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Contents

Vol. 37 No. 1

Winter, 1979

Primula Marginata, Its Forms and Hybrids—Kris Fenderson	1
Not All Plantsmen Are Men, Part II—Nan Ballard	5
Houttuynia Cordata—Mrs. Ralph Cannon	10
Primula Mistassinica—Maryann Collins	11
The Raised Bed, A Practical Solution—Francis Cabot	12
In Search of Aciphylla 1977-78—James R. Le Comte	21
Rock Gardening in the South, Part 2—Elizabeth Lawrence	29
Plant Show Notes—Bill Brown et al.	35
Book Reviews: Hybrids and Hybridizers—Rhododendrons and Azaleas for East- ern North America, edited by Philip A. Livingston and Franklin H. West; Violets by Doretta Klaber	39
Of Cabbages and Kings: Update on Deer Repellents—James Cross; An Alaskan Garden—Ernest H. Yelton	41
Front Cover Picture— <i>Primula marginata</i> —Laura Louise Foster	

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PRIMULA MARGINATA Its Forms and Hybrids

KRIS FENDERSON
South Acworth, New Hampshire

One of the most instantly recognizable of all primulas is *Primula marginata*. Its natural distribution, in a small area of the Alps of south-eastern France and north-western Italy, belies its common occurrence in cultivation where it has proven handsome, soundly perennial, and easily manageable.

In its native habitat *P. marginata* is rare and of limited distribution on both limestone and granitic formations at elevations of 600 to 2600 meters (1900-8600 feet) where its long woody rhizomes sprawl from rock crevices in both sun and shade. The central rosettes of young leaves and the margins of older ones are densely covered with a light golden or cream colored farina,

which gives the plant a very distinctive appearance. The gray-green leaves are one to four inches long and one and a half to two inches broad. They are oblong and deeply and regularly toothed. As with many species of primula there can be surprising variation in the extent and obviousness of such leaf indentations. The leaves lack cartilaginous margins and are, instead, thickly dotted along the edge with short, farina producing glands. This characteristic give this primrose the handsomely outlined leaf margins from which it derives its name and which give it the great beauty that would earn for it a place in any rock garden even without the added grace of its fragrant

deep blueviolet blossoms, which are so reliably and easily produced.

The one to five inch flower-scape is conspicuous and often exceeds the length of the leaves. It carries an umbel of two to twenty deliciously scented flowers. The bracts are broadly ovate, short, leaf-like and heavily dusted with farina. The one quarter to one inch long pedicels are also farinose as is the one eighth to one quarter inch bell-shaped calyx. The latter is purplish beneath the farina and is divided for nearly half its length into blunt triangular lobes.

The corolla of *P. marginata* is usually bluish lilac; rarely slightly pink or off white specimens have been found. Most desirable are those forms in which the corolla is of the luminous blue so prized by Farrer and in which the limb is full and rounded. The corolla, three quarters to one and a quarter inches across, is somewhat funnel or saucer shaped. The tube greatly exceeds the calyx and widens at the throat. The length of the seed capsule is equal to or greater than the length of the calyx.

Given reasonable drainage, a light airy site, and a fertile soil that does not become parched, *P. marginata* is one of the easiest, most permanent and floriferous members of the Section Auricula. Even when not in bloom it has the added attraction of its handsome evergreen rosettes, beautifully sculptured and powdered.

It is possible to raise *P. marginata* from seed, but patience is required as it is slow and erratic to germinate, needing long periods of freezing and thawing. The seedlings, when they do appear, as with many of its European relatives, are rather slow to develop. Propagation by cuttings of short terminal portions of the tough root-stalk, which may reach eight inches in length,

is by contrast infinitely quicker and more successful and in this way fine forms may be increased with surety.

A cutting should be cleanly detached from the stock plant and the largest lowermost leaves carefully stripped away. The resulting cutting, which should be about one to two inches long, is inserted in damp gritty soil or sand in a shaded location. Cuttings thus taken and kept damp but well ventilated should show signs of rooting in several weeks. Young, lightly rooted plants are best carried through the first winter in a cold-frame or sheltered nursery bed because in unfavorable locations in the open garden they are apt to be heaved by frost and dehydrated during the winter.

With the possible exception of a cross with *P. viscosa*, there appear to be no natural hybrids of *P. marginata* and other members of the Section Auricula found in the wild (a state in all likelihood attributable to its relatively limited distribution.) In cultivation *P. marginata* has been successfully crossed with such diverse species as *P. allionii* and *P. minima*. These crosses have resulted in a series of sometimes beautiful, and always interesting, small plants of great charm. Far more common are superior selections of the species itself, possible hybrids with border auriculas, and some plants with handsome deep wine-colored flowers, perhaps indicative of a cross with *P. viscosa*. The most familiar of the foregoing is the beautiful and well known *P.* 'Linda Pope', a plant which flowers considerably later than the species and which has broader foliage, fuller, more overlapping petals of a richer color and a conspicuous white eye.

It is possible by persistent crossing and selection of hybrids between *P. marginata* and good forms of *P. x*

pubescens or other European species and crosses to create diminutive, easily grown, floriferous plants of great beauty and stamina for the rock garden and alpine house. Many such plants have been created in the past resulting in a plethora of names, some for plants that may no longer be in cultivation. The following list represents some of the many selections that have been made of the species itself, as well as the hybrids in which *P. marginata* is a likely parent.

P. marginata 'Agee' is a recently selected American cultivar with small, well-rounded dark blue flowers carried well above heavily powdered foliage.

P.m. alba should only include white forms of the true species, which are reported to be rare, small flowered and narrow petalled. It is an epithet which is also in use to describe a very attractive possible hybrid with a white form of *P. viscosa*; the resultant plant being tall, pale pink in bud and pure white in flower.

P.m. 'Amethyst' appears to be a recent American selection. Though possessing the handsome foliage which *P. marginata* readily transmits to its hybrid offspring, its large, deep wine colored flowers suggest parentage involving another species such as *P. viscosa* or a hybrid such as *P. x pubescens* or, as in the case of *P.* 'Marven', *P. x venusta*. It might well be a selected clone of the single rare natural hybrid of *P. marginata* and *P. viscosa*, which was correctly termed *P. x crucis* by Bowles.

P.m. 'Barbara Barker' is a well known British clone described as a plant with stiff, light green leaves and a large head of bluish mauve flowers with white eyes. It received an Award of Merit from the Royal Horticultural Society in 1925. It is reputed to be a cross between two hybrids: *P.m.* 'Lin-

da Pope' and *P.* 'Zuleika Dobson', the latter a handsome blue-violet selection of *P. x pubescens*.

P.m. 'Barbara Clough' is described as having rounded, pinkish lavender flowers with white eyes.

P.m. 'Clear's Variety' should, according to the literature, have a small, round lilac flower with a white eye over deeply toothed, yellow-powdered leaves.

P.m. 'Col. Champney's Variety' is met with in some frequency in actual cultivation as well as in catalogs, show reports, and older literature. It appears to be a fine, large flowered selection of the species.

P.m. 'Coerulea' is sometimes encountered as var. *albo-coerulea*. This plant may have originated as a wild form selected for its pale blue color. Indiscriminate propagation from seed may have obscured some of its supposed uniqueness.

P.m. 'Elizabeth Fry' is mentioned in a recent specialist periodical as having a few, large, silver-lilac flowers on tall slender scapes.

P.m. 'Highland Twilight' has been offered by a British firm whose catalog describes it as a small, dark-flowered form.

P.m. 'Holden Clough' or 'Holden's Variety' is supposedly a superior, vigorous, clear blue, small flowered plant with deeply lobed corollas and heavily serrated foliage with pale yellow farina.

P.m. 'Hyacinthia' is likely the result of line breeding an older form of *P. marginata* 'Beamish Variety'. It was recently described as a clone with very fine, blue flowers with six overlapping corolla lobes. The foliage is green with some farina on the margins. It received an Award of Merit from the Royal Horticultural Society in 1945.

P.m. 'Janet'. There is some confusion

surrounding this name. The common clone with this appellation is a generously flowered lavender form with broad rounded greenish foliage and little dentation to the leaf margins, which still show a characteristic fine beading of farina. At one time a plant close to, if not identical, with 'White Linda Pope' was propagated under the name 'Janet'. It is possible that the lavender flowered 'Janet' may be the result of seedlings of the white flowered clone of the same name. However, note must be made that the 'Janet' currently in cultivation lacks the conspicuous white eye of 'Linda Pope' and usually blooms considerably prior to that clone.

P.m. 'Jenkin's Variety' is to be found in a recent catalog but without an adequate description.

P.m. 'Kesselring's Variety' is condemned as small and unimpressive, but mentioned for its late flowering habit.

P.m. 'Lilac Domino' is a smaller edition of 'Linda Pope' with deeply toothed stubby leaves.

P.m. 'Linda Pope', so well known, much admired and widely distributed, was apparently raised by a nurseryman in Birmingham, England. It was named for his daughter and gained a richly deserved Award of Merit from the Royal Horticultural Society in 1920. It is a somewhat larger, more generously proportioned, handsomely colored form of the species with a conspicuous white farinose eye zone and flowers considerably after *P. marginata* itself. It may have resulted from a cross with a fine border auricula or *P. x pubescens*.

P.m. 'Marven', like the former, is a well known and widely distributed plant. It is a hybrid of *P. marginata* and *P. x venusta*, the latter a cross

of *P. auricula* with *P. carniolica*, an attractive species from the mountains north of Trieste. In this cross *P. marginata* is assumed to be the pollen parent. The resulting seedlings have leaves like *P. carniolica* but carry flowers of dark violet with white eyes. A clone of this hybrid received an Award of Merit from the Royal Horticultural Society under the name *P. 'Marven'*.

P.m. 'Millard's Variety' is an inadequately described plant appearing in a current catalog.

P.m. 'White Linda Pope' is said to be a seedling of 'Linda Pope' of which, circa 1930, there was a true white form in cultivation in England. The latter was raised by a Mr. Casburn and propagated by a Dr. Cobbett. It was proposed to name the seedling in question 'White Lady', a name under which it received an Award of Merit from the Royal Horticultural Society in 1970. Due to a prior description of the plant in the Journal of the Royal Horticultural Society as 'White Linda Pope', this name had to be retained instead. 'White Linda Pope' is described as having rather large, obovate, toothed leaves to three and a half inches long and two inches broad. The four inch scape may carry an umbel of up to ten flowers, each with a corolla diameter of one inch. The bloom opens pale green and matures to white with a greenish yellow center.

In addition to the above named clones there are likely other unnamed selections and hybrids. Among the latter are some fascinating small plants involving *P. allioni*, *P. minima*, and *P. carniolica*, with *P. marginata* frequently transmitting its handsome powdered foliage characteristics.

NOT ALL PLANTSMEN ARE MEN

Part II

NAN BALLARD

Issaquah, Washington

Drawing by Dr. Helen M. Gilkey

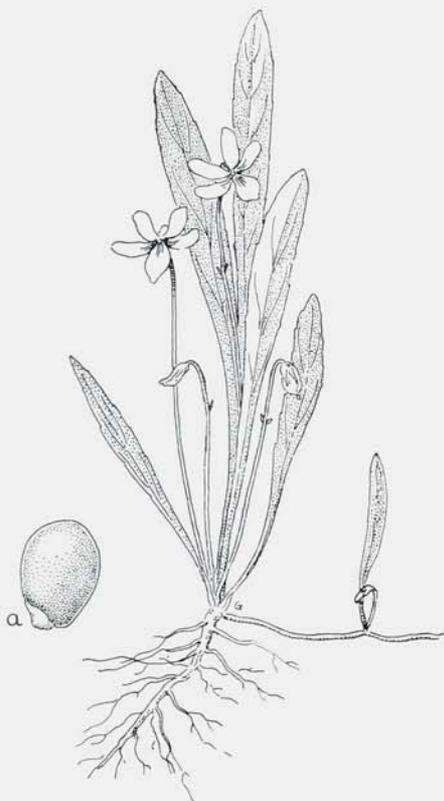
In discussing western plantwomen with members of the Northwest Chapter of ARGS, one name on everyone's list was Helen M. Gilkey, author, illustrator, teacher well-known throughout the Northwest. LaRea D. Johnson, former student, co-author, close friend of many years, and her successor as Curator of the Herbarium at the Oregon State College (now Oregon State University) at Corvallis shares the following biographic sketch with us.

Dr. Helen Margaret Gilkey

Her spirit must still walk among the wild flowers she loved, for each Spring we again feel a special closeness to her. All who knew this gentle lady, this inspiring teacher, this dedicated natural scientist cannot help but feel her presence amidst the fields and forests as they burst into colorful bloom.

She said her first exposure to botanists came when, as a child in grade school in her home town of Montesano, Washington, she watched a young couple from the eastern United States putting violets in a plant press. She asked why anyone would be collecting common violets and her mother explained that botanists collected all sorts of plants, identified them and preserved them for others to use. She felt this incident had made a lasting impression on her as thirty years later while studying specimens at the Gray Herbarium of Harvard University she came upon a collection sheet of violets from Montesano bearing a date which indicated

that these were most likely the very same violets she saw collected as a child.



Viola lanceolata

In 1903 she moved from Washington with her family to Corvallis, Oregon where she enrolled in Oregon Agricultural College (now Oregon State University). Her outstanding artistic

talent was soon recognized and she was appointed as undergraduate assistant in Botany, where she began her illustrious career as a botanical illustrator. After receiving a masters degree at OAC she entered a doctoral program at the University of California, Berkeley in 1912. She financed her education by doing scientific illustrating; and after receiving her doctorate she remained at the University of California for three years as an illustrator. In 1918 she returned to Oregon Agricultural College as curator of the Herbarium and Assistant Professor of Botany, where she remained even after her official retirement in 1951.

Under her thirty-three years of guidance, the Oregon State herbarium became the state center for the deposit of important scientific botanical specimens and for the dissemination of vast amounts of guidance and useful information as well as plant identification for Oregon citizens. She worked closely with the Agricultural Experiment Station and the Agricultural Extension Service on problems of weeds and poisonous plants, and her publications, *Weeds of the Pacific Northwest* and *Livestock-poisoning Plants of Oregon* have been of great value to farmers and ranchers.

