forming a pyramidal head." It was a small low shrub with horizontal branches, but I supposed it would grow in grace, and make a screen where a screen was needed. But now, after twenty-five years, the trunk is only four inches high, and not bigger than a man's wrist, and the spreading branches lie on the ground or grow upward for a few inches and then grow out at right angles for as much as eight feet; the branchlets turn upward, and the tips of the tallest are about three feet from the ground. The glossy dark green needles are narrow and short, only an inch long; they are as fragrant as balsam. It grows in deep shade with a carpet of *Vinca minor* beneath it.

Yews and Plum Yews

The most satisfactory yew for the South is the English species, *Taxus baccata.* There are numerous low growing forms, but the only one I have grown is 'Repandens', which came from Tingle's and grew in my Raleigh garden for a number of years without getting to be more than two feet tall. When I came to Charlotte Mr. Tingle sent me another; it had evidently been growing in the field for some time, and was already four feet tall; in spite of being cut back, it is now about eight feet tall and sixteen feet across.

I have learned that in seventy-five years it may grow to ten by thirty feet, and I had better begin dealing with it more severely. In addition to putting up with heat, it is said to be the hardiest English yew, withstanding temperatures well below zero.

The most beautiful dwarf yew I have ever seen is *Taxus baccata* 'Prostrata' in Mrs. de Forest's lovely garden in Santa Barbara. It is a low, neat, slowly spreading ground cover, two feet tall or less, with bright green needles. My visit to California was long ago; I have searched in vain ever since, but I have never found a source for it.

In our Bulletin (January 1968) Anna Sheets says another dwarf Japanese yew, *Taxus cuspidata* 'Minima', one of the very smallest, is easy to grow in sun or light shade in Piedmont North Carolina It was raised in 1932 from a seedling selected by B. H. Slavin, Director of Parks in Rochester, New York.

Mr. Hall told me that the dwarf plum yew at Fruitland was *Cephalotaxus drupacea*, which is now considered a variety of *C. harringtonia*. As it suckers, I take it to be *C. h. d.* variety *nana*, which Ernest Wilson sent from Japan to the Arnold Aboretum in 1916, and which is the only form that I know of that does; if so, it must have been a young plant in 1937 for it did not cover much ground when I saw it. In my garden, after twenty-five years, three suckers have come up a few feet from the trunk, which is only seven inches tall, and from the trunk the suckers stretch out horizontally to eight feet, lying down or slightly ascending. The tips of the branches are sometimes three feet above the ground. The needles are in two ranks; they are a bright and shining green, and to an inch and a half long. It is hardy in zone six.

At one time Mr. Tingle grew, as *Cephalotaxus repandens*, a dwarf form of *C. harringtonia fastigiata*. When I saw it in the nursery, a six or seven year old plant that had never been cut was still less than a foot tall. I don't think he propagated it, and I suppose it is now lost forever.

Seed List Syndrome

Do others have self-delusion problems with the seed lists? At the moment I have a nice group of common foxglove in bloom. They were grown from a seed packet which certainly did not have *Digitalis purpurea* on it. The squirrels have made off with the label and I don't recall what it was supposed to be, but, from the location, I judge it should have been six to ten inches tall, with lavender, lilac or blue flowers in summer. I was thrilled to raise one *Dipelta yunnanensis* from seed. The other day, while strolling by, I remarked to myself, "My that poplar is doing well." Ten feet further along sense caught up with me. No dipelta. It seems impossible to let an entire growing season go by without realizing something is not quite right. Anyone else have this syndrome? —Shirley Klett, Bel Air, Maryland

GARDENING IN SAND

NORMAN C. DENO
State College, Pennsylvania

One of the simplest and most satisfying methods for growing a wide variety of rock and alpine plants is the technique of sand beds. To make a sand bed, select a reasonably level area on the order of twenty-five by twenty-five feet and have the nearest neighborhood lumber and building supply company dump about twelve cubic yards of ordinary builders sand (the coarse, sharp kind) on the plot. When the sand is raked even it will give a covering of about six inches overlaying the soil. While it may be desirable to eliminate some of the most vigorous weeds, such as dock and thistle, before the sand is delivered, the fact is that these sand beds have been made on an old field that had been cultivated but still held its quota of weeds; thus rigorous elimination of weeds before setting down the sand is not necessary.

It is a fact that certain plants will grow better in sand bed conditions than anywhere else and we shall inquire as to why this happens. But first, let me talk of some other advantages of this type of gardening. Ever try to dig a dandelion or deep-rooted dock out of hard soil: break them off at the top and have five crowns for one a month later; that is the usual story. It is different in sand. You can work your fingers several inches down, get a good hold on the crown, and out it comes. Weeding becomes a joy and a pleasure instead of toil and frustration. Even chickweed and purslane are easily brought out whole rather than torn off to sprout again.

