

Bulletin of the
American Rock Garden Society



Volume 49 Number 2

Spring 1991

Cover: *Primula auricula* in Spingarn Wall _____

From a photo by Ellie Spingarn,

Watercolor by Vickie Danielsen of Englewood, Colorado

Bulletin of the American Rock Garden Society

Volume 49 Number 2

Spring 1991

Features

Primulas for the Southeast, <i>by Nancy Goodwin</i>	83
Primula Propagation, <i>by Charles Oliver</i>	91
Long Island Primulas: Trials & Tribulations, <i>by Joann and Fred Knapp</i>	101
Primulas for Mountain Gardeners, <i>by Martin Jones</i>	107
A New View of an Old Garden, <i>by Robert Bartolomei</i>	111
Wild Primulas of Western America, <i>by Jay Lunn</i>	125
Ellie Spingarn's Walls, <i>An Interview by Gwen Kelaidis</i>	133

Departments

Plant Portrait: <i>Primula minkwitziae</i> , <i>Primul minima</i>	145
Labels	146
Obituaries	148



Primula veris

Primulas for the Southeast

by Nancy Goodwin

Primulas have an undeserved reputation for being difficult to grow in the Southeast. Part of the problem is the fault of growers who offer the wrong plants in full flower through garden centers and flower shops. These are often Pacific Coast Giants or the tender juliana hybrids that grow better in gentler climates. These plants can take neither our heat nor our cold.

There are lots of wonderful primroses that grow well here. Many of these may be seen in old gardens throughout the East. Most of them are happiest if planted in the fall. Unless plants are set out early enough to become established before the heat of summer sets in, they often perish. In climates such as ours, summer droughts are to be expected and hot, humid weather prevails from June through September. We often have over 50 days with temperatures 90°F or higher. Those primulas that grow well for us are often not very pretty in the summer. Some of them cope with the weather by going dormant. Other species just sit there with tired-looking foliage, sometimes damaged by red spider mites. I know of a garden that was designed so that primulas were

out of sight for the summer, but a feature the remainder of the year.

For the other three seasons, primulas are a wonderful asset to a rock garden or woods garden. They can be found in bloom from fall through late spring even in the Southeast.

Taxonomists have organized primulas into seven subgenera and further into 40 sections and subsections. I will deal with them from a gardener's perspective and discuss each section with members I have succeeded in keeping for two or more years.

By far the easiest section to please is *Primula* (*Vernales*), which contains *P. vulgaris*, *P. veris*, *P. elatior* and their hybrids. The common name for *P. elatior* is oxslip. This is a wild species that varies enormously, is relatively rare, and occurs in moist meadows from Britain east to western Asia. I don't have a moist meadow but am growing them successfully in a deciduous woodland with dogwoods, oaks, and hickories to provide shade. In general, they grow on calcareous soils, and amendments are necessary in extremely acid woodlands. There are many forms, varieties, and even



Hose-in-Hose Primrose

subspecies of this species. Most of the ones I have grown well have pale yellow flowers, several to a stalk. There are hose-in-hose forms of this species to be found in old gardens throughout the East. We are happy to have two of them here. One is a deep red form found in our own garden that had been neglected for about eight years before we took it over. We found it growing in sun, competing favorably with Bermuda grass. Incidentally, it is much happier in shade. Also in Hillsborough we found a pale yellow one with the same form. There is some question of whether these might be forms of *P. x media*, in which case *P. elatior* would be only one of the parents.

Primula veris is the true cowslip found throughout Europe. It is distinguished by pendulous, fragrant, yellow flowers, fairly tightly clustered, often all drooping to one side of the stalk. The

length of the calyx is a variable important enough to characterize several of the subspecies, all of which are easy to grow here. We have an orange one that appeared in a batch of seedlings. It is probably a bastard.

Primula x media (or *P. x tomasinii*) is the result of a happy marriage between *P. veris* and *P. elatior*. It is a sterile hybrid that may be found in large patches in old gardens. Although it is extremely susceptible to red spider mites, it can withstand a severe attack, often losing all of its leaves in summer, but producing more in the fall. It seems to combine the best qualities of both of its parents, having pale yellow flowers with darker centers and a more upright carriage than *P. veris*. Many people call this the cowslip primrose and that is a problem for me in the nursery. I never know whether what I send is what is expected. I don't consider it the "true" cowslip.