In addition to the herbarium and Extension Service duties Dr. Gilkey taught courses in Field Botany and Plant Taxonomy. In later years she took great pride in her former students and visited and corresponded with a great many of them. Her door was always open and the tea pot always on. A visit usually included a walk around the large backyard looking at the many native plants she and her father had transplanted from throughout the state. Something was always in bloom. In the summer a visit meant sitting in the shade of a

huge *Umbellularia californica* (California Laurel); a tree she planted when she was twenty years old. The yard of the Gilkey family home was a woodland garden of which she was justly proud.

Dr. Gilkey contributed in many ways toward an improved understanding of the flora of Oregon, especially through her *Handbook of Northwestern Plants*, which is widely used by students and amateur botanists. In addition, she was a world renowned mycologist. She did the pioneer work on the classification of the North American members of the fungus order Tuberales (truffles), and was an international authority on these underground fungi. The years following her retirement witnessed an outpouring of her scientific expertise in technical articles and books, including her treatment of the Tuberales for the *North American Flora*.

Over the years Dr. Gilkey received many honors. At the Eleventh International Botanical Congress in Seattle, Washington, in 1969, she was featured in the Hunt Botanical Library exhibit of 20th Century Botanical Art and Illustration. In 1952 and again in 1972 she was honored by the Oregon Academy of Science for her outstanding services to Oregon. In 1967 she received the Distinguished Service Award from Oregon State University, the highest honor awarded by the University, and one only rarely given to faculty members.

Throughout her distinguished career she remained modest, gracious and good-humored . . . a most remarkable and unforgettable lady. —LaR. D. J.

Edith Hardin English

Many gardens of the Pacific Northwest, and indeed other areas of the country, too, reflect the knowledge and the generosity of Mr. and Mrs. Carl

S. English, Jr. In the Summer, 1978 Bulletin, Walter Lyon pays a glowing tribute to them both.

Edith Hardin grew up in Bellingham, Washington, with Mt. Baker dominating the inland sky. She had made her mark in botanical annuals and was accepted as an accomplished botanist and able teacher before she joined Carl as his wife, his business partner and his constant companion in plant exploration and collecting throughout the high country of western America. For nearly fifty years, her work on the flora of Pacific Northwest mountains has been appreciated by botanists and students. Her exhaustive study of the flora of Mt. Baker, written with Dr. Harold St. John, her professor at Washington State College (now University) was first published in "Mazuma", Vol. XI, 1929, and was later available as a reprint. This flora is still cherished by alpine plant enthusiasts visiting that area. Few if any botanists knew this portion of the Cascades as they did. In his introduction to this flora, Dr. St. John tells of the areas of the mountain which she covered painstakingly over a period of years from 1924 until the flora was published in 1929. The flora includes the collections of previous botanical explorations which had not been numerous or extensive.

In 1951, in the Arboretum Bulletin, Vol. XIV, No. 3, "The Flowering Season on Mount Baker", she takes us from the deciduous stands of the lower forest up through the various elevations of the high alpine region to that where the last vascular plants seen are "little clumps of sedge (*Carex*) or perhaps a stray plant of grass." She reports that "Three alpiners, *Aster bakerensis*, *Antennaria gormanii*, and a loco weed, *Oxytropis cascadenis*, were all discovered on Mount Baker and named by Dr. Harold St. John. Two other

interesting species, Lyall's saxifrage, *Saxifraga lyallii*, collected by the writer, and *Anemone parviflora*, collected by Carl S. English, Jr., represent the first records of the occurrence of these plants in the state of Washington. To Mr. English also goes the credit for adding two other important plant records to the flora of Mount Baker, namely *Saxifraga oppositifolia*, which formerly was thought to be rare in our state but which is now known to occur in many high places, and *Asplenium viride*, a rare little fern that seems to prefer limestone cliffs for its habitat. It is to be expected that many more rare and interesting plant records will come out of Mount Baker's high alpine region."

In the late 1930's and early 1940's, Edith English was the editor of a fine local magazine, *Little Gardens*, published by the Lake Washington Garden Club of Seattle as a public service venture in horticultural education. This publication maintained highly professional standards, both editorially and botanically. Mrs. English's regular contributions are as interesting and helpful now as they were then. She frequently wrote for the Arboretum Bulletin, for the *Bulletin of the American Rock Garden Society*, and for many other horticultural journals of America and England, often illustrated with her own fine botanical drawings and outstanding photographs.

In an article about natural alpine gardens (Bulletin of ARGS, July, 1959) Mrs. English again paints pictures with her poetic prose. Speaking of ascending through Hudsonian meadows up to the tree line, she says "... a certain feeling of aloneness is experienced. This feeling is of wilderness quality and perhaps is most satisfactorily explained as being just the opposite of loneliness. Above all else it is the diminishing

stature of the trees that tells us we are entering one of the types of true wilderness. Here scattered individuals of subalpine fir and mountain hemlock occur but they are sparse, dwarfed, gnarled and rheumatic-looking. The few trees that have challenged the elements by pushing up to this high country develop a ruggedness of character that tells of the wind-torture they have endured. Always their fingers point with unmistakable evidence at the direction taken by the prevailing winds." And again, after describing various types of mountain terrain, "The facetious thought often presents itself that if we could arrange for one or two weeks' supply of ice water to run rampant over the alpiners in our lowland gardens just about the time that the plants are pushing through the ground, we would see more contented plants."



Edith and Carl English

In the same issue, she and Carl together described "A Few Favorite Rock Plants" illustrated with their own remarkable photographs of *Lewisia*

tweedyi, *Anemone occidentalis*, *Viola flettii*, *Dodecatheon dentatum*, and *Campanula piperi* forma *sovereigniana*.

With Carl, in 1966, she received an Award of Merit from ARGS for outstanding contributions in the field of Rock Gardening.

Through her many articles, her lectures, her botany classes, and their private nursery, Mrs. English introduced delightful plants to northwest gardeners. One of these was a big, husky, white iris she called "Pegasus" which she found in the wild and made available to other gardeners. In October, 1948, in the *National Horticultural Magazine*, she gave a detailed description of *I. 'Golden Nymph'* (*Iris aureonympha*) and the story behind its development. She writes, "The genetic adventure of planning the existence of a plant with certain definite and desirable characteristics and years later seeing that very entity blooming in profusion in the garden, is an experience to warm the heart of any plant lover." Disappointed in the inability of *Iris innominata* to withstand the onslaught of heavy rain storms, she succeeded, after several ill-fated attempts, in cross-pollinating *Iris innominata* with *Iris douglasiana*, using both species as seed bearing parents. The seed from *Iris innominata* were wizened and abnormal looking and produced only one plant which seemed to show recessive characters of both parents in frailty and muddy lavender color. The seeds from *Iris douglasiana* were plump and full and brought forth a high percentage of very acceptable bloom. "Whatever the dainty little *I. innominata* lacked in ability to produce plump, fat seeds was more than counterbalanced by its ability to transmit the apparently dominant golden color. Such an interesting assortment of yellows appeared, the varying degrees

of veining and shading making no two truly identical. It was surprising to find such a meager amount of violet-lavender in evidence at all." 'Golden Nymph' was chosen for "its air of daintiness, an attribute of golden frilled femininity". Mrs. English and her 'Golden Nymph' were given an Award of Merit by the National Iris Society. This is one of the few hybrids described in Lee W. Lenz' "A Revision of the Pacific Coast Irises" published as a reprint from *Aliso*, April 25, 1958.

In *The Genus Lewisia*, published by the Alpine Garden Society (London), R. C. Elliott refers to *Lewisia* 'Edithiae' which Carl English raised as a hybrid of *L. rupicola* and *L. columbiana rosea*, naming it for his wife. Similarly named by Mr. English is *Penstemon* 'Edithiae', noted for its intense pink coloration.

Mrs. English is no longer able to garden, but plants she helped to introduce and some bearing her name enhance many a garden.

There was a period when the Englishes regularly led groups of school children into the Olympic mountains. Still vitally interested in the science of plants, Nancy Katherine Read, now with the San Francisco Park Department, has written of her appreciation and memories of those trips and of the Englishes:

It all began in 1960. I was fortunate to be one of the five chosen by Mrs. English for a ten day trip to Deer Park in the Olympic Peninsula where we would study the flora and the fauna under her excellent supervision.

Each of us had a personally designed study syllabus for our ten days of study. Each syllabus was written especially for us to suit our age and ability. Much careful thought and work went into each of the twenty-five typewritten pages which contained projects such

as: safety and health, camp honor and citizenry, geology, geography, art work, conservation, photography, poetry, games and puzzles, and of course botany and zoology. Besides our projects the five of us would rotate chores to keep the camp functioning. Mrs. English was the chief chef and each meal required an assistant chef, pearl diver and dehydrator. Other chores included: water carrier, fire maker and chipmunk proofer. Chipmunk proofer was an important job as it meant securing all food boxes against raiding by our chipmunk friends. Only once in my four years were the chipmunks able to break in. This was a lesson never to be forgotten, as they ate the cherished graham crackers which were to be used by us to coax deer, camp robbers and chipmunks into eating from our hands. The importance of responsibility was stressed with such lessons.

Mrs. English set up few camp rules but the ones stressed were basic and logical. The main rules were: be considerate to those inside and outside our camp, no running on the trails or rolling rocks off the trails, hike in pairs if possible and inform the camp leader of your whereabouts. Through projects in our study syllabus, it became very apparent how our negligent actions could affect and in some cases might jeopardize the safety of the group.

Throughout the entire ten days our minds were occupied with the scientific approach; counting the number of sepals, recognizing animals by their prints and recognizing different ecological niches and communities. We read and studied in camp and then went out into the field for first hand observation. Observing does feeding, finding the home of a field mouse and discovering an unusual *campanula* were

typical of some of our field projects. By the end of our stay we had gained knowledge in different fields of geology, zoology, astronomy, botany and geography.

Our education by Mrs. English did not end with our ten day stay in the Olympics but it extended itself throughout the year. Never were you forgotten. Loving interest in what you were doing in school and other activities were important to Mrs. English. Your interest was always nurtured in many ways; by sending articles to you, alerting you to special events and even

sending a book at the holidays.

The English home had tables with stacks of scientific journals, flora from exotic parts of the world, window sills decorated with arching branches of orchids or a pot of fragile pleione in bloom, germinating fern spores and a beautiful, friendly and talkative golden collie named Scamp. This picture was completed by the warmth of a truly inspirational woman — a great teacher and a wonderful friend — Edith Hardin English.

Nancy Katherine Read

Houttuynia Cordata

MRS. RALPH CANNON
Chicago, Illinois

Some plants are of botanical interest as well as supplying beauty, charm, and excitement for an ideal place in the garden. A rugged little plant for this purpose is *Houttuynia cordata* (pronounced *Who-too-nya* —Ed.), a monotypic genus belonging to the Saururaceae Family and a native from the Himalayas to Japan. Although classified as a moisture loving dicotyledonous perennial and happy growing in three to five inches of water, the ones in my garden grow in ordinary garden soil in border-beds in which hostas, ligularias and hemerocallis abide.

Since each plant has only a single leafy stem with some branching, a border planting must be about five plants deep to be eye-catching, or, a group of three to five plants will give good effect. The root-stock of *Houttuynia* is creeping, which makes it slightly invasive, but it is easily controlled and

sometimes this rambling can be quite favorable. Like most meadow plants it requires sun to thrive but will grow nicely in part shade. It is perfectly hardy, presents no difficulty in cultivation and can be propagated easily by seed or by division at any time during the season.

Growing about one foot high, *Houttuynia* has bluish-green, heart-shaped, alternate leaves two to three inches long with bright red stems. The terminal inflorescences, consisting of very small, dainty, and insignificant flowers, which have neither sepals nor petals, are densely packed in spikes about one-half inch long. These flower heads are set off by a collar of four white bracts, which impart a snow-like appearance to the area where a group of these plants is growing. These bracts are leaf-like structures, which are distinctly different from the heart-shaped leaves below. They are the showy part of

the plant and appear in mid-summer.

The number of inflorescences per stalk depends upon the number of branches that grow off the main stem as each branch will form a terminal flower head. Later, when the plant gets a little older, the bluish-green leaves turn to a red-purple, the stems become reddish crimson and the spike of densely packed flowers becomes a spike of many small seeds. Since these do not detract from the beauty of the plant, they can be left on until the seed is ripe when they are pinched off.

The formation of this viable seed is of botanical interest in that the sexual reproductive cells contained in the ovules within the ovary do not have

to be previously fertilized to develop into embryos. In other words, *Houttuynia* can develop its seed parthenogenetically. If all seed spikes are allowed to remain on the plant, many self-sown seedlings will result and this, perhaps, could be termed unusual for an aquatic plant growing in ordinary garden soil.

These rare little plants, with their cone-shaped flowers and whorl of snow-white bracts at the base of the flower-heads, are not spectacular but are attractive. They have a quiet elegance and charm all their own and their purple-red foliage in late summer create a purple shadow, which is in exquisite contrast with associating plants.

Primula Mistassinica

My experience with *Primula mistassinica* began two years ago when I was given a single plant collected along the north shore of Lake Superior by a fisherman of my acquaintance. It was a minute rosette of slightly farinose leaves, whose roots were much entangled with those of a plant of *Campanula rotundifolia* which accompanied it. I decided to let well enough alone and planted the *P. mistassinica* - *C. rotundifolia* amalgam in a richish scree one half pea stone, one fourth non-acid peat, one fourth soil, (fairly neutral here) above a loose-laid limestone wall in half sun. I kept it well-watered and it rewarded me with a flush of bloom off-season. Much to my surprise, I discovered it to be stoloniferous when many new rosettes popped up about the mother plant.

I kept the campanula more or less trimmed and pulled off a few of the more ambitious runners, but basically

let nature have its way. Now, two springs later, I have (Just went out and counted and measured!) fifteen budded rosettes and eleven without buds covering an area eight inches in diameter, despite having detached at least a dozen rosettes over the two years for gifts.

Plenty of moisture but fast and perfect drainage and a limey soil seem to be what it likes. In addition, although I don't feel there is any necessary association between the *Primula mistassinica* and the *Campanula rotundifolia*, I do think there is a symbiotic relationship in that the campanula, which grows tall after the blooming period of the primula, gives it shade and protection during the heat of summer. It may also provide the *P. mistassinica* with the root company that so many of the Birdseye Primroses seem to like.