Why do some plants do so well in sand? There are several reasons. One of the most important is that sand naturally provides a well aerated soil. This is a much misunderstood factor. It does not seem to be generally realized that plant roots, as growing organisms, get energy from oxidation-respiration and they need air, or more specifically the oxygen in the air. If they cannot get oxygen, they die of asphyxiation just as surely as an animal. Many gardeners achieve this aeration by striving for what they call drainage. The truth is that the roots of plants really don't care whether water flows past them fast or slowly; however misconceptions sometimes work and soil with good drainage will be well aerated, even well below the surface. It is evident that the porous nature of sand provides one of these well aerated mediums.

A second feature of sand is its looseness. It is fun to run your fingers through sand and I like to imagine that the mat-forming phlox and arenaria also love to run their wide-ranging roots through the sand. This ability to encourage root growth is well known to propagators, who often use pure sand to root cuttings.

Another aspect and a surprising one is that sand does not frost heave; just why is not clear, but it is so. As a result, there is none of the tearing of deep tap roots and upheaval of rosettes which is such a problem in some loam soils. This is particularly important in species such as *Phlox alyssifolia* and *P. andicola.* Frost heaving tears up their thin fleshy roots and the whole system can be shredded and thrown

to the surface if such heaving is extensive.

A factor that we know less about is the presence or absence of bacteria and fungi. The loose texture of sand seems to discourage these microorganisms and some plants that grow well in sand are debilitated by rots and molds in ordinary soil.

The question will soon be asked: is there enough nutrient in sand? Here is where the subtle feature of six inches of sand overlaying soil comes into play. The plant roots can penetrate through the sand and invade the soil more or less to the degree in which they need nutrient. It should be apparent that shallow rooted plants will not fare well. This is, in fact, one of the features of sand beds: shallow rooted grasses and weeds do not establish easily.

What are some of the plants particularly suited to the sand bed in full sun? Any sandy desert in Wyoming will provide a number of possibilities. Try *Phlox alyssifolia, andicola,* and *hoodii.* These send up little forests of stems from adventitious root buds. In spring they are covered with gay flowers in whites, pinks, and lavender blues. Even the eastern phloxes such as *P. subulata* and *P.bifida* do superbly in sand beds. *P. bifida* is a glorious shower of bloom when grown in sand whereas it is apt to be weak due to mildew in other soils.

Eriogonums are a race of buckwheats of which many species are found in the Rockies. They have evergreen foliage ranging from furry white to russet red in winter depending on the species. They are mostly matformers and have sumptuous bouquets of cream to deep yellow flowers in large heads. Try *E. umbellatum* and *E. flavum* in sand for plants that look dressed-up all year long and never go ragged. They are decorative for twelve months of the year despite drought, burning sun, sleet, or snow.

The arenarias are called sandworts meaning sand weeds. Species such as *A. montanum* and *A. saxosa* form evergreen mats (deep myrtle green in the case of *A. saxosa*), which disappear under masses of inch wide cups in May.

Another group of plants, not as well known as the arenarias, that do well in sand but not elsewhere are the acantholimons or thornyfields. They resemble a very symmetrical, mounded dianthus, but one touch will tell you these are no dianthus; the needle-like leaves are stiff and piercingly sharp. Sprays of pink or white flowers develop in June and the plants are evergreen the rest of the year.

For real excitement, become a penstemon buff and join the American Penstemon Society. Penstemons have long, thong-like roots, evergreen foliage, and spikes or mats covered with tubular flowers. Some of the finest blues in all the plant world are found in *P. glaber* and its allies and there is no finer sheaf of bloom than that produced by the multitudes of one-foot spikes of *P. laricifolius* when covered with salmon-pink trumpets. *P. caespitosus* lives up to its name by forming deep green, inch high, evergreen mats covered with lilac-purple flowers. The roots along the creeping stems go straight down for twenty inches, enough to withstand any degree of drought.

The Cactacaea are not everyone's plants and many of the opuntia group are rather large and lack distinction of form. In contrast, the beauty and elegance of *Echinocereus pectinatus* and *E. baileyi* will satisfy the most discerning tastes. The flowers are bigger than the little symmetrical ball of a plant and are crystalline pink or lavender in color. Unfortunately the flowers last

only two days, but the plants are hardy to -20°F. and the spines are relatively benign compared to those of the fearsome opuntias.

The Oncocyclus and Juno irises are kings and queens of all iris. They are spectacular and dwarf and enjoy the dry upper layer in sand beds. The Oncocyclus iris have flowers as big or bigger than those of the usual German bearded iris on one-foot stems over leaves only six inches tall. The blossoms are beautifully veined and there is a large eye-patch on each fall. The Juno iris resemble little one-foot cornstalks with several orchid-like flowers at the top.

Many other genera do well in sand, among them the drabas. *Draba aizoon* looks like a tiny yucca with yellow flowers in very early spring and *Draba dedeana* is the perfect alpine rosette covered with large white flowers. *Dryas octapetala* also does well in sand. It forms yard-wide mats of little evergreen oak leaves. The two-inch flat flowers of this member of the Rose Family resemble single white roses. Dryas is circumpolar in distribution and it gives me a thrill to think of this plant growing on mountain tops on the *north* coast of Greenland.