The third member of this section is *P. vulgaris*—sometimes called *P. acaulis*. It is one of the earliest primroses to bloom, with pale yellow or pink flowers. This species prefers heavy clay soil, which is what I have. The first one to bloom is the Turkish subspecies *sibthorpii* and it is pale pink in the form that I have (photo, p. 99). These primulas often are caught by late freezes that damage their foliage and flowers, but they recover to produce more before the season has passed. This makes seed collection difficult; therefore, I am propagating this one by division. The wild, pale yellow, fragrant *P. vulgaris* is a joy, with flowers in early spring and relatively attractive foliage throughout the summer (photo, p. 99). Typically *P. vulgaris* has a relatively large solitary flower on each stem.

There are many wonderful forms and hybrids in the Primula section. By far the easiest ones to grow in the Southeast are the Barnhaven strains. Florence Bellis produced strains with exquisite colors and good heat and cold tolerance. Heat in western Oregon, where she lived, and heat in central North Carolina have different meanings, but her plants will grow here. Florence Bellis also worked with the Cowichan strain and produced many colors from a chance seedling found in Cowichan, British Columbia. The remarkable characteristic of these plants is that they lack the golden eye common to most primroses. The effect is of a deep velvet, almost sultry flower. The reds, purples, dark blues, and a black-red known as garnet

are all pretty happy in this climate.

There are some excellent garden plants to be found in the hybrid *P. x polyantha*. These are natural or artificial crosses between *P. veris* and *P. vulgaris*. The color range is fantastic, going from pure white to deep purple, and many of them are fragrant. We can grow many of the double *P. vulgaris* forms produced in the Northwest.

Primula x juliana hybrids may be deceptive. These are crosses between *P. juliae*, a species that thrives in wet, shaded areas in the Caucasus and other species, including *P. elatior* and *P. vulgaris* and hybrid *P. x polyantha*. Certainly most of the world except me succeeds with 'Wanda', a small, deep wine-red one that blooms very early in spring and accommodates most garden-



Primula elatior

ers by spreading by stolons. It will grow in this area. Much of the current hybridizing is being done in Japan by Sakata Seed Company. Unfortunately, only some of the plants are extremely cold hardy, while others definitely aren't. The Julian series is hardy, and the F1 hybrid 'Lovely' series isn't. I have one vigorous hybrid, 'Early Girl', a fine plant that lives up to its name by producing beautiful pure white flowers in very early spring. It seems able to withstand any number of late frosts and freezes.

I am especially attracted to the anomalous forms such as 'Jack-in-the-Green' that date from the 16th century. Some have the *P. x polyantha* habit, with several flowers to a stalk, but most are forms of *P. vulgaris*. They have expanded calyces that look like green collars beneath each flower, and some have bits of the color of the flower mixed with the green.

The next section in order of ease of growth is *Cortusoides*. It seems to me that we should be able to grow all of these, but thus far I haven't succeeded. *Primula cortusoides* itself is a short-lived, attractive little primula that grows easily in the woods but seems to exhaust itself by the production of seeds. I can keep it for about two years. *Primula polyneura* is the same—hardy enough, but not vigorous enough. *Primula kisoana* in both its pink and white forms is wonderful (photo, p. 98). After a struggle to get them established in the woods, I finally have large patches spreading every year. Furry pink stems are a delight in early spring and even in summer the pink-tinged petioles are attractive. Pink resting buds may be found in midwinter and that is always exciting. After nearly losing the white form I put it into the lath house where it is spreading vigorously. It has white, rather than pink, fuzzy stalks. Another Japanese species, *P. sieboldii* (photo, p. 98), may become an addic-

tion with its infinite variety of flower patterns and colors. I haven't seen any I don't like. Some are fringed; some have violet on one side of the petal and white on the other; some are pure white or nearly blue (actually blue-violet). These, too, are stoloniferous and quickly spread to make showy masses. Here, too, we can thank Florence Bellis and Jared Sinclair for producing seeds of wonderful color forms. Both of these Japanese species are best divided in spring, because they cope with summer's heat by going dormant in August, and unlike the species in the *Primula* Section, they don't grow fresh leaves in the fall. They wait until early spring. To reassure myself that they are still there, I gently probe the soil until I find a resting bud.

Section *Denticulata* produces a fine color range of early blooming, drumstick-type primulas. *Primula denticulata* is most abundant in the Western Himalayas from 7,000-12,000'. We are growing it at 450' in an area with sporadic but intense droughts (only .2" in June 1990). What it prefers is a lot of water and then the bloom scape may reach 20", but in my garden it is closer to 8". We have some problems with this species because it is always lured into bloom before it is time, and so we more often than not lose the flowers. I consider it a marginal plant for the Southeast. Hardiness certainly is not the problem.