Maryann Collins
Apple Valley, Minn.

THE RAISED BED — A Practical Solution

FRANCIS CABOT

Cold Spring, N.Y.

Photographs by the author

The cultural rationale for planting alpine in a raised bed is clear to any rock gardener who has struggled to grow the choicer species and to carry them through the winters and summers of the lowlands to the point where they become a permanent rather than a transitory element of the rock garden. This rationale is based on the fact that a raised bed facilitates control over two elements that are central to the longevity of those prized species that we have wrenched from their alpine settings in the ephemeral hope that we can induce them to accept our more temperate climes with their uneven winters and hot muggy summers. The elements are, on the one hand, deep drainage around the plant's roots and, on the other, a soil mixture best designed to satisfy the plant's requirements in its unnatural and hostile surroundings.

Another attribute of the raised bed is the felicitous way in which the alpine jewels grown therein are presented to the viewer so that they can be examined at a convenient height without risking damage to the sacroiliac, much as one would examine the very precious stones at Cartier's or Tiffany. This agreeable method of presentation also simplifies maintenance of the plants and their surroundings throughout the year.

Another important factor is the comparative ease with which a raised bed can be introduced into the garden and the generally satisfactory aesthetic result derived from its (almost always) geometric configuration.

Nebuchadnezzar may have been the first to give the raised bed a try. As you may remember he was married to a Median girl from the hills who, once she settled into their palace on the alluvial plain of the Euphrates, was, naturally enough, always sighing and longing for her tree-covered mountain home. To cheer her up, in 605 BC, Nebuchadnezzar was said to have built the Hanging Gardens of Babylon, one of the seven wonders of the world. These gardens consisted of trees and flowers planted in a series of stepped-back sixteen-foot wide terraces placed on a square platform that covered three acres. These terraces were, in turn, set upon a series of seventy-five foot high arches whose four-foot square pillars were hollow so that the trees could root into them. Presumably the drainage was outstanding.

The scale seems overwhelming but then those Babylonians built things solidly when you consider that the walls around Babylon itself were said to be 335 feet high and 85 feet broad so that a chariot drawn by four horses could reverse direction with ease on the ramps. Allowing for a large measure of exaggeration one still is left with an enormous wall and the fact that little remains today gives one a perspective on the ephemeral nature of our own landscaping constructions. A garden indeed is 'the most perishable of all creations as every lazy gardener soon finds out'.* Nevertheless garden we must!

Sir Thomas Browne thought that the

Hanging Gardens were an early example of man's effort to recreate Paradise, liberated from "ordinary level of ground . . . with many conceptions elevated above the plane of the earth." A raised bed on a very grand scale indeed.

Walafrid Strabo of Reichenau, an agreeable abbot of the Ninth Century, followed the same principles on a more manageable scale and in *Hortulus*, his verse account of how to go about gardening, described the building of a raised bed: "Then my small patch was warmed by winds from the south. And the sun's heat. That it should not be washed away, we faced it with planks and raised it in oblong beds. A little above the level ground."

Walafrid Strabo appears to have been a real dirt gardener, the sort of fellow whose company we would have enjoyed. He begins his book with a charming dedication to a fellow abbot, urging that his poem be read while sitting in a garden beneath fruit trees in the shifting light and green shadows of a summer day. This is somehow not a vision one associates with those remote and gloomy Dark Ages. Besides writing the first known medieval gardening book Strabo was a famous botanist, physician and a biographer of Charlemagne. Were he alive today he would of course be a member of our esteemed Society.

The early gardens of the Middle Ages were small enclosures huddled against the castle, tiny plots of peaceful land won from the wilderness, close to shelter if danger threatened. Now after centuries of development through the great formal gardens of the Sixteenth Century and the sweeping landscape gardens of the Eighteenth and Nineteenth Centuries the wheel has come full circle and we are back again to the garden that is huddled against

our house and circumscribed by its geometry.

Humphrey Repton, perhaps because he lived to be an old man himself, considered carefully how a garden should be planned for the comfort of old age. The paths, he said, should not be of gravel but of grass or brick — for gravel, he warns us, is so excessively noisy beneath the wheels of a bath chair. The beds too should be built up high enough for the aged gardener to reach them from his bath chair without stooping.

So apparently there is nothing particularly new about raised beds and their attributes.

For the small rock garden, particularly if that rock garden is one feature of a larger garden, I submit that the raised bed is a logical and practical landscape solution.

Looking back over my own past attempts to build naturalistic rock gardens, most of them now abandoned and overgrown (and fortunately unrecorded on slides), I realize that no matter how satisfying they seemed at the time they really were rather awful efforts to create a natural effect in unnatural surroundings. The rocks were never big enough, the sites were awkward, the drainage inadequate, the maintenance problems were a constant nuisance and the gardens themselves always in need of replanting and rehabilitation. What is more incongruous than a mound of rocks set in the middle of the lawn or on a slope along the edge of a woodland or fenced boundary. To achieve a truly naturalistic effect in a rock garden one has to be blessed with either a natural outcrop and/or space, funds, energy and access to weathered massive rocks and boulders. The duplication of nature is not only expensive but, sad to say, one is never assured of complete suc-

cess. The raised bed, on the other hand, is achievable for all of us, can be constructed out of a great variety of natural and unnatural materials and, given its geometric parameters, is almost invariably an aesthetic success. In fact the materials used to raise the bed determine its character and flavor.

Wood

Cedar logs stacked three or four high are one of the simplest of all arrangements. As edgings to beds in Tage Lundell's garden in Helsingborg, Sweden, they enhance the rusticity of the woodland corner of his garden.

Betty Miller has used logs to great advantage in the propagating and bedding out area of her garden in Seattle, by creating a series of terraced beds edged with logs that step down a hill in orderly fashion, rendering a slope serviceable.

Roy Davidson has used old stumps to shore up raised beds along a stream garden. The stumps, with their gnarled roots, give a wonderfully naturalistic flavor to the setting especially as they age and accumulate moss and ferns.

At Stonecrop we have built a wooden raised bed under a bath house gazebo that Rex Murfitt and I acquired from a neighbouring garden club exhibitor at the end of one of the old New York Flower Shows. We could have it for the carting away and no sooner said than done. After fifteen years of use as a bath house it now serves to frame and shelter a U-shaped raised bed some three and a half feet high made of wooden planks treated with preservative and lined with tin. The bed's principle purpose is to provide a partially controlled environment for plants that cannot always survive the windswept rigours of the Cold Spring, N.Y. climate on an exposed hilltop at 1100 feet. It also serves to provide

a home for plants that languish in the alpine house during the warmer months because of the calcium content of our well water which, alas, does much to inhibit any ericaceous plant's growth under glass. The bed has an eight inch high frame superimposed on it which serves to hold plexiglass side panels that can be open or shut and into which plexiglass top panels can be placed when one wishes to cover the bed. The panels are useful in shielding the plants from drying winds in the spring and fall and for ensuring that the bed is well covered with snow throughout the winter.

This bed is overhung by a series of misting nozzles and, in addition, can be irrigated by attaching a hose to a perforated plastic pipe that is placed a foot underground and embedded in gravel so that in spring, especially a dry spring, or in a dry but muggy summer the roots can be drenched as needed.

This rather contrived approach to simulating climates and ecosystems conducive to the requirements of certain plants can be applied in any number of ways and may enable those of us in the northeastern part of the country to grow plants that we might otherwise lose to our hot humid summers. One possibility could be a bed for Western American alpiners and certain xerophytic plants and Middle Eastern bulbs where the bed would be covered with plexiglass panels in summer and then opened up again in fall and packed with snow through the winter. (The baking would be just what the doctor ordered but would those difficult and displaced species survive the muggs of August?) Another possibility would be a raised bed solely for *Lewisia*s with a thick layer of rotted manure about fifteen inches below the bed's surface to cater to their gluttonous ap-

petites. Again one would cover them and keep them generally dry in the summer.

Troughs

The shapes we make for ourselves and live by are primarily geometrical and the background of civilized life is more or less rectangular.

The classic trough garden is a case in point. A trough is nothing more than a specialized, self-contained, usually portable form of raised bed ranging in size from the diminutive to the immense with its shape up to the imagination of the maker. Troughs look particularly well when they are grouped and framed within a geometric setting. Alex Duguid has them lined up as an alley, flanking the lawn in his Edrom Nurseries in southeastern Scotland. In the new alpine house area at the Royal Botanic Gardens in Edinburgh, the troughs are placed on low blocks on paving and are framed by walls on two sides. In Sir George Taylor's garden at Dunbar, Scotland, his troughs are raised to waist height on blocks and framed by an old cellar foundation, now open to the skies and sheeted with vines and espaliered shrubs.

Linc and Timmy Foster have built a garden for Ted Childs in Norfolk, Connecticut, perched on the edge of a hill and using the rectangular outlines of existing walls and buildings to frame the setting. The effect of the whole is such that the visiting plantsman feels he is walking on the surface of a giant trough or raised bed. It is a very successful garden.

Containers

In our lives we deal primarily with right angles and straight-sided shapes and if we use a curve it is usually the exact and mathematical circle.

Ray Welch has built a raised container garden on Long Island entirely

out of chimney flues, stacked ingeniously to form a pleasantly irregular sort of pyramid. Each flue has ample width and depth to give the most demanding alpine plant all the root run it needs.

Concrete well tiles are available from concrete products manufacturers and come in varying diameters and heights. At Stonecrop we favor a size forty-eight inches in diameter and two feet in height. These are made of reinforced concrete. Another readily available shape is the bottom half of a reinforced concrete septic tank some four feet by eight feet by thirty-two inches high. There are many other forms available in the trade from rectangular junction boxes of all sizes to immense concrete ovals used in highway construction. The Ripley-Barneby garden on Long Island saw the ultimate in the use of containers in the rock garden, set in a random pattern in a sandfloored courtyard.

Stanford White, the great turn of the century architect, used to furnish the patios and courtyards of his elaborate houses and palazzos with sarcophagi filled with plants and in England one intrepid plantsman, Clarence Elliott, used a stone Saxon coffin for his choicest alpine, a huge planter still in use at his son Joe Elliott's nursery. The only limit to what can be used as a container is our imagination.

In front of the elegant Royal Gate at Kew there is a large handsome ancient stone watering trough or bath tub or princely sarcophagus crying to be filled with alpine plants. It is surprising that these accomplished and talented members of the Alpine Garden Society haven't convinced the authorities that it should be filled with androsaces and eritrichium.

Retaining Wall Gardens

The most satisfying and of course

the most difficult medium to work with is rock, the classic material for the construction of wall gardens and raised beds. Would that laying stones were as simple as it appears in photographs in books on the subject where the rock gardener-builder doesn't seem to have even bothered to put on his work clothes to do the job.

I like the caption in one of these early books — "Good soil must be used for packing in behind the wall, as it will be impossible to put it there afterwards" — a neatly phrased admonition. It goes on to say "It is desirable to plant at least some of the occupants in their appropriate positions as the work of building proceeds."

Wall garden literature is full of the debate on whether to plant during or after construction. I find it all a bit academic since, in our part of the world, at least, one can count on enough failures in every wall planted during construction to require a fair amount of replanting after the fact.

Steps are often one of the most striking elements of the wall garden and their configuration provides wonderful opportunities to grow plants in protected corners.

Raised Stone Beds

Rock work in the garden, like bone structure in humans, determines in large measure the visual quality of the finished product. I suppose the aesthetic success of any rock garden must be primarily due to the way in which the rocks are used and placed and how they fit into the rock garden setting.

As we progress and mature as rock gardeners we learn that if we choose large rocks with character as the retaining border of the raised bed we will be much better off than if we hurriedly pile glacial boulders into a

retaining wall so as to contain the soil behind it. In the former case the plants happily fill the gaps between the large stones over the years and are truly perennial while in the latter case the plants only survive if they are planted far enough behind the wall so that their roots are undisturbed when the wall crumbles from frost heaving every spring.

At Stonecrop the redoing of one such bed was the number one rehabilitation priority since not only the rock was wrong but the soil mix was not satisfactory and the drainage inadequate. In fact the only creatures happy with it were the rodents and snakes who thrive on or dwell among the roots of alpenes and the choicest of bulbs. There were several other similar wall beds in the garden built about fifteen years ago that put on a pleasing show in April and May but all of which needed to be redone if the more challenging plants were to be grown in the garden. Changing the soil in these beds was to be the second priority.

But then a terrible thing happened. I saw Ellie Brinckerhoff's planted rock walls for the first time and realized I had to start all over again. That meant no more glacial boulders; only field stone, which fortunately abounds in the woods of Putnam County, would be used in the future. And it would have to be cut by someone who knew what he was doing. (A useful course for rock gardeners would be shaping stones with hammer and chisel under the aegis of an experienced stone mason.)

Well, slowly but surely the soil in the beds is being changed and properly laid squared field stone walls are replacing the walls made of glacial boulders. The only trouble is that having begun there is no turning back and the garden won't look right until all its walls

are redone, a project that will take a number of years to accomplish. But then I suppose no real gardener will ever be satisfied for more than the briefest moment with the state of affairs in his or her garden.

But, of course, instead of logically proceeding to redo *all* the existing walls, the rebuilt wall bed seemed to provide an opportunity to construct some raised stone beds, a recurring fantasy that for some reason I was particularly addicted to.

You must know the old Chinese proverb "If you would be happy for a week, take a wife. If you would be happy for a month, kill your pig. But if you would be happy all your life, plant a garden." I have a friend who has modified this old saw by inserting "If you would be happy for a year, kill your wife." My own modification is "If you would be happy for a year, build a raised stone bed." After that first winter it is likely that there will be enough disappointments to do away with happiness no matter how carefully one has followed the rules.

Let's look at how a raised stone bed is built:

In effect it is a free standing dry wall bed that offers all exposures of the compass in a compact setting. Its height can vary up to anything one can comfortably look over with the best results probably between two to four feet and its width should be such that one can reach every bit of the surface. Since it is free standing and lacks the solidity of a normal retaining wall bed that is an integral part of the terrain it must be built in a very solid fashion and possess sufficient mass so that the elements won't prove too much for it.

The solidity can be achieved by building an inner wall behind the facing stones which is carried up to the penul-

timate tier of stones. The double wall provides the structural strength and insulating qualities necessary to a successful free-standing bed. It is also a good idea to fill the center with large rocks as well as soil as the bed is built. In general the more solid the wall the less pronounced the batter or slope from the base to the top need be.