Douglasia vitaliana (now, by some botanists, renamed *Vitaliana primuliflora*) forms a mat of glaucous needle-like leaves in the sand bed covered with yellow bugles in May. It belongs to the Primulaceae and possesses all the neatness so characteristic of that wonderful family. *Pulsatilla vernalis*, Our Lady of the Snows, is a large white anemone on six inch stems over a mat of lacy evergreen foliage. It is not easy to keep in regular garden soil but does well in sand. Several companulas also take to sand beds including the dwarfs with great cup-shaped flowers such as the purple *C. pulla* and the pink *C. betulaefolia.*

Daisies are not everyone's choice but the two-to-three-inch flat lavender pinwheels of *Aster alpinus* and *Townsendia parryi* or the white pinwheels of *Townsendia strigosa* will satisfy the most discriminating tastes. The first two hold their flowers on four-inch stems while *T. strigosa* has flowers nearly flat to the ground.

It is fun to see what will grow in sand beds. Who knows what old favorite or new challenge will reach its peak of perfection there. In general, plants are inclined to be low growing and more floriferous in sand beds than in ordinary rock garden soil and that is what it is all about.

• • • *of Cabbages and Kings* • • •

What is the why of a garden? Most gardens are created primarily as a setting — a pleasant adjunct to a home, a bit of landscape tamed and tidied and made bright with color.

For some people this is the only reason for a garden. Those who are sufficently affluent will buy such a landscape, custom-designed and planted and hire someone to keep it trim and flowering, much as they would purchase ornaments or pictures for their rooms or display on their side-boards maid-polished silver. Others, though they may wish the amenity of a garden, are unable or unwilling to go to such expense. They may, perhaps, have it professionally designed but will plant it

themselves and will plan to tend it personally a few hours each week with or without the part-time help of what frequently turns out to be an unknowledgeable, unwilling high-school boy.

Many such garden owners even believe they will learn to love gardening; indeed, a few will discover in themselves an affinity to horticulture. But most will find it a disheartening chore. True, in the first warm days of spring they may get an atavistic pleasure in poking about in the moist, richly scented soil and discovering uncurling, upthrusting stems among the soggy debris of winter. They will revel in spading up a bed and sprinkling it with the contents of brightly colored seed packets, or in tucking nursery-bought plants into the newly turned earth. They will greet each sprout, each new leaf with the pride of creation and cheerfully pull up the tiniest weeds. But soon this initial enthusiasm dwindles. A day slips by, then a week without so much as a glance at those plants which do not seem to be growing as fast as they did at first. Other interests impinge and suddenly that bed — neat and clean only yesterday — is filmed with weeds. Conscience-stricken the gardener pulls and scratches to release his plants, only to find that next week it has all to be done again. Gradually as the sun presses wth greater heat, even this minimal attention is begrudged. Summer weekends are too short. Guests arrive. The children must be ferried to the beach. More appealing than weeding and wrestling with hoses are the tennis court, the golf course, a trip to the mountains, a shaded terrace. Besides summer is a time for friendship and gardening is a solitary chore.

And so the dream-garden becomes increasingly unkempt: weeds shoot up, the plants do not flower as well as the catalogs indicated, they develop blights, are chewed by bugs; some even vanish completely. It is all very discouraging. And after a few heroic but sporadic attempts at cleaning up the mess, the beds are sometimes resodded for the sake of tidiness and simple upkeep; as frequently they are allowed to go completely wild, a permanent reminder of unattained hope.

There are, it must be conceded, many gardens planned, planted and cared for primarily as settings for a house that are neither professionally tended nor allowed to become unsightly weed-patches. For just as the conscientious housewife will spend time and effort — though frequently grudgingly — on the bedmaking, tidying, dusting, and vacuum-cleaning essential to maintaining the inside of an attractive home, so will she or her husband, or both, weed and trim the plantings which enhance the outside.

A desired landscape is not, however, the only why of a garden. Many are created by those for whom gardening itself is a joy, where the decorative aspect is a result rather than the intent. And we rock-gardeners are definitely in this category. Gardening itself is a joy and a relaxation. Our lives would be diminished without a garden in which to work.

Happy gardening to you all.

Note on Phlox Bifida

Mina Colvin of Nashville, Indiana, who discovered *P. bifida* 'Starbrite' (Vol. 32, p. 184), sends in the following note on the species:

On my way home from Bloomington, Indiana recently I noticed that the weeds were quite tall where I used to see *Phlox bifida* and decided to stop where I used to see large patches

of it. They were gone, not a *P. bifida* to be found. In another spot, where the roadside is still being privately mowed, I found nearly as many plants as in the past. This has about confirmed my suspicion that this plant desires disturbed soil.

After a bank has been scraped to bare soil, they will soon appear and get thick. If fallen leaves keep down the growth of tall weeds, *P. bifida* thrives in the leaf mold, but when tall weeds come in, no more *P. bifida*. If the grass grows and is mowed they do well but with Indiana's present policy of only mowing roadsides twice a year (they used to do it four even five times annually), the *P. bifida* can't compete and dies out.

The area where I found 'Starbrite' has no *P. bifida* at all; the trees are so much more lush and the shade has become just too heavy. I've marked plants in the wild and find they only live a short time, three to four years at the most.

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