In Section *Muscarioides*, we have only one species that we can grow and that is *P. vialii*. It brings many different qualities to the genus. For one thing, the color combination is fantastic in every sense of the word. It has brilliant scarlet calyces and medium violet-blue flowers. These are produced from the bottom to the top of a tightly packed, conical spike. It is very late-blooming, often in June in North Carolina. And, alas, it is monocarpic. It seems to

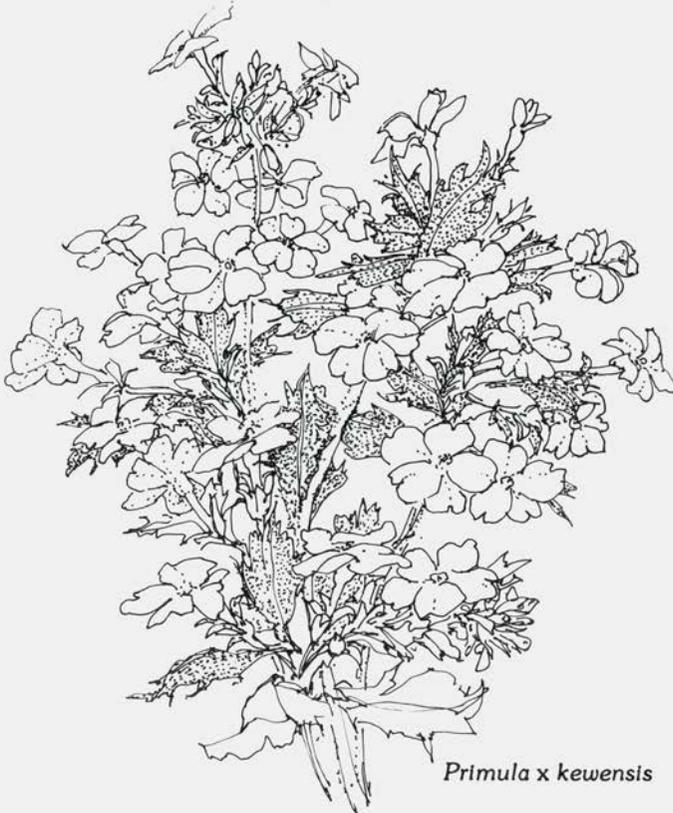


Primula 'Gold Lace'

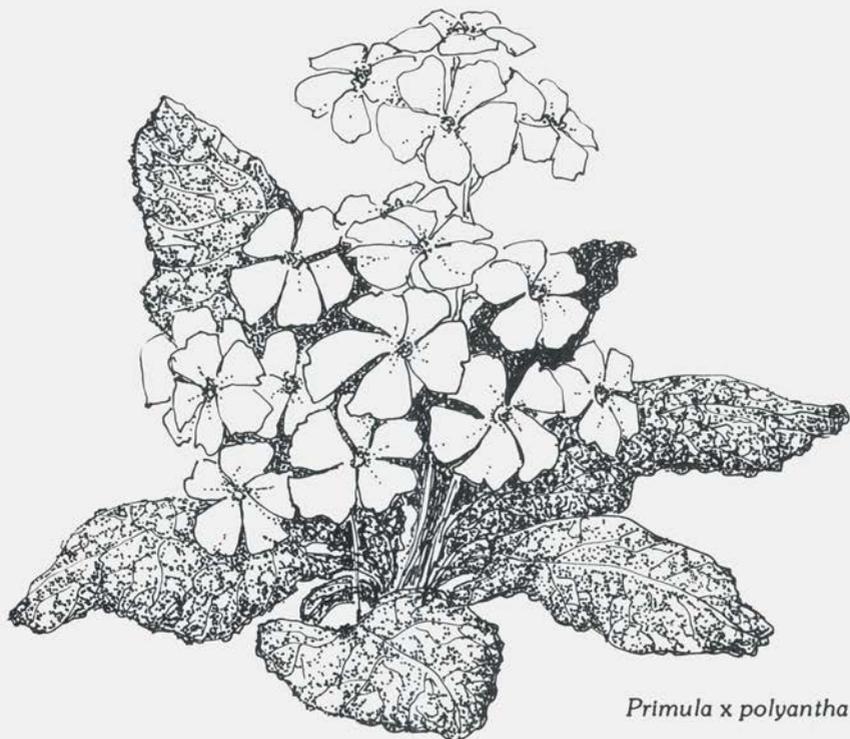
require two years growth to bloom and then dies. We have grown it most successfully in a stony rock garden, but also in the woods in our clay loam.