There are two cardinal rules in building any type of wall garden, and especially a raised stone bed. The first is the importance of packing the soil mix into all the crevices so that there is no possibility that there is any air space left to provide an excuse for some temperamental and intransigent plant to give up the ghost because its roots are suddenly exposed. Packing the soil will also minimize the tendency of the soil to settle after the bed has been built. The other rule is to bond the layers of stone so that no two vertical cracks are above one another.

The unfortunate part of all this is that no matter how hard one tries, or how careful or thorough one is, the structure is never perfect; the soil does settle; there are always some vertical cracks that end up where they

shouldn't and the soil does wash out of places where one least expects it to and inevitably one ends up trying to patch the chinks after the fact with bits of rock and heavier soil and plants that will grow no matter what. I'm convinced that the ecological rationale of sempervivums is for the very purpose of filling the chinks in both mountains and stone walls, slowing down the process of erosion and binding the whole together. Fortunately the arachnoid forms are choice and delicate and contribute much to the effect that one is after.

There are as many recipes for soil mixes in a wall garden as there are gardeners. Despite admonitions to the contrary, since we are trying to grow some of the more exacting species, we use a sandy mix with at least three and a half parts of very coarse sand to one part each of humus (or leaf mold) and gravel. The raised bed is built on a gravel foundation with the depth of the gravel dependent on the function and the drainage inherent in the surrounding soil. If the bed is built on a lawn or turfy area the gravel base should be deep; otherwise several inches should suffice.

In the bottom of the bed and in its center the mix is a bit richer in humus by way of encouraging the plants into believing that their temporary home is as much like their native habitat as possible, where the nourishment has washed down deep into the scree. By the same token the soil mix on the top and sides of the bed is more gravelly and a bit on the lean side. The choice plants seem to revel in the challenge of rooting through sand and gravel on their way to find the cool, moist nourishment in the depths. They will root for a while in any event but if that nourishment is not there, they will languish and become

discouraged.

Another key factor is the timing of the planting. It should be as early as possible in the spring so that the plants can root deeply back into the wall and become anchored during their most active period of growth. We have noticed a marked difference in the success of horizontal plantings of the same species that appears to be directly related to the planting dates; a difference that was not evident in vertical plantings. Another apparent truth applicable only to the choicer species appears to be the smaller the plant the greater the chance for success, given a sufficiently long root system in the first instance.

Finally assembling, choosing and placing the plants is an important and time consuming matter. One really has to plan at least a year or even two years ahead and propagate with the raised bed in mind since buying all the plants becomes quite a tall order and, in many instances, bought plants are too large for the job. So one has to obtain the species that one would like to use and then propagate an adequate supply. We often plant the same species on all four exposures (except for species that clearly prefer a particular exposure) to see where it does best. We also over-plant at the beginning, filling every chink and interstice on the theory that somewhere between twenty-five and fifty per cent of the plants will not survive over the long term.

Common sense should direct the planting so that floppy trailers have ample space and don't inhibit choice slow growing chink-fillers. One should also resist the temptation to use a plant that is not appropriate just because it is there and because one wants to get on with the job. One only has to pull it out later. It is surprising how difficult it is to obey this rule,

especially as one wearies of the task and begins to run out of choice material.

Once the walls of the raised stone bed are finished it is important to pick the very best stones possible to fill the top center of the bed. Scale is important here and, as in all rock garden work the bigger the rocks the better. Rocks covered with lichens are particularly appropriate as is aged tufa, so long as it blends in with the rock used for the walls. A further worthwhile

mostly with *Pinus* and *Chamaecyparis* and in the other bed *Abies*, *Picea* and *Tsuga*. Most of the species chosen are slow enough growers so that they will keep within bounds for a long time. The new growth candles of the pines can be pinched back each year to keep the faster growing varieties under control. I enjoy these groupings since part of the fascination of dwarf conifers is noting the variations in the different forms. Of course the labels usually vanish and then one has to rely on



touch is surrounding the bed with a curb of matching stone paving. Not only does this band of horizontal rock work set off the bed as a whole to best advantage but it also provides wonderful opportunities to tuck in plants that enjoy being planted in shady corners or whose habit would seem out of place in any other part of the bed.

The top of the raised bed (in effect a large trough garden) is a marvelous setting for the very dwarfest conifers and shrubs, items which I find difficult to incorporate gracefully in the regular rock garden. In these raised stone beds I'm experimenting with grouping dwarf conifers by genus with one bed filled

the experts to sort out which is which.

In this particular case the dwarf conifers are supposed to echo the evergreen background motif of the setting with the larger dwarfs planted on the top of the retaining wall bed behind the raised stone beds, the chest high conifers behind them on the lawn and the tall conifers in the rear.

Francis Bacon described gardening as the purest of human pleasures and the "Greatest Refreshment to the Spirit of Man."

Our delight in growing plants is a complicated pleasure, partly an appreciation of their beauty and partly an affection for them as pets. What we

have to struggle against as rock gardeners is our preoccupation with the plants rather than the garden. The raised bed of whatever sort helps us in this struggle by providing a limiting and orderly setting for our plantsmanship, a substitute for that truly alpine scree that we would like to have in our backyard.

Since rock gardeners are an entertaining lot, our imaginations are the only limit to the raised beds of the future. As prospective projects at Stonecrop we are thinking about building a low raised bed solely for saxifrages; this to be made out of tufa that has been cut and squared with the top of the bed paved with uncut tufa so that virtually no soil would be visible; a kind of tufa loaf if you will. And then there are those railroad ties — ideal for a raised peat bed in a partly shaded setting. Should it be square, rectangular or hexagonal? Or should it be a bog garden in full sun in one of those septic tanks. And isn't it time for some fancier of Alaskan flora to come up with a tundra bed with permafrost under its surface?

An experienced and wise gardener of a former century observed that "A garden should be a place private enough

to make love wherever one fancies." Clearly the romantic person who stated this delightful principle was not a dedicated rock gardener who, in the first instance, would be more concerned with the cultural happiness of his or her plants than with such frivolous diversions or dalliances and, in the second place, given the nature of a scree would not naturally have such an uncomfortable thought.

But as enterprising rock gardeners let us not overlook the point. There is a challenge there to be met. One friend has suggested incorporating an old car into the landscape as a trysting place. I submit that we all should consider the ultimate use of the raised bed and go back to the drawing boards and come up with some ideas remembering that a Garden is the only complete delight the world affords, ever complying with our various and mutable minds.

After all, "the expulsion from Eden fully explains our love of Gardens. We long to return to our first Paradise."

Perhaps a raised bed is, in fact, the practical solution.

*The quotes for the most part are gleaned from *Men and Gardens* by the late Nan Fairbrother.

Frits Wanted

James R. Le Comte of Ashburton, N.Z. very much wants a bulb or two of the following fritillarias to add to his collection. He'd be happy to swap for or buy bulbs of *F.F. pluriflora*, *pinetorum*, and *falcatata*. He writes that he has *F. purdyi*, but would like to obtain the form illustrated in Brian Mathew's book: the one with the very white background colors. He also yearns for *F.F. forbesii*, *albaryana*, and *minima*, all rare and all from Turkey. These last three have only been recently introduced into cultivation in Great Britain. Perhaps some of our British members can help Jim out. His address is No. 2 R.D., Ashburton, N.Z.

IN SEARCH OF ACIPHYLLA 1977-78

JAMES R. LE COMTE
Ashburton, New Zealand

Photographs by the author

Jim Le Comte is a nurseryman whose explorations for wildflowers of New Zealand have greatly enriched the gardens of the world. Previous narratives of his trips have appeared over the years in the pages of the Bulletin and are well worth re-reading. The most recent can be found in Vol. 34, p. 123 and Vol. 33, p. 134.

It seems a long time since I recorded anything for the Bulletin but the New Zealand summer of 1976-77 was excessively wet and it was mainly this factor plus pressure of work in the nursery that prevented my making any trips into the mountains. In complete contrast, the summer of 1977-78 was hot and dry and the lure of the mountains in such beautiful weather is just too strong to be resisted.

For many years I had wanted to visit the Lyell Range in the south of the Nelson Province to attempt to find *Aciphylla trifoliolata* that was collected by Mr. Townson sometime prior to 1906 and never rediscovered. To find it was of vital importance to the revision of the genus because a botanical trip to this Range some years ago had turned up some hybrids, one of which came very close to the description of *A. trifoliolata*, and it was conjectured that the species may have been based on a hybrid.

The Lyell Range rises steeply from dense rain forest to about 4,500 feet and is a narrow ridge with intermittent higher peaks. The forest ceases at about 4,000 feet, making a land approach long and arduous, requiring four days for the round trip because the range is many miles of dense forest from the nearest road. As I did not have that sort of time to spare for one mountain and certainly did not relish fighting my way through all that forest,

I enlisted the aid of my very good West Coast friends. As usual, they were happy to help and so at the beginning of January, 1978 I drove to northern Westland.

The weather on the West Coast is fickle and when I dressed at 4:45 a.m. next morning it was still too dark to see what the day would be, but at least it wasn't raining. At first light the helicopter lifted off and we were soon skimming along the ridge of the Brunner Range, heading north and watching closely down both sides of the ridge to see if there were any red deer about, for the capture or shooting of these animals is the main occupation of the helicopter's owners. As we came to the end of the Brunner Range we kept our height and soared high over the Buller River to the southern end of the Lyell Range.

The original collecting notes give the source of *Aciphylla trifoliolata* as "Mt. Lyell — on rocky spurs at 4,000 ft." Phil, our pilot, had his one mile to the inch map on his knee and pointed out Mt. Lyell ahead and below us. It is only 3,625 feet and completely forest clad so it could not have been that mountain where Mr. Townson collected his specimens so long ago. The first 'open' top was Bald Hill (4,525 feet) but as this was covered with tussocks with no 'rocky spurs' evident, I pointed towards the next higher, and obviously rocky, peak appropriately

named Rocky Tor (4,725 feet).

A few moments later I was standing on that 'Tor' watching the helicopter depart to get on with the hunting. "Back in two hours," they'd told me so I couldn't stand about for long. All about me were hundreds of one species of *Aciphylla* and even with a quick examination it was obvious that I had landed in the middle of a large population of *A. trifoliolata*. It is not a small mound forming species but is a dwarf with upright leaves about eight inches long having three to five leaflets three to six inches long, each ending in a sharp point. The male plants were in full flower and yellow in colour, while the female inflorescences were not yet fully expanded. The inflorescences are of the elongate type and about half as high again as the leaves. As the sighting was of distinct botanical note, I took several photos and collected specimens for pressing, plus young plants to grow in my garden for further study.



Aciphylla trifoliolata, male

On the highest rocks of the peak I found a population of one of the 'Vegetable Sheep' species and because of its greenish colour I thought it to be *Raoulia rubra* but the Botany Division of the D.S.I.R. identified it as *R. eximea*, a species common in the

Canterbury Mountains but always having a bluish colour there

The population of *A. trifoliolata* extended widely on Rocky Tor but ended about four hundred feet below the summit. I had just found a plant of *A. hookeri* at a lower elevation when the aircraft returned and took me back to base; thirty minutes flying time away. It had been a short but very successful trip so that I wasn't too disappointed when rain prevented flying the next day, and I had to return home.

Towards the end of January word came to me that my friends had been allocated a large mountainous block of country to shoot over during the month of February. This block, with the Buller River as its southern boundary, is in excess of four hundred square miles in area and crammed full of interesting mountains that rise above great areas of forest. We were to be based at Murchison and I was advised to be there on the 1st. I was, but not without one minor setback. The distance from my home is about two hundred and fifty miles and the day was very hot and stifling causing the bitumen to melt on the roads so that I wasn't in the best of humours when, at one hundred and twenty miles out, there came the awful realisation that my sleeping bag, boots, pack and camera were sitting, all neatly packed on the garage floor at home. With heavy muttering all the way, the return journey was made; the gear was collected and I finally arrived at Murchison at 10 p.m.

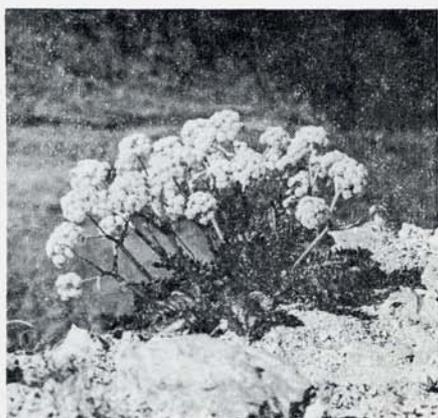
The boys decided that the Matiri Range was a good place for me to start and that I should stay out overnight in one of the many huts provided by the Forest Service for trampers. At 9 a.m., after the early morning hunt, the helicopter took me to the Haystack Hut, where I deposited my

sleeping bag and provisions, and then whisked me up to a high peak 5,080 feet above and across a wide valley from the hut. The view from this peak was really something! In every direction, mountain after mountain stretched as far as one could see. Not far away was the 'Thousand Acre Plateau' which is a high plateau with almost sheer sides apparently caused by the subsidence of the surrounding area. Indeed the whole of the Matiri Range is extensively faulted and it is essential to watch one's step because narrow rifts and small potholes are plentiful. On one very narrow ridge I came across a rock crevasse that completely traversed the ridge, causing me to go downhill to get around it. It wasn't very wide and partly covered with bushes, but very deep, for a stone I dropped into it kept rattling down for an awesome long time.

The writer has seen a lot of *Aciphyllas* but never such a density as that on the Matiri Range. They were everywhere, almost all in flower. It was almost impossible to walk without treading on them. Along the ridge and part way down the sides grew great numbers of a small form of *A. ferox*, a plant with more or less upright leaves of eight to twelve inches and with very showy golden male inflorescences. The female inflorescence is much narrower, darker and inclined to bend over. This was my first sighting of this species, so that young plants were collected as well as seed.