I have been surprised by how well we can grow many members of the Auricula section. I am speaking more of the wild *P. auricula* (photo, p. 97) than of the hybrids with their fancy mealy centers. These have been popular since the 16th century. They ask only for excellent drainage, and that means lots of stones throughout the soil. I have found them successful in large iron pots filled with a scree mixture. These pots remain outside, uncovered all winter. I love the clear, lemon yellow ones best, but they come in almost all colors and most of them are delightfully fragrant. *Primula marginata* is difficult for me,

but I have succeeded by keeping it in a cold greenhouse with careful attention paid to the watering, especially in summer and midwinter. They need to rest during both of those seasons, as do so many primulas, and we water infrequently then. It is a very good idea to mulch the top of the pots, especially beneath the leaves, with small stones or chicken grit. The *P. x pubescens* hybrids are the easiest members of this section to grow in my conditions. This is an interesting result of *P. auricula*, which I grow fairly easily, and *P. hirsuta* (photo, p. 97), which is more difficult. Three of the easiest are: *P. pubescens* 'Bewerley White', 'Mrs. J.H. Wilson' (fragrant, purple with white centers), and 'Harlow Carr' (large, creamy-white flowers). Most of



Primula x kewensis



Primula x polyantha

the *P. allionii* forms and hybrids are unhappy with me, but *P. x 'Ethel Barker'* (*P. allionii* x *P. hirsuta*) has consented to stay and grows vigorously, blooming with bright carmine flowers with a white eye.

Most species in the Aleuritica Section don't like living in the South a bit. *Primula farinosa* and *P. frondosa* are the easiest ones, but *P. frondosa* is the only one I have kept going. The trick seems to be to plant it outside in midautumn, early enough to establish roots before a frost, but late enough for the weather to be cool. It is a delightful little plant with its silvery resting bud in winter and delicate lavender flowers in spring. I even had one bloom in late June this year. I grow it best in a large iron pot filled with a mixture of sand, stones and spent potting soil, topped

up with a mulch of gravel.

Section Proliferae has several species that like (or rather tolerate) our climate. They all love moisture, but they don't insist on it. By far the easiest is *P. japonica* in its many wonderful colors. 'Miller's Crimson' and 'Postford White' or their look-alikes (it is always tricky to give cultivar names to plants that are grown from open-pollinated seeds) are the ones I have had for many years. They grow successfully in the woodland garden and rock garden with no extra irrigation, but they grow best in the stock area in pots where they are watered daily. Tiers of flowers are attractive for a long time after many primulas have finished. *Primula beesiana*, with carmine-red flowers, *P. chungensis*, with pale orange or yellow ones, and *P. pulverulenta*, with red-

purple ones, are all possible with us. I got *P. wilsonii* through a winter easily but lost it during a dry spell in summer. I have had moderate success with the yellow-orange *P. bulleyana* but total failure with *P. anisodora*. I couldn't get the latter through the summer. Incidentally, many species in the section will cross easily.

There are a number of tender species worth growing. I have friends in Chapel Hill who have *P. obconica* growing outside and blooming for much of the spring and summer. This is the one that should have been called "malacoides," for it causes a rash on many people. The true *Primula malacoides* I grew in a cold greenhouse for years until I ran out of space. It is a charming little thing but is monocarpic. The Sphondylia section has an attractive, tender species, *P. verticillata*, that blooms almost all winter with clear yellow flowers. Even better is its hybrid offspring, *P. x kewensis* (*P. floribunda* is the other parent). I will always find room for plants of this species in the greenhouse. I prefer the ones with a mealy farina on the leaves. They bloom from Christmas into midsummer with fragrant, clear yellow flowers, larger than those of either parent.

The list of primulas I have loved and lost would be longer still. I mention only *P. capitata* that I nurtured all summer, planted out into the rock garden in fall, saw bloom with its blue-purple flowers in December and die shortly thereafter.

Primulas have more diseases and pests than do their cyclamen cousins and we have more problems dealing with them, partly because of our reluctance to use restricted-use pesticides. Slugs, mealy bugs, and red spider mites love them. Our cure is to keep them as cool and moist as possible. We had excellent results last winter by setting them into a cold frame pit in the sun, facing east. Even this summer we have

left them there, covered with a shade of slender bamboo. They are watered daily. The potting mix we are using now is simply bark and sand with trace elements and a pinch of Osmocote. We found that they hated a peaty mix, such as Pro-mix or Metro-Mix 360. It is essential that most of them be divided in fall rather than spring in the Southeast. I have already mentioned that *P. kisoana* and *P. sieboldii* are the exceptions and should be divided in spring. Most primulas are somewhat dormant in summer and under stress because of our heat and humidity. I don't know of any primulas native to lands with climates similar to ours. It is one of the most delightful chores of fall to divide them. We enrich the soil with compost made from leaves, weeds, and kitchen waste, and we divide them down to single crowns. This is only done every three years or so, and they require two years to look really full again. We don't add lime to the soil even for those that occur naturally in limestone areas, such as *P. auricula*. Our woodland soil pH is about 5.75.