Not far below the ridge, and continuing to the bottom of every valley were vast quantities of *A. colensoi*, brightening the whole area with millions of their three to four feet high golden-yellow inflorescences. There were many other plants on the ridges and notable among them were twelve inch high clumps of *Anisotome pilifera* and a

very lovely *Epilobium* species with one inch wide open flowers of white, flushed pink, growing among the fine rock detritus. Several species of *Celmisia* were in flower and, at the top, I was surprised to find *C. bellidioides* growing out of seemingly dry rock fissures because this plant is usually associated with wet places by streams. It is a tiny creeping plant with closely set small, leathery, glossy green leaves that make a lovely mat, which in the spring is studded with neat white daisies on two inch stems.



Anisotome pilifera

The range I was on curved around in a U shape to the saddle above the hut and having the whole of this beautiful sunny day to myself, I leisurely made my way, photographing and collecting specimens, until in late afternoon the saddle was reached.

At this lower point the bush reached to the ridge and the main vegetation was *Dracophyllum traversii*, commonly called the 'Grass Tree', and *Olearia lacunosa*. The latter grows to twelve to fifteen feet and has long narrow leaves seven by one to one and a half inches wide. These are green above and covered with buff coloured wool beneath. The branchlets and leaf petioles also have this covering making

it an attractive shrub. *Dracophyllum traversii* can grow to thirty or more feet but all the specimens on this wind-swept saddle were definitely krummholz, so much so that I had to crawl under their lower branches. This is a very distinctive tree. The long, pointed grass-like leaves are arranged in tiered circles around the branchlets, thus making bushy tufts. As the older leaves fall off the ring scars remain evident. Unfortunately it is very slow growing and two seven-or-eight year old plants in my garden are not yet two feet high. Young plants are not easy to find so it was with pleasure that I came across a patch of moss containing about twenty little rosettes, each about two to three feet wide.

Around 9 a.m. the next morning the helicopter arrived and took me back to Murchison, leaving me most of the day for packing and labelling plants, writing notes and planning the morrow.

At this point it should be explained that the crew catch hinds and fawns alive for their deer farm and shoot the stags that are just too big and 'ornery' to handle. Many operators use either tranquilizer guns or nets suspended under the helicopter. Not these boys. They consider tranquilizer guns inaccurate, of very limited range and the drug too slow acting. Often a deer will escape into the bush after being 'hit' and it is necessary to search for it and bring it out, if it can be found. They just can't be bothered with nets. So they bulldog them. I ask the reader to try and imagine a large red deer in full flight over rough mountain terrain, dodging and twisting, uphill, downhill, among rocks, with the helicopter twisting and turning to keep as close as possible so that the catcher, perched out on the skid, can leap out onto the deer, bring it down, dodge the flailing razor sharp hooves and

secure the legs and head with specially made straps. All in moments. Allan, the young man who does this, is either very brave or very stupid. I haven't yet made up my mind. The deer is then put into a canvas bag and suspended under the machine for the trip home. The animals settle down fairly quickly and are then released into large fenced areas to breed.

The night that I was out in the mountains, they had caught a young fawn but it had escaped from the temporary cage Allan had put it in. With a good natured grin he had to put up with many jibes for his indiscretion in not securing the cage properly. We had searched through the trees by the airstrip and found nothing, but early next morning in dim light, we had just lifted off when Allan spotted a small grey shape among the larger ones of the one hundred and fifty strong, dairy cattle next to the airstrip. The aircraft was quickly landed and the chase was on. We leapt the fence and raced among the now galloping and bellowing cows until Allan brought the fawn down in a flying tackle. This commotion had all the farm dogs barking furiously and lights were switched on in the farmhouse. The farmer was very philosophical about it all; "It was time to get up and milk the cows anyway," he said, almost thanking us for waking him. I wonder how much milk the cows gave that morning.

Trips to more mountains followed in the next few days and notable among these were those to Mt. Newton and another place on the Lyell Range where I was able to see *A. trifoliolata* again. These were wonderful days: mountain trips in the morning from dawn to 11 a.m.; lying in the sun the rest of the day and another mountain trip in the evening from 7 to 10 p.m. But

all good things must come to an end and when I announced that I would have to go home on the morrow it was quickly decided that they would take me that evening to the farthest mountains in their block, the Glasgow Range (4,500 feet), which is nearest the sea coast.

It was quite a long trip and we had to fly over the Lyell Range, reaching the Glasgows at almost 8 p.m. It was a pity not to have longer there because it was a wonderful plant place but I didn't have long enough to study the flora as it deserved to be studied. *Aciphyllas hookeri* and *tounsonii* were abundant and although these have been described in earlier articles it can do no harm to talk a little more about *A. hookeri* as it is an unusual and attractive garden plant.

The leaves vary in length from three to six inches and although sometimes green, they are usually a sort of copper-orange colour, recurving lengthways, with each leaf segment terminating in a three part arrangement giving it a trifid appearance. The plant is not more than four to five inches high with the elongate inflorescences topping the leaves by another six to eight inches. More will be said of *A. townsonii* in the future.

One of the most prominent celmisias in this area was *C. dallii*, which really is a lovely foliage plant. The broad leaves are four to five inches long, shining pale green above and pale buff beneath. The leaf margins curl slightly upwards showing the buff, thus outlining the leaves. A small clump of twelve to eighteen inches across will be composed of many neat rosettes all belonging to the one plant. These are topped by lovely broad white daisies. Another very handsome species present was *C. armstrongii*, which forms tufted clumps of long narrow tapering leathery leaves

of bronze-green colour with two thin yellow lateral lines down the centre, while the underside is covered with thick white tomentum.

Time slipped by all too quickly and suddenly it seemed; soon it was dusk and I hurried to the area designated as the pad for this hunt. They had had a great time, having shot a large stag and caught four large hinds alive. Two were securely lashed onto the netting racks on either side and the other two were in canvas bags to be hooked underneath. As live deer are very heavy and because there were three of us the stag had to be left behind until the next morning.

As I have great confidence in the experienced and skillful pilot, I am usually unperturbed by almost anything on these flights, but the excitement that followed caught me unawares. Because of the downwind take-off the helicopter could not lift off the narrow ridge with so heavy a load, so while Allan stayed on the ground with the two deer in bags, Phil circled time after time trying to find the right updraught. On one of the approaches to the ridge the machine sank just as we got there and suddenly we plummeted sideways downhill for about two hundred feet before pulling out level. As I was sitting on the downhill side, with no door, to say the experience was thrilling is an understatement. I was assured later that this maneuver is standard procedure to escape down-draughts. Eventually the deer were shifted one by one to another ridge where wind conditions were right and we lifted off in what was not quite complete darkness.

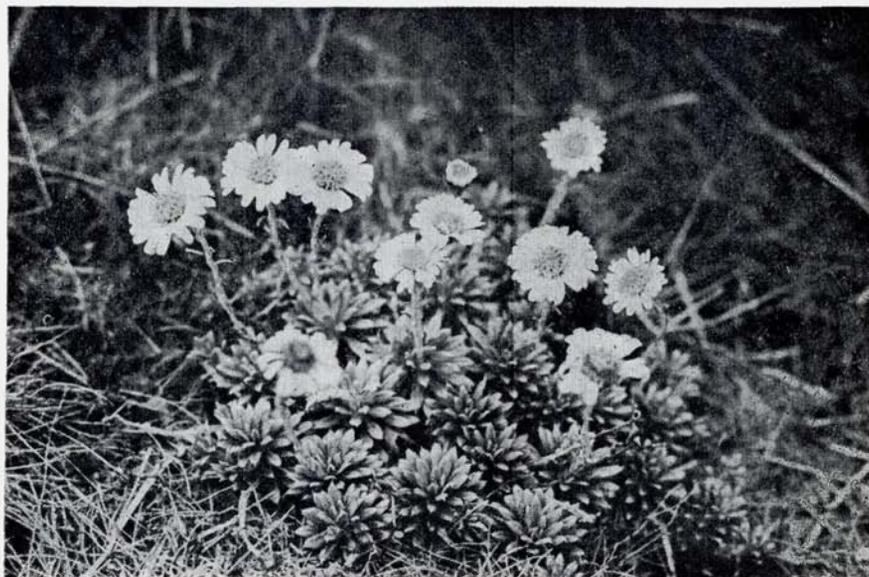
At early 'cup of tea' time next morning Allan, who had every reason to be proud of his catch of four live deer, was not allowed to develop a swelled head. He was subjected to good natured ribbing to the effect that he

would have to get fitter and toughen up. Suggestions were made that he should practice jumping off the truck at 30 miles per hour or so on the way to the airstrip or perhaps be dragged behind the truck on a rope; also, that a soft bed was out for him; in future he must sleep on the rock garden.

It was hard to leave them for I had experienced several wonderful days of botanizing, good fellowship and adventure; adventure that doesn't usually come to a man of fifty.

inflorescences really make a wonderful show. We also saw the handsome glaucous foliaged *A. glaucescens* in flower in many moist areas.

The summer of 1977-78 was certainly the year of the *Aciphylla* — almost every plant was in flower, or so it seemed, and this was very fortuitous because it enabled us to find many of the smaller species that can easily be passed unnoticed in the tussocks and small scrub. One such find was *A. takahea* in a location never before



Celmisia hectori

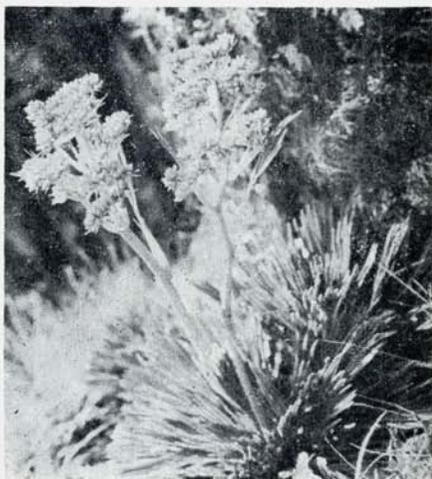
At the end of February my botanist friend, John, arrived in the University Land Rover. We travelled south and on the basis of information we had received spent two days on a fruitless search around the Mavora Lakes area for the elusive *Aciphylla inermis*. The next leg of the journey took us to Te Anau from which we drove to different areas to study the variations in the large *A. horrida*. This magnificent species was in flower in many places and the five to eight foot golden

recorded. *A. takahea* is a dwarf species with almost glaucous, twice pinnate leaves ten to fifteen inches long. It was previously thought to be confined to the Takahe Valley area to which public access is denied because it is one of the last haunts of the endangered Notornis (Takahe), a rare flightless bird. Our finding was in a very accessible area and, as it was the first time either of us had seen it in the wild, we took several photos and collected seed.

The Hector Range was our next target and we drove up the Nevis Road from Garston to the high saddle and then onto a bulldozed track that followed along the ridge up to the top. This is a wonderful plant area and reasonably accessible so that it should be a 'must' for all alpine plant lovers who can make it to that area. We stopped at some of the large rock outcrops to be greeted by scores of the low growing, spreading shrub *Senecio revolutus*. Height varies according to habitat but here it was not over nine inches. This is a desirable plant, having foliage somewhat resembling that of rhododendron and aromatic, although literature does not ever mention this. The flowers are bright yellow in a broad cluster. Seed was available aplenty and will appear on the seed list. Many different *Celmisias* were either in flower or seed but pride of place must go to the huge silvery sheets of *C. hectori* that cascaded around and over the rock detritus at the base of some outcrops. This species forms low mats composed of countless thousands of small silver rosettes from which arise the neat white daisies. The writer has seen *C. hectori* often but never in such beautiful, almost unbroken sheets over such a large area.

As always, the main purpose of the visit was to study *Aciphylla* and growing on and around the rocks were hundreds of the plants we were seeking, *A. 'Otago'*, and this time we had found it in full flower with many of the females already in seed. 'Otago' is our interim name for this species but a paper will be published within a year describing it and giving it its final epithet. Once erroneously called *A. similis*, *A. 'Otago'* has once-pinnate leaves of about five inches usually with four pairs of leaflets spreading wide from the rachis. The rosette is always

neat and symmetrical. The female inflorescence is of the broad type on a stem of up to eighteen inches but usually about eight to ten inches high, while the male inflorescence is shorter, broad in shape and golden-yellow. The establishment of *A. 'Otago'* as a new species (under a new name) has been delayed for several years because we had not previously been able to find the plants in flower.



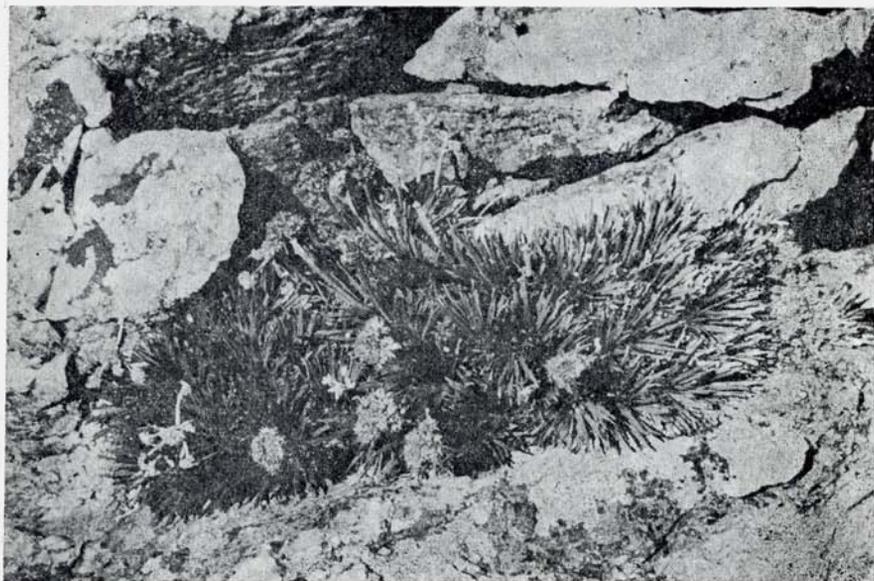
Aciphylla "Otago", male

After a very warm and rewarding afternoon on the Hector Range we descended and drove to Wanaka, a recreational town on the shores of Lake Wanaka. Here we had a 'real home', for a friend had very kindly offered us the use of her holiday house in the town and it proved to be a very comfortable base for the next four days. During two of these we went to the tops of Mt. Cardrona (6,218 feet), Treble Cone (6,888 feet), Old Woman Range (5,264 feet) and the Remarkables (7,000 feet approximately), collected hundreds of specimens and took lots of photographs. The other two days were spent writing masses of notes, photographing the

leaves and inflorescences of collected specimens on a flat surface (comparative photos are very helpful), visiting the local herbarium of the National Park Board, and talking with a local enthusiast whose future assistance may well prove valuable.

disturbed 'just germinating' seedlings. It is wise not to empty the seed containers until two seasons after sowing.