I feel like I am just beginning to understand primulas. After all there are almost 500 species and subspecies!

Drawings by Martha Blake-Adams.

Nancy Goodwin is proprietor of Montrose Nursery. She gardens near Hillsborough, North Carolina. Nancy specializes in cyclamens as well as primulas.

Primula Propagation

by Charles Oliver

Primulas are among the most pleasing of garden plants, yet few varieties have the visual clout of the more showy border perennials when grown as individual plants. They are best grown in large clumps and groups. In nature a single species often occurs in large colonies within a restricted area of suitable habitat. To duplicate these large numbers of individuals in the garden, most gardeners have to do some propagation. Many techniques can be used, depending on which species and varieties are being grown.

SEED

For a number of reasons we prefer to grow primulas from seed whenever possible. First, this is usually the fastest, most efficient propagation method when more than a few plants are needed. Seed is usually available —primulas usually set seed so abundantly that the gardener can use only a small part of it. Second, this method ensures maximum genetic diversity among the plants. This has several advantages. There is more chance of obtaining individuals that will do especially well in your garden. There

is a greater chance of getting something especially interesting, such as new recombinants or hybrids. And the seed produced in your garden from more than just a couple of individuals will have greater adaptability in the next generation. If you contribute seed to the exchanges, you will be doing your fellow gardeners a service by sending this genetically variable seed.

When we get stock of new primula species it is almost always as seed from the exchanges. In general, the only problems we have encountered have been misidentification and low viability. One of the mysteries of the seedlists is how *P. veris* can be submitted under so many names. We have grown this in place of not only *P. elatior* (an understandable mistake), but also *P. forrestii*, *P. caudoriana*, and many of the candelabras (Section *Proliferae*), none of which resemble it in the least. It has also proved nearly impossible to obtain seed of *P. aurantiaca*, *P. chunensis*, or *P. prolifera*, since everything submitted under these names turns out to be forms of *P. x bullesiana*. Primula donors should try to make sure of the identity of their plants before sending

seed by checking such references as Green (1976) or Smith, Burrow, and Lowe (1984).

I think that given proper germination technique, poor seed germination and seedling growth is most often due to inbred seed. Like many other plants, primulas set little seed when individuals are self-pollinated. Primulas are special in that the flowers of most species are heterostylous. That is, the sex organs may be arranged in either of two ways: with the pollen-bearing anthers at the upper end of the flower tube and the pollen-receiving stigma at the bottom, or with the style extended to put the

stigma at the top and the stamen length reduced to put the anthers at the bottom. Flowers with the former arrangement are called thrums, probably because the stamens have a fringed appearance as does the edge of cloth cut free from the loom; those of the latter type are called pins, probably because the flattened stigma and slim style resemble a straight pin viewed from above. These morphological forms, one of the classic textbook cases of genetic polymorphism, are in effect mating types, since seed resulting from crosses within each form (thrum to thrum or pin to pin) has much lower viability than that from crosses between the forms (thrum to pin).

Most Reliable Primulas in Western Pennsylvania

Section Auricula

auricula
carniolica
marginata
x pubescens

Section Primula (Vernales)

elatior
x polyantha
Julian Hybrids
veris
vulgaris

Section Cortusoides

kisoana
polyneura
saxatilis
sieboldii

Section Oreophlomis

x 'Johanna'
rosea

Section Aleuritia

frondosa
hallii
mistassinica
modesta

Section Proliferae (Candelabras)

beesiana
x bullesiana
bulleyana
japonica
poissonii
pulverulenta

Section Muscarioides

vialii

Section Denticulata

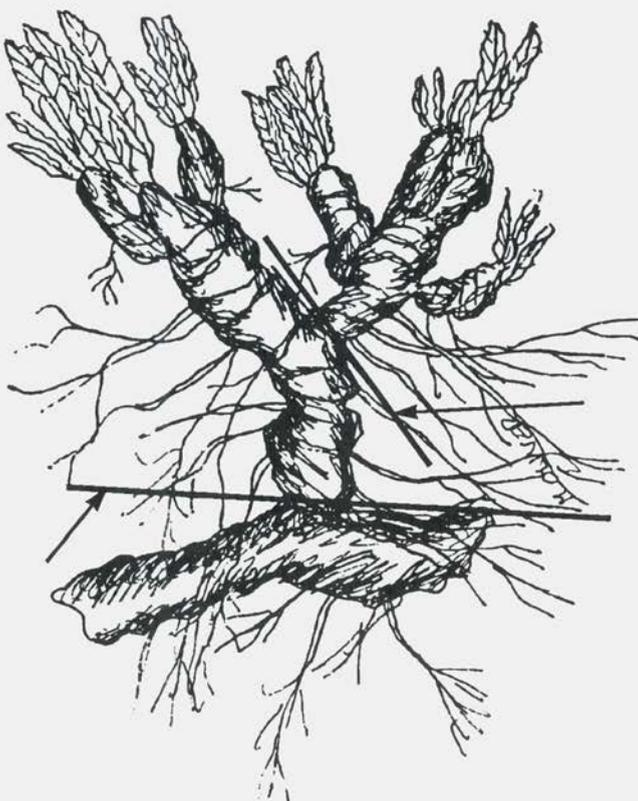
denticulata

Section Sikkimensis

florindae

When grown in the garden in groups containing both thrums and pins, most primulas will set abundant seed by insect pollination. A notable exception is *P. sieboldii* (photo, p. 98). In this case, the mouth of the flower tube is greatly narrowed above the stigma or anthers and is relatively long overall. This sort of flower structure appears to be an adaptation to a pollinator with a very long, narrow tongue, such as a moth or butterfly. Some primulas, most notably the candelabras in our gardens, are attractive to Lepidoptera. I think that wild *P. sieboldii* is probably specialized for pollination by Asian Lepidoptera but does not encounter suitable American species. To get good seed set we move pollen around between our stock plants by poking a fine paintbrush down into the flowers, moving back and forth between different clumps.

Hand-pollination is the best method to ensure that progeny of selected forms or freely hybridizing species are as true to type as possible, to breed for desirable characteristics, or to make hybrid crosses. Because it is much easier to transfer pollen from thrums to pins, we use pins as the seed plants, potting up a group of selected individuals to be kept in the greenhouse where

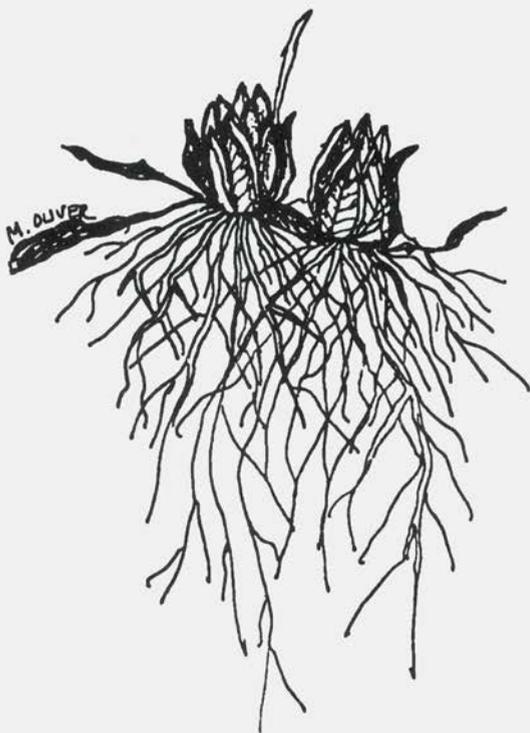


Part of a clump of *P. vulgaris*; dividing cuts to be made at lines.

uncontrolled pollination can be prevented. It would also be possible to put fine-mesh screen cages or netting over plants left in the ground, so long as access by small flies and bees is prevented.

We usually take our potted pin mother plants out to the stock beds for hand-pollination from the thrums. Alternatively, we can gather some thrum flowers outside and bring them in to the pins. The actual pollination is very simple, requiring only the transfer of a dab of pollen on a fine paintbrush from the anthers of the thrums to the stigmas of the pin flowers.