New Zealand high alpine plants grow in conditions that give them moisture at the roots but usually very good drainage around the necks, and al-



Aciphylla simplex, female

On Treble Cone we found masses of *A. montana* and *A. kirkii*, both in flower and seed. They were also prevalent on Mt. Cardrona where we found a hybrid intermediate between the two. Hybrids in *Aciphylla* are not common but when collected, prove to be quite vigorous in cultivation. On the exposed rocky tops of this mountain *A. simplex* clung tenaciously to life, sending its roots into the crevices.

Seed was collected from many *Aciphylla* and *Celmisia* species and will appear on the Societies' seed lists this year. I have found that they germinate over a long period because, when removing well developed one year seedlings from their boxes, I have often

though some days can be very warm in the mountains, the plants there are not subjected to the intense heat they would experience in lowland gardens. Clouds and mists give them intermittent shade and moisture in summer while in winter they are heavily blanketed with snow. In the garden they do well in light shade where they are never allowed to dry out. Excessive hosing on poorly drained soil will quickly cause their collapse.

My earnest hope is for a good summer in 1978-79 so that at least some of the many planned trips can materialize and the few remaining anomalies in the genus *Aciphylla* be resolved.

ROCK GARDENING IN THE SOUTH

Part 2

ELIZABETH LAWRENCE
Charlotte, N.C.

This is the second of a series of articles about rock gardening in the South by Miss Lawrence.

A Southern Rock Garden

My rock garden in Raleigh, North Carolina, grew slowly, of necessity, for I had only Page, our house boy, to help me, and he had a full time job within. But he could always find time to work out of doors, and no mention was made of dust on the parlor table. The rock garden followed a curving path that led from the driveway at one end to the wall foundation at the other. From the garden proper, it was entered through an ivy covered arch in the hedge. Beneath the arch was a flight of concrete steps, steep and narrow as to riser and tread. Page and I began by replacing these with wide and shallow stone steps. Page said he would rather lay stone than anything he had every done, and he went about it with the deftness and intuition that he put into making his perfect souffles.

Garden steps can scarcely be too wide or too shallow. "The wider and shallower the steps," Gertrude Jekyll says in *Gardens for Small Country Houses*, "the pleasanter they are to go up and down — the extreme of comfort being a step from four to five inches high and twenty-two to twenty-four inches from front to back; such steps as one may run up and down." Such steps are not only the extreme of comfort, they are also the extreme of beauty. Equally important to beauty, and also to comfort, if garden visitors are not to be herded single file, is the breadth of the flight. A wide flight

is pleasant and inviting, a narrow flight is cramped and inhospitable. A common fault in garden steps, and a bad one, is a tendency to dip forward with the slope, so that you feel as if you are going to fall forward on your nose as you descend them. In laying them myself, I found out how this happens. It is hard to avoid, unless you back away frequently, and look at the steps in relation to the slope. Invariably the step that seemed level when you knelt close to it, has a forward slant when you get a longer perspective.

We picked out the flattest and smoothest stones in our rock pile. None were very flat or very smooth, but this, up to a point, is all the better. Stones with straight front edges are preferable in parts of the garden that are laid out in a regular pattern, but rough ones are better where the lines follow the contours of the earth. The rocks at hand were a kind of modified granite that crumbles like sandstone and weathers a dark grey. They were already mossy and worn, and the edges rounded.

When the steps were finished I sat at intervals on the top one, staring at the space in front of me until it opened up like a fan. I used to feel guilty about the time I spent merely sitting on that top step when I could have been weeding the borders or tying up the chrysanthemums, but I was much comforted when Elsie Hassan who was

then living in Birmingham, Alabama, wrote, "I sat on the terrace when weather permitted, and after staring for days at the woods, I began to have ideas. We cleared most of the saplings and underbrush out of the center, making a wide path, and leaving room for bulbs, violets, and such along the sides."

With the outline of the fan in mind, I explained to Page that I wanted to extend the third step to curve into a line that would take a definite direction but not be perfectly straight. You cannot tell a person how to lay rocks. He has to see what is to be done, as you see it. If you have ever been dependent upon some one with a stonger back than yours to lay a stone the way you want it laid, you will know what I mean. I told Page that the contours of the rocks were to determine the direction of the line, and I showed him the excellent pictures in *Gardens for Small Country Houses*. Some of these, such as "bold stratified rockwork and small cascade," were beyond our scope, but "cypripediums thoroughly at home on the upper margin" had the quality of careful carelessness that I wanted to emulate. Page studied the pictures long and thoughtfully, absorbed the principles underlying them. Then he set out to get a similar effect with a very different kind of stone, and carrying out a different kind of design. He had the unerring eye for line that is often characteristic of a person who has not had his senses blunted by having his mind improved, and he was much quicker than I to pick the rock that seemed inevitably to be the fellow of the one before it.

I had read, and I have found it to be true, that more of the rock should be below the earth than above it. This, and laying it with the broad side

downwards, gives a look of stability. Using the same kind of rocks throughout, and setting them so that they all tip the same way preserves unity. If the rocks are stratified the strata should run in only one direction. Too many small rocks cause confusion, but a variety of sizes is pleasing. These principles, picked up from observation and reading, are helpful; but the creation of a garden which looks as if the rocks belong where they are, is more a matter of feeling than of forethought. I do not believe that any one can tell you how to accomplish it. And I do not think that many gardeners ever find out. But this does not matter, for each one of us will be satisfied with his own, because no other kind of a garden is so individual, so personal, or so much an expression of the gardener himself.

Page and I were well pleased with our efforts, and never thought — until a friend, Mr. Sturtevant, who was also a landscape architect, came for a visit in the spring — that our construction was open to criticism. Mr. Sturtevant said that we had created an effect of confusion by laying the stones too close together. We had not been aware of this until he pointed it out. Then we wondered how we could ever have failed to see it. Under Mr. Sturtevant's direction a number of major and minor stones were removed. Those left formed definite units which were tied together by a series of transitions like modulations in music.

Between the rock garden and the driveway, Page and I built a wall of stone cut from the quarry. It was a nice wall with a graceful curve, but we did not build well, and it kept falling down. An instinct for beauty will not make a wall stand, and after this one had twice been knocked down by the coal truck, I was forced to

let Day come and do it over. Day was an obstinate and surly old man, nearly always drunk. We invariably ended in a quarrel, but I was always forced to take him back — or rather, allow him to come back when he returned, for he always did. And he knew how to fit stones one to another in such perfect balance that they would stay forever.

In time more rocks were fitted to the slopes above and below the path that led to the wall fountain. In front of the fountain was a flagged terrace with a south-facing retaining wall to the right. Between the flags, and the rocks of the dry wall, and on top of the wall, and at the foot of it were the rock plants that must be grown in the open and the little bulbs that need all of the sun that they can get.

A rock garden can be natural even when it is "somewhat formal in character." For a garden that is functional is natural in the best sense. Dry walls which offer a solution for sharp slopes are also a happy place for growing rock plants; low ones are not difficult to build. Elsie Hassan says she built hers with stones that were not too large for her to handle. "We sit on a knob," she wrote, "and I have built walls and more walls to stop the wash. When Victor Ries came to visit us he said, 'Why not more open spaces instead of so many flat terraces?' and I replied, 'I hope it rains while you are here.'"

Gertrude Jekyll says that "a terrace is always friendly to quiet thought." When the space for the garden is small and flat, and especially if it is near the house, a little paved terrace with creeping plants between the stones may be the best kind of a rock garden. The English cottagers call this a "craw garden." I have in one of my scrap-books a picture of a garden like this.

It is a small rectangle with low brick retaining walls on three sides, and the house on the fourth. Bricks are left out of the retaining wall at intervals, and rock plants are growing in the interstices. More plants are growing on top of the wall, and some of these hang over it. Down the center are two long narrow beds filled with low perennials, and edged with thrift or pinks. Between these beds there is a bird bath, a very charming one.

Since rock plants are so varied in their needs it is necessary to create for them a variety of situations. There must be places that are high and dry for bulbs that require a summer baking, and low lying pockets for those from meadow and marsh. There must be sun for flowers from the fields, and shade for those from the woods. In the South, especially, there must be shade. Large trees protect garden and gardener from the sun in summer, break the winter winds that blow on half-hardy plants, and temper the air when treacherous late frosts follow a false spring. The idea that shade, "or even the proximity," of trees is to be rigorously avoided applies only to gardens where plants from above the timber line are in the majority. "Caroline and I get so disgusted when people say that we cannot have rock gardens in the South" Ruth Dormon of Shreveport, Louisiana, once wrote. "Of course we can't when we try to grow alpenes. We have both tried a number. I find that another reason some people fail is that they just put plants on top of rocks in the broiling sun. At Briar Wood, Caroline has a lovely rock garden in semi-shade, and I have mine in semi-shade."

"I wish that all doubters could see the beautiful garden Inez has created in the red clay hills of northwest Louisiana," Caroline wrote in *Natives Preferred*, "a good part of it is made

up of brown stones which she had transported from nearby and skillfully embedded in the hillside. Here are *Iris cristata*, clumps of *nemostylus*, *Phlox divaricata* in every shade, silenes and masses of violets. Mostly this is in high shade."

Since the plants in the open part of my garden lay in the afternoon shadow, I have often wondered whether, even in the South, an ideal rock garden should not have some space in full sun. I asked Claude Barr, who used to send me plants from the "High Plains, Badlands and Black Hills," whether he thought that my almost total failure with these lovely things was due entirely to the climate, or partly to the background of trees. He answered wisely, "I will not make any suggestion for full sun in your garden. I know a man who cut down many large trees on an old residence street in the interest of his rock plants. Under certain conditions full sun may not be worth the price. Your lack of it may not be a detriment to most of the Plains plants, but it may explain why you can't get bloom on *Thermopsis rhombifolia* and why you can't hold *Asclepias pumila*. Those which grow in open exposed places must have sun. If you give them all you've got and the most suitable footing and they don't prosper they are hardly for you I guess."

The "suitable footing" is the first problem of the rock garden. Most saxatile plants require good drainage along with a moisture holding soil. As Mr. Barr put it, "The great problem is to provide the right drainage for certain exacting plants, and not get a medium so porous that they cannot hold out between drinks." A good general mixture for the rock garden is loam, sand and leaf mould in equal proportions, with more humus for the moisture loving kinds, and more sand for those

that require sharp drainage.

The leaf pile is the heart of the rock garden. It seems to me that in my Raleigh garden most of my waking hours were spent dragging oak leaves in and out of the holes I kept them in, and in the few hours that were left for sleep I dreamt of leaves. I kept them in holes at the back of the surrounding shrubbery so that they would be out of sight, but close at hand for mulching and planting. If they were piled very high in the fall they would sink to ground level by spring. They were never turned over, for there was no one to turn them over, and nothing was ever mixed with them. They just rotted. In a year or less they would do for a mulch, and in a year or more some were so thoroughly decayed that they could be mixed with the soil at planting time. I used the holes in rotation, always keeping one with well rotted compost in reserve. When they were mixed with the loam and sand, bone meal or lime rubble or old manure would be added to suit the individual plant. It is to be remembered that only the partly decayed leaves are acid in reaction, those that have become fine dark compost are circumneutral.

According to the British, who garden so sternly, the soil beneath the rock garden should be dug to two and a half feet, and thoroughly mixed with compost. The rocks should be laid upon this with the special mixture for each type of plant in the spaces between. If I had waited to do all of this, I should never have had a rock garden. Mine was planted inch by inch, and I dug the stiff rocky clay as deeply as I could (which in some cases obviously, was not deep enough) and dug in sand and rotted leaves. Due to faithful mulching thereafter, the soil improved a little each year.

In the spring all men are gardeners. Every one wants to rush to the local nursery, dig up plants in full bloom and bring them home to set out in the moist, receptive earth. In the South this will not do. Sometimes when new spring lists came from the North with long sought rarities offered for the first time, I was weak minded enough to sit down and order from them at once. Nearly always I was sorry. In the North plants cannot be dug until March, and by that time we are having spring days and drying winds. No matter how carefully spring set plants are sheltered and watered, it is almost impossible to keep them alive until they can become established. With a few exceptions, such as bulbs of uncertain hardiness, all planting should be done before Christmas. But it is hard to get Southerners to make up their minds to this. No one wants to garden in late fall. There is a portent in fading petals and falling leaves that chills the heart even while summer lingers, and it takes a Spartan gardener to set out newly arrived plants in a cold November drizzle.

Since our late, and often terribly dry, falls permit of little planting of herbaceous material before the middle of October, I ordered first the little bulbs that should be in the ground in September. When these were planted, I ordered plants from nurseries where frost comes early, for if I waited too long they would have stopped shipping for that season. Then I ordered from dealers in the South and Southwest. I tried to have everything in by the end of November so that the new plants could get settled before bad weather came, but, because I was so greedy, this could not always be managed.

Along with fall planting, I tried to take up the leaves as they came down from the trees. "What!" visitors would

often say when they saw the (comparative) tidiness of my garden at the end of winter, "Isn't it very early to be uncovering?" They were surprised to hear that it had never been covered at all. The purpose of a winter covering is to keep the ground frozen, and the plants dormant. Where the ground freezes infrequently, and then only on the surface, and plants may start into new growth in midwinter, protection does more harm than good. When the garden is made tidy for the winter, after the leaves have fallen, I covered it with a mulch of leaf mold that was in the crumbly state, a mulch thick enough to protect, but not to smother, the plants that do not die down completely in winter. By spring this mulch had become a powder that could be stirred into the soil with the addition of bone meal or old manure for plants that need a richer diet, and then another mulch of semi-decayed leaves was put on for the summer.