There are some species such as *P. rosea* and its relatives whose seed must be sown as soon as ripe, but in general



Winter crowns of *P. modesta* ready to be separated.

we collect our primula seed through the summer and in the fall divide it into two groups: that which will germinate without cold treatment and that which requires cold to break dormancy. Of the groups that we grow, the Auricula section, candelabras, most Cortusoides, and a few Bird's-Eyes (Aleuritia) like *P. scotica*, belong to the latter group. Some of the montane Vernales seed we have tried has been reluctant to germinate, and this may be helped by cold exposure. We sow seed to be chilled in the late fall in small flats on the surface of a sandy peat mix with a little pelleted fertilizer and cover the seed with a single layer of granite chick grit. We then seal the moist seed flats into plastic bags and stack them in our barn, which is open to outside temperatures. Germination often occurs in the first

warm spell of late winter, so we bring the seed flats into our very cool greenhouse by late February. As soon as we arrange these flats under the benches to await germination, we sow the rest of our primula seed. I think it is very important to germinate primula seed under cool conditions (below 60°F), and perhaps best to sow the seed under cold conditions and let it germinate as spring comes and a suitable temperature is reached. Seed sown after the weather turns warm in late spring or in summer often germinates, but seedling growth stops before the cotyledons are free of the seed coat and before the plant is rooted down. This problem has been especially marked in some of the Sikkimensis

section and in other cool-requiring plants such as *Cortusa matthioli* and *Meconopsis*. It is also desirable to transplant the seedlings as early as possible in the spring so that they can be planted outside and achieve maximum growth before winter.

DIVISION

For selected individuals and clones or for plants that set little or no viable seed, divisions or cuttings will eventually produce as many plants as anyone could want, all of them identical. Dividing most primulas is very easy. The species we grow at The Primrose Path divide well in early spring before growth starts. The Vernales (now called Section Primula) and Auricula sections and *P. sieboldii* also divide any time after

bloom, although we like to replant divisions by early September so that they have time to root down well before winter. The British recommend dividing candelabras after flowering, but I have found that the summer heat in western Pennsylvania makes this risky.

Vernales primulas such as *P. x polyantha*, *P. veris*, and *P. vulgaris* grow as groups of crowns separated by short, thick stems (photos, pp. 99, 100). In clumps three or more years old the larger crowns will have grown their own roots and the stems connecting the crowns will have begun to weaken. We divide these clumps by digging them, shaking off most of the soil, then pulling the well-rooted larger groups of crowns gently apart, cutting individual stems where necessary with a knife. Since the crowns bear relatively few, thick roots, slicing up clumps with a shovel or large knife as you might a Siberian iris will result in too much root and crown damage to be a good method. If the divisions are to be planted directly into the ground; they should not be broken down further than well-rooted groups of crowns. Smaller pieces with just a few roots can be potted up and kept moist and shaded for a couple of weeks before planting out. The Auricula group and some Cortusoides, like *P. sieboldii*, have a similar growth pattern and can be treated in the same way.

Other commonly grown primulas have quite different growth patterns. Some of the Cortusoides species such as *P. polyneura* and *P. saxatilis* form such tight clumps that division is difficult and damaging to the plant. Luckily, these set abundant seed and are easy to propagate this way. Candelabras, *P. denticulata*, Bird's-Eyes, and *P. rosea* and its relatives (*Oreophlomis*) begin as a single crown and form offsets after blooming. By fall these have become separated from the central crown,

which may have died after ripening seed. When the clump is dug in early spring and most of the soil is carefully removed from the roots, the separate crowns should come apart easily with none of the root or crown damage that often leads to rotting in the soft-tissued larger species. The divisions can be planted directly back into the bed. We have had serious division problems with the 'Postford White' form of *P. japonica*. In this form the old mother crown dies but the new crowns remain firmly attached to one another. Cutting the crowns apart has resulted in so much mortality that we now propagate this form only by seed.

Candelabras and *P. florindae* occasionally form plantlets at the top of the bloom-stalk. When the stalk falls to the ground in late summer, these come into contact with the soil and root down. This process can be helped by pinning the bloom-stalk down or by removing the plantlets, potting them up, and treating them as poorly rooted divisions.

CUTTINGS

We regularly propagate only the Auricula primulas from top cuttings. The easiest method is to clear the mulch and soil from around the base of an established clump and nip away small offsets that have formed some independent stem. These can be rooted by the usual methods for stem cuttings. We prefer to pot cuttings individually in 3.5" pots in a sand and peat mix and to cover each cutting with a 10 oz. clear plastic cup. Kept moist under artificial lighting at about 75°F, the cuttings root in six to eight weeks.

Root cuttings have given mixed results. Potted lengths of candelabra root, cut into 1"-2" lengths, as recommended for *Phlox paniculata* and *Papaver orientale*, have never grown for us, but whole roots of candelabras,

bird's-eyes, *P. denticulata*, and *P. florindae* with some crown attached usually do grow when left in the ground. *Primula kisoana* (photo, p. 98) grows new plants very well from 1"-2" lengths of the long, horizontal roots it puts out, but this wonderful plant multiplies so well on its own that it is hardly necessary to make root cuttings.