I once had an idea that by a consistent use of mulches I could forgo summer watering. But this will not do. There are plants that will survive and even bloom through the hottest, driest seasons, but an unwatered garden loses its summer freshness. If you are going to water, however, do not let the ground dry out before you start. It is fatal to put off getting out the hose because it looks like rain. Once the ground gets dry, even a good rain fails to penetrate, and summer showers only make the air a little fresher. It is better to let the plants take the weather if you are not going to keep the ground always moist. The best method is with a canvas hose, leaving it in one place for a long time, and letting the water trickle very gently. Be sure that the ground is thoroughly soaked by digging down several inches to see how far the moisture has gone before the hose

is moved on. You will be surprised to find out how long a thorough soaking takes. Apart from the plants that need summer moisture, there should be a place that the hose never approaches. Here little bulbs that require summer baking can be planted with drought resistant plants to cover them.

Many rock garden failures are due to the size and age of the plants set out. Young, home grown plants have much the best chance for survival in any climate. Moreover, a collection grows much more quickly if cuttings and seeds are acceptable, than if — like me — you are willing to deal only in plants and bulbs. Being too trifling to undertake any sort of propagation myself, I begged permission to quote Elsie Hassan, as she was very good at it; she always had plants to give away.

Everything you read about raising plants begins with a cold frame. I asked Elsie if a cold frame is necessary in this climate, and she answered, "No, it is less necessary here than farther north. Most of the things do not need that much protection, and unless they are carefully watched grow too soft in mild climates. You do have the advantage of sustained humidity in the air. I have used a frame more for seed sowing than for cuttings."

She said that her propagating bed was in the shade against the back of the brick garage, and was raised above the ground to the height of four bricks. For use on a smaller scale she suggested a galvanized bucket with a drainage hole three inches from the top, filled with coarse, washed sand, and watered only through a lead pipe an inch in diameter. This should be kept in the shade under the eaves of the house, and is especially recommended for rock plants that are finicky. As to the propagating mixture (every plant raiser

has his own pet one), she said she had changed from her original combination of sand and sifted peat to one of half sand and half vermiculite. The mixture of sand and vermiculite is about ten inches deep. "That is plenty for most small things. After the cuttings are well rooted, I move them to the other half of the same bed, which is filled with a potting mixture which is about one fourth vermiculite. From that you can transplant to permanent positions without many casualties.

"I use large pots for seeds," she said, "and if they are not too thickly sown, like to have the pot about two thirds filled with a good potting mixture, with an inch of vermiculite on top of that. Then, if you can't get around to transplanting right away, the roots go down and find food about the time they begin to need it. If you use all vermiculite," Elsie wrote, "and want to leave them for awhile, it is necessary to water with a nutrient solution. In my haphazard state I find it much simpler to have the layer of good soil for the roots to seek. I have very good results with this method.

"Of course," she added, "on the cuttings, watering is imperative. If they once dry out, they are done for. A period when the wind is hot and dry, and there are only one or two very light rains in six weeks or so, and the weather is scorching hot is particularly difficult. When I water in such weather I try to get the wall back of the seed bed dripping wet, and soak the bricks that outline the bed, in order to create a little space of humid air."

Labels are always a problem, but especially among rock plants. They must be permanent, easily read, and inconspicuous. The best and cheapest of all the kinds that I tried were strips of zinc or copper. I got a sheet metal dealer to cut his scraps into strips

about an inch wide and eight inches long. I printed the name with acid and a gold pen. It is a good idea to begin at the end of the label and print toward the center, because rock plants have long names. It is also a good idea to put the date and the source on the label, as they do in botanical gardens. The labels should be deep in the ground with only the names showing. This looks better and they are not so likely to be raked

up with leaves and trash. The only fault I found with these labels was that the sharp corners sometimes cut my hands when I was working around the plants. I always wanted to get the sheet metal people to round the corners, but I was afraid to ask them as they were not enthusiastic about fooling with the labels anyway and might have refused to bother with me at all if I had asked for further favors.

Plant Show Notes

Herewith are some notes on a few of the plants that appeared on the show bench at the Annual Meeting in May 1978. They were gathered by Bill Brown of the Long Island Chapter and are illustrated by photographs taken by Joel Spingarn of Baldwin, L.I., N.Y.

Asperula nitida puberula

1st in Class IX; shown by Howard Porter

Asperula nitida puberula is a first class alpine house plant: I grow this asperula in a six-inch bulb pan in a mixture of three parts grit to one of leaf mold poured between and around tufa chunks. It leaves the alpine house in early March for a table on an exposed terrace, returning to the alpine house when hot and humid weather comes, and goes out again in late September and October. This regime keeps its growth tight and makes it very floriferous. Two efforts to grow this plant out all summer in a trough failed. The first warm rains set them back, later ones killed them. Indeed the plant



shown was put out with a covey of other potted treasures while I was in England during the last week of May and the first two weeks of June. When I returned it was nine-tenths dead, but it was forgiving — unlike some plants I could mention — and is now as good as it ever was.

Cuttings root easily most any time of year, though in midsummer a cutting handled by sweaty hands and put in a humid propagating case can fuzz over with gray mold in virtually no time.

— H.P.

Calochortus uniflorus (lilacinus)

3rd in Class VII; shown by Francis Cabot

The genus *Calochortus* belongs to the Lily Family, Liliaceae; the epithet *calochortus* deriving from the Greek, *kalos*, beautiful, and *chortus*, grass, the latter pertaining to the shape of the leaves. This large genus occurs mainly in western America and Mexico.

Although there are over sixty species of *Calochortus*, many of which are gar-

den worthy, success in growing these bulbous plants outside of their native habitat is rare. Some of the species are tender and most need a period of ripening at which time all water is withheld.

Calochortus uniflorus is one of the easier species to grow. In nature it is found growing in moist areas and is, therefore, probably more easily acclimated outdoors in the less arid sec-

tions of the United States than most of the genus, especially in the warmer areas.

The flowers are held erect on short stems, three to six inches tall, and are usually light pink or lilac. Blooming time is May to June.

Calochortus uniflorus can be propagated by seed and also by the bulbils produced in the leaf axils. — B.B.



Daphne cneorum pygmaea

Daphne cneorum pygmaea

1st in Class XVI; shown by Francis Cabot

This dwarf form of *Daphne cneorum*, the Garland Flower, is essentially smaller in all its parts than the type. It is also more compact, slower growing, and prostrate, seldom reaching a height of twelve inches. As with the type, *Daphne cneorum pygmaea* has tight clusters of rose pink flowers, usually borne in May, deliciously

fragrant and beautiful. It is a supreme plant for the alpine house and owing to its slow growth suitable for the trough garden as well.

Propagation is best carried on by cuttings. I have found it is best to take these in July at which time they will generally root in seven to ten weeks. The newly rooted cuttings should then be placed in the cold frame for the winter after potting up.

The plant on which the name *D. c. pygmaea* is based was found in the Venetian Alps at about 8,000 feet. There is at present some uncertainties as to its actual distribution in the wild. One difficulty lies in the vague botanical description of the plant itself. Plants labeled as *Daphne cneorum* var. *verlotti*, *verlotti alba* and *D. c. alba* may prove to be forms of *Daphne cneorum pygmaea* and only when this taxonomic question is settled will it be possible to determine accurately this form's distribution. — B.B.

Fritillaria acmopetala

1st in Class VII; shown by Ron Beckwith.

The name fritillaria refers to the checkering of the corolla, likening it to the chess board; acmopetala means "with pointed petals". *Fritillaria acmopetala* grows to about twelve inches with me, the leaves grayish, linear and scattered on the stem at the tip of which are the charming bell shaped flowers of the most delightful shade of green, the inner segments being shaded maroon. It is quite widely distributed in the wild in the eastern Mediterranean region including Cyprus and Turkey and grows in limestone areas in both open fields and woodlands.

The plants in the show were grown from seed sown in 1972. They flowered rather sparsely in 1977 but reached perfection for the May show in 1978. With few exceptions, I bake my fritillarias under glass in the cold frame all summer long, withholding water from the moment that the foliage dies down (and this includes seedlings and ungerminated seed pans). Old World fritillarias stay in this condition until February or March of the following year depending when I can get back into the cold frame again; I then

start watering them more or less on a daily basis. I feed fritillarias only rarely, usually about twice a growing season, using by preference a liquid seaweed fertilizer. I generally repot every other year in a very gritty mixture.



Fritillaria acmopetala

When growing fritillarias from seed, I never prick them out of the seed pan but sow them initially fairly thinly in three or four inch pots and leave them thus until the plants need repotting. I do this in the fall, potting them on as a whole clump so as to disturb the bulbs as little as possible. So far I have not ventured to grow the plants outside, mainly because I feel the soil in my new garden is yet insufficiently cultivated and mellowed.

Fritillarias are rather restrained plants, rarely given to flamboyancy, but they most certainly have a special kind of charm that attracts many devotees. — R.A.B.

***Primula polyanthus* 'Gold Laced'**

1st in Class V; shown by Paul Palomino.

The gold-laced polyanthus of today

are the result of the work of English horticulturists in the 19th Century. Polyanthus primroses are themselves hybrids, descended most probably from a fertile hybrid, the result of either a natural or garden cross between *Primula vulgaris* (*acaulis*) and *P. veris*, the wild English hedge Primrose and the Cowslip. It is a very old garden plant described as early as 1620 by Parkinson, its main characteristics being the large showy open flowers of *P. vulgaris* growing, not singly, but in umbellate clusters as in *P. veris*.



Primula 'Gold Laced'

These plants enjoyed tremendous popularity in England during the 18th and 19th Centuries especially in Lancashire and Yorkshire. The English florists of the time were interested in producing flowers aesthetically pleasing to the tastes of those days and this involved a gold band or lacing around each petal in addition to a perfect symmetry of the bloom. The overall effect of the gold lacing is to apparently double the number of petals from five to ten.

These gold-laced polyanthus lost their appeal, however, during the mid-Victorian era of "natural gardening" as espoused by William Robinson and

Gertrude Jekyll and were nearly lost to cultivation. It was not until recently that the gold-laced polyanthus once more became popular and the revival of these cultivars, at least in the United States, is to a large part due to the skill of Mrs. Florence Bellis of Oregon.

Although bred originally as a florists' flower these primulas are hardy enough to be grown outside in all areas where primroses of the Vernales Section do well. Propagation is possible by seed, by division, or by root cuttings. Division of polyanthus primroses is best done in early spring or late summer.

— B.B

Saxifraga cebennensis

1st in Class IV; shown by Howard Porter

This saxifrage has been described as a Mossy Saxifrage that is treated like a Kabschia. I grow *Saxifraga cebennensis*, however, in a rich moisture retentive, woodland type soil: sand, peat moss, leaf mold and aged compost. It is certainly not a xerophile. Winton Harding says that it grows well for him in frame and alpine house but that he hasn't attempted it out. None the less I see no reason why it should not do well outdoors in a spot that is reliably shaded in summer and mean to try it in such a place. (*It has grown well and self-sown in a northfacing limestone wall in northwestern Connecticut for several years.*-Ed.)

I saw splendid specimens of this plant in the alpine houses in Kew and Wisley and when I returned home I looked benignly at my own, thinking that in a couple of years it would be just as glorious as any that I had seen in England. Alas, it was not to be. I had put it in June under the alpine house bench where it was shaded all day except for the early morning, but the insidious sun crept lower and lower

and one fine hot August day I returned from a sail to find one whole side of the plant burnt to a crisp. The rest of the plant is growing well but will never again form the perfect

hemisphere of tightly packed rosettes which is the plant's distinction.

Cuttings root satisfactorily but not quite as rapidly as the other mossies.

— H.P.



HYBRIDS AND HYBRIDIZERS — Rhododendrons and Azaleas for Eastern North America

Edited by Philip A. Livingston and Franklin H. West. Harwood Books, 1978; Newtown Square, Pennsylvania. \$25.

The more we know about the plants we grow the greater the pleasure we should derive from this avocation of ours. It should be a cultural experience. It should be a passion. We can attain this state in a number of ways. Personal exchanges of information can be gratifying but only by extensive reading can one really delve into the heart and all of the extremities of any subject. Few of us can write well enough to interest or stimulate our peers but all of us can read. The reading plant lover will enjoy this book. For the rhododendron enthusiast it is a must. It is Horticultural Americana at its best.

It is a history of the loves and works of our very own hybridizers who started with a vision then stumbled, ran, walked and occasionally fell backwards in their quest for superior hybrids which would perform well in the east. They

devoted years of hard work, imagination and love in an attempt to attain these ends. They knew of the spectacular species and varieties which flourished in the British Isles and on our West Coast but they also knew that few of them could tolerate our harsher climate. Their aim, I imagine, was to develop hardy equivalents. In many ways they succeeded but the work goes on — still searching for hardy, good yellows, tall growing blues similar to the best forms of *R. augustinii*, compact plants for smaller properties, etc. This then is the story of Joseph B. Gable, Charles O. Dexter, Benjamin Y. Morrison, Guy Nearing and Anthony Shammarello. They were the fathers of rhododendron hybridizing in eastern North America. I personally would place Joseph Gable at the head of the list.

The final chapters titled Contemporary Hybridizers and Ratings and Recommendations also make good reading. Generally the plants mentioned in this book are "safe" in the east. When the gardener peruses catalogs with enticing descriptions of English and West Coast hybrids he must beware.

This is a history book first but one

which can be used again and again as a valuable reference. The illustrations are generally of good quality and the total effect of the book as far as appearance and content are concerned is excellent.

Many of us have been entertained and inspired by the writings of the great gardeners and plant explorers of Europe. Well, this book has a story which is just as interesting and entertaining and is Made in America to boot.

Don't borrow it. Buy it.

Nickolas Nickou M.D.

VIOLETS

by Doretta Klaber, A. S. Barnes and Co., Inc., 1976; Cranbury, N.J.

What a work of art, this book on violets of the United States! Unfortunately it is the final book by Doretta Klaber.

The amateur often gets lost in the technical differences in violets, and consequently is never able to identify the various species. This book uses Doretta's marvelous drawings. Each drawing is worth hundreds of written words. To make it easier for the average gar-

dener, the author has broken down the violets by color — blue, white and yellow. These categories are then divided into two further groups — stemmed or stemless, which, in turn are further subdivided into uncut- and cut-leaved forms of violets.

The text is kept to a minimum, with only a description of the type locale, pertinent features for identification and hints on how to grow each species. Many violets have an accompanying drawing on the same page. The color plates are combined in five sections.

The author's excellent glossary has the usual word definitions, but, in addition, each is illustrated with Mrs. Klaber's marvelous line drawings of all the parts of the violet, the forms of growth, and a final page on leaf shapes and tothing. Each page is a technical library, and a work of art. For the violet lover, or the gardener who needs help in identification, this book is a must.

It is available on loan from the A.R.G.S. Lending Library at the Pennsylvania Horticultural Society, 325 Walnut Street, Phila. Pa. 19106, with a request and fifty cents.

Anita Kistler

Douglasia vs. Androsace

Dr. Arthur R. Kruckeberg, Chairman of the Department of Botany at the University of Washington, has a further word on the Douglasia-Androsace controversy:

"There are two kinds of name changes: one, when a prior legitimate name must be revised and in such cases we are obliged to get ourselves accustomed to the new name; the other is a matter of taxonomic judgment, such as we have with Douglasia/Androsace. In the latter case, any taxonomist or anyone else who may want to take the splitter's bias can continue to use both generic names legally, and there is no need to protest or proclaim 'invasion of rights'; just continue to use Douglasia for our American plants."

• • • of Cabbages and Kings • • •

Growing plants from seeds can be both the most rewarding and the most frustrating of occupations

The rewards are obvious. How else is one to acquire a population of some of the more exotic rock garden plants? And, just as the children of human parents vary in appearance, physical sturdiness, and personality, so too can seedlings from the same pod vary in growth habit, color of blossom, and tolerance to climates other than that of their natural habitat.

As you probably know both British and Czech rock gardeners grow superb *Lewisia cotyledon*, many of which are spoken of as hybrids: sturdy cabbagey plants with large flowers in a rainbow selection of sunset colors. These are not hybrids but rather selections grown in gardens for many years from what was originally wild collected seed. By attrition (the less amenable plants died young) and careful selection of seed from only the best of these garden grown lewisias, a garden hardy race of glorious plants has emerged. Yet Roy Elliott has reported that even good British gardeners find it difficult to keep plants grown from seed collected in the wild. Thus eventually we may perhaps even be able to grow and flower in our gardens such impossible plants as *Eritrichium nanum* and *Dianthus lapponica* if we grow them from seed collected originally from wild plants growing at the lower elevations in the most southerly extension of their range. A forlorn hope, perhaps, but has it been tried?

The frustrations of growing plants from seed are familiar to most of those who have tried it. Perhaps one of the most common complaints is that of seed that does not come up what it is purported to be.

This is forgivable if the seed has been gathered in the wild, particularly so if the collecting was done in unfamiliar territory. Professional collectors are either very familiar with the locality and with its plants or else try to scout the area in advance so as to identify and mark the plants while they are in bloom, returning later in the season in the hope that they will find again those same plants with ripe seed still attached. A chancy business.

Unfortunately, most of us visiting in a strange locality see the plants only in bloom or in seed, not both, and even quite knowledgeable botanists find it difficult to give a specific name to a plant seen only in seed. This accounts for the designation *sp.*, meaning species unknown, after a generic name in seed listings.

But misnaming garden collected seed is less excusable. True, labels get lost and memories are fallible and, unfortunately, plants acquired from nurseries, plant sales, and seed lists, even those of botanical gardens where students usually collect and clean the seed, are all too frequently misidentified. But after all one has a garden raised plant at hand and can study it at all seasons, so it should be quite possible to check its identification against the descriptions in texts when it is in bloom to make sure it really is what its name suggests. Surely it is better to spend a few minutes confirming the identification of a plant new to you than to continue the deception, even though unintentionally, by sending out seeds or plants under the wrong name. And surely it is not too much to ask, once the plant has been found true to name, to print that name clearly on the seed envelope, correctly spelled. The volunteers who man the seed exchanges are

not, after all, cryptographers.

But misnamed seedlings are not the only frustration faced by the seed sowing gardener.

When someone plants seeds for the first time he tends to hover over the garden plot or seed pan examining it almost daily for signs of life and must frequently feel that the old adage, "A watched pot never boils", could be recast to, "A watched seed never germinates." But usually after a period of several weeks, if the directions on the seed packet have been followed and the soil has been faithfully kept moist but not waterlogged, he will be rewarded with the sight of tiny scraps of green thrusting up through the dirt. But not always, and many a neophyte gardener gives up and loses interest and after a few months the pot goes unwatched and unwatered and that is that. It may, indeed, be the last time he tries to grow plants from seed.

But even if this first seed sowing leads to success and consequent enthusiasm and assurance, when the gardener branches out into sowing seeds more exotic than the brightly packaged (and tested) vegetable and annual seeds from the local hardware store, he will learn to his chagrin that he may not always reap all he sows. Not all seeds come in neat packets with explicit directions for successful germination and many an inexperienced gardener, having waited patiently a year for germination (for he has learned some seeds require a winter to pass between sowing and germination) will throw out the potful if there are no signs of life that first spring.

There may be many reasons why. In a few cases there simply was no seed in the packet. This is not a case of deliberate hoax on the part of the seed gatherer, but rather a case of misidentification. Many seeds are

dustlike in size if not in shape and without a hand lense it is not always easy to tell if there is, indeed, any seed mixed with the debris that results from the breaking up of seed capsules and receptacles. Sometimes the seed itself has been devoured by insects and those blackish specks, mistakenly identified as seed, are, in truth, the droppings of the departed diners. Sometimes the seed was not fertilized and there are only shrivelled, seed coatings as empty of life as a scarecrow's jacket. Or the seed may have been gathered before it was sufficiently mature or conversely the seed may have already dispersed and all that is left to put in the seed packet is "flug."

But even when the seed is present and viable it may not germinate because the requirements needed to break its dormancy have not been met.

It is surprising how many people, even those who have gardened for a number of years, are appalled to learn that it may take more than one spring to persuade some seeds to sprout. "Wait two years for germination", they exclaim in horrified tones and you can see them make the instant mental decision to write off any possibility of their growing *that* plant from seed. They have yet to learn that without patience no one can truly call himself a gardener.

But sometimes it takes more than patience to make a seed germinate. The phenomenon of seed dormancy and seed germination is a complicated one and still not completely understood; in many cases we have yet to learn just what is needed to make the tiny spark of life enclosed within the seeds of some plants spring into action. We know some seeds need several alternating periods of heat and cold (sometimes of rather precise duration) to urge them into growth. Others need light to ger-

minate. The seeds of some desert plants may wait years until a sufficient number of inches of rain soak them before they will sprout; some, indeed, require the scouring and abrading of flood waters to summon them to life. The seed of some pines can germinate only if the cone in which it is enclosed is opened by the heat of a forest fire, which incidentally assures an open seed bed with no competition for the young pine seedlings.

Seeds may be prevented from germinating by something either present or lacking in the soil on which they fall. Some plants (Black Walnut is a notorious example) give off a chemical inhibitor that discourages the germination of many seeds that fall within its influence, particularly those of their own species; while the seeds of others such as *Jeffersonia* and *Adonis vernalis* seem almost to require the benign influence of a parent and can hardly be persuaded to germinate except under their mother's skirts where they sprout like cress. Some seed, such as that of *Dentaria*, refuses to be born into captivity and will not germinate in a pot, but will come to life quite readily if sown in the open.

In some cases the seed itself is encased in an inhibiting covering and will not sprout until this coating has been stripped away, either by the crops and digestive juices of birds and animals or by the bacteria of decay.

Some seeds need rather specific soil temperatures to germinate. Grass seed needs a soil temperature above 50°F and rhododendrons germinate best at temperatures above 70°, while the seeds of many alpenes seem to prefer a cool soil and will frequently sprout when it is still cold enough for the surface of the soil to freeze at night. Light intensity, too, and even day length appear to play a part in

the germination of the seed of some plants. Year after year such seeds will send up their cotyledons simultaneously on a certain date no matter when they were planted.

Some seeds will sprout within a few weeks if planted immediately they are ripe but will go into a stubborn dormancy if allowed to rest before planting. Others lose viability completely if not planted as soon as mature; while still others require an after-ripening period before they will germinate.

In most cases seed dormancy and the means by which it is broken make great good sense. It may be one of the many means whereby seed is scattered to start new colonies, or it may delay germination until a propitious time for the survival of the seedling, but in some instances the combination of mechanisms needed to break seed dormancy seems unduly complicated and difficult to achieve.

Recent field studies in West Cornwall, Conn. have brought to light a case in point. While conducting a study of the seed germination of pioneer species in a small plot within Gold's Pines, an ancient stand of *Pinus strobus*, Peter Del Tredici of the Cabot Foundation of Harvard University was interested to note great numbers of seedlings of the Sweet Fern, *Comptonia peregrina*, among the annuals, biennials and perennials sprouting in the area, which had been clear-cut and scraped by a bulldozer the previous fall to encourage White Pine regeneration. As the plot was completely surrounded by mature pines and hemlocks and there was no *Comptonia* in the vicinity, his curiosity was aroused.

Sweet Fern, which is not a fern but a shrub closely related to Bayberry, *Myrica pensylvanica*, and by some botanists put in the same genus, grows about three feet tall and spreads by

deep underground suckers to form colonies in dry sandy soil. It is a not uncommon plant from Nova Scotia to Saskatchewan and south to Minnesota, the coast of North Carolina and the uplands of Georgia and has long been considered a pioneer species in sandy wastelands. The alternate, rather leathery leaves are long, slender, and deeply lobed. It is this leaf shape and their delicious spicy fragrance that gives *Comptonia* its colloquial name.

The seed of Sweet Fern is a hard nutlet contained in a bur-like fruit formed by the eight bristly bracts that enclose it. When ripe, in July, these seeds fall to the ground under the parent plants at the slightest disturbance. As they are too heavy to be distributed by either wind or rain and are not particularly palatable to birds, insects, or beasts, they are likely to remain where they fall and, in time, to be covered by the litter of leaves and blowing dust and sand that collect around the parent plants. Yet a search for seedlings around a colony of mature plants is fruitless. Nor, as Mr. Del Tredici discovered, can the seed be germinated by means of any standard seed treatments under artificial conditions.

It has long been noted that the most likely place to find *Comptonia peregrina* seedlings is in disturbed, sandy soils. Henry Thoreau, that keen observer of all things natural, noted in his journal on October 22, 1860 that Sweet Fern was one of the first plants to come into railway cuts through the woods. Obviously the seeds germinate best on bare mineral soil in full light. Why then would they not sprout when sown under such conditions?

Mr. Del Tredici discovered that a powerful and long lasting chemical inhibitor in the seed coat that surrounds the embryo prevents germination. As further insurance against premature

germination the seed is enclosed in the hardened ovary wall. Not until these were removed would the naked embryo sprout, though Mr. Del Tredici found that soaking the seed in a solution of gibberelic acid neutralized the inhibiting chemical thus permitting the seed to germinate.

As gibberelic acid is not a usual component of soils, Mr. Del Tredici reached the conclusion that other soil chemicals could, over a sufficient period of time, also break down the inhibitor so that the seed could germinate as soon as it was brought to the surface, which in this case had taken place when the clear-cut area had been bulldozed.

How long a burial is needed to break the dormancy of Sweet Fern seed, Mr. Del Tredici does not say in his monograph, but in the case of the seed in Gold's Pines, West Cornwall, it was a very long time indeed; the trees that had shaded out the original colony of *Comptonia peregrina* ranged in age from 96 to 124 years when they were felled.

So, seed sowers, don't throw out that seed pan of ungerminated seed. Leave it in your will to your grandchildren and, perhaps, they will reap what you have sown.

Update on Deer Repellents

Unfortunately Jim Cross's report on the success of the hot pepper deer repellent did not arrive on the editor's desk in time to catch the Fall issue of the Bulletin, but we print it none the less.

The experience so far (with the deer repellent) has been quite mixed, ranging from excellent results to no results. It has now been found that the latter can generally be attributed to poor or no distribution of the oil of the hot

peppers, which is what does the job. The current recommendation is to mix the Vaporguard or Wiltproof with the water before adding the Tabasco or "hot sauce"; otherwise you do not get emulsification of the oil, it just settles out by itself. Also some of the other latex type formulations will not emulsify the oil.

In addition it is now recommended after more experience to increase the amount of Tabasco, Louisiana Hot Sauce or Frank's Hot Sauce in the mix, particularly for rabbits: In 100 gallons of water use 2 quarts of Vaporguard (3 quarts in winter) and 60 to 90 ounces of the hot sauce. This year I am going to try 75 ounces of hot sauce per 100 gallons and will see how it goes. In eastern Maryland lesser quantities have been effective but in western Maryland they had a lot of damage in nurseries late in the winter. I hope to put down a second spray during a mild period in mid-winter since I never felt that the sticker would hold the hot sauce on for that long.

Those needing lesser amounts of the mixture might try 2 tablespoons of hot sauce to 1 gallon of water mixed with 2 or 3 tablespoons of sticker.

An Alaskan Garden

A note on an Alaskan garden by Dr. Ernest H. Yelton of Rutherford, N.C. might be of interest to those who grow or wish to try to grow plants from this, our most recent state.

While taking a stroll through the Aleut village on St. Paul Island we saw one home that was conspicuous in that the front was graded off and beautifully planted with local flowers, especially lupines in several shades of blue, white and light pink. The lady,

who owned the garden, invited my wife and me to come to see her other plants. Immediately I spotted some nine-inch clumps of heavily blooming eritrichiums in a mixed border along her front walk, by far the best I have seen anywhere. Also in the border were excellent *Androsace chamaejasme*, *Primula cuneifolia*, *Papaver alaskanum*, *Polemonium boreale*, *Silene acaulis*, various drabas, and three species of dwarf willows with catkins, one of which was a beautiful form of *Salix reticulata*. She answered the questions about the eritrichium by telling me that she had no name for "the little blue ones." She also told me she had something that looked like a "black tulip" not in bloom; the foliage suggested *Fritillaria camschatcensis*.

This border had been planted four years and was constructed on backfill behind lava stone walls. She digs up at least a one foot diameter bolus of soil with each plant, especially "the little blue ones", and looks for the most luxuriant growth on plants nearest the "haul yard", beaches used for slaughtering seals, and digs up extra planting soil there. This soil is composed of aged scoria from ancient lava flows and is permeated with the blood and meat of two centuries of seals. She screens out the larger chunks of lava down to peazized and smaller gravel. No fertilizer or other humus is added and drainage is excellent.

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After reflecting on these requirements

for culture, I have vowed not ever to attempt to raise eritrachiums again in North Carolina!



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