BREEDING

As I plan our propagation program each year I am always struck by how little breeding work has been done on perennials. Except for the ubiquitous eight or ten restricted groups like bearded iris, daylilies, and *P. x polyantha*, where the breeders have "gone crazy," most of the garden selections and hybrids have arisen by chance, been

noticed by alert gardeners and been preserved by careful propagation. Probably the world does not really need many new mass-produced bedding plants, but as the supply of unexplored exotic habitats dwindles, we will have to turn inward and rework the perennials we already have for the excitement of growing new plants. Some purists may be put off by this, but what is "natural" about growing Eurasian plants in Connecticut or about gardening at all? The genus *Primula* offers a wonderful mix of plant types. Not only is there great potential for section and hybridization in groups like the candelabras and *Cortusoides*, but there are also large numbers of very difficult species which may eventually yield selected strains much more amenable to cultivation.

References

Fenderson, G. K. 1986. *A Synoptic Guide to the Genus Primula*. Allen Press:Lawrence, Kansas.

Green, R. 1976. *Asiatic Primulas*. The Alpine Garden Society:St. Johns, Woking, England.

Smith, G. F., B. Burrow, and D. B. Lowe. 1984. *Primulas of Europe and America*. The Alpine Garden Society:St. Johns, Woking, England.

Drawings by Martha Oliver.

Charles Oliver lives and gardens on an old farm in southwestern Pennsylvania. He and his wife Martha run The Primrose Path, a mail-order nursery specializing in primulas, phloxes, and other woodland and rock garden plants.



Primula auricula var. *albocincta* (p. 88, 107)

Phil Pearson

Primula hirsuta (p. 88)

Phil Pearson





Primula sieboldii (pp. 86, 92, 105)

Dick Redfield

Primula kisoana (pp. 86, 98, 105)

Charles Oliver





Primula japonica (p. 105)

Dick Redfield

Primula sibthorpii (p. 85)

Primula vulgaris
(p. 85, 95, 102)

Nancy Goodwin





Primulas at Hindlas' Garden (p. 102)

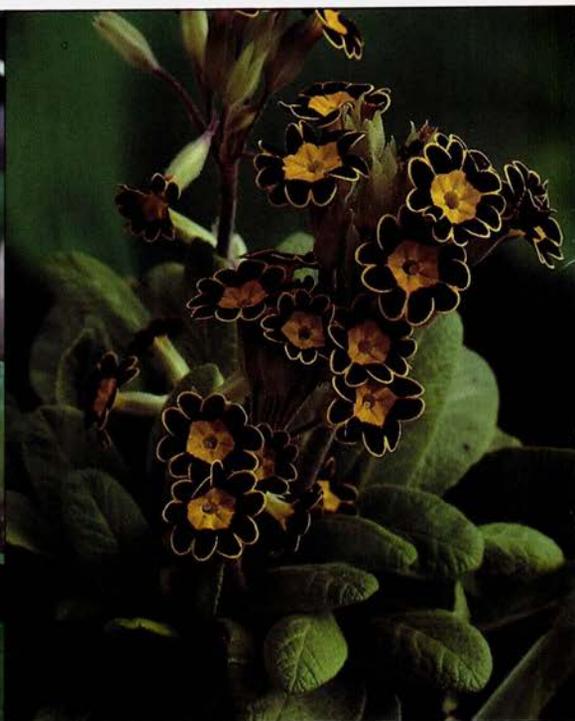
Joann Knapp

Primula vulgaris
(pp. 85, 95, 102)

Nancy Goodwin

Primula 'Gold Lace'
(p. 105)

Martin Jones



Long Island Primulas: Trials & Tribulations

by Joann and Fred Knapp

Growing primulas on Long Island is considered a matter of trials and tribulations. "Trials" in the title of a plant article hints of a scientific experiment, but the present article has no scientific pretensions. It's just a rambling exposé of our experiences with the genus in this less than prime environment.

Only a few miles north of the Island, across the Sound, one finds wider use of primroses in gardens, and huge pots of *P. denticulata*, *P. rosea*, or *P. japonica*—or even some other candelabra forms—are common in good nurseries along with the more familiar *P. x polyantha* types. Such pots are not to be seen here, and the colorful *P. x polyantha* is only a nurseryman's target of opportunity from December to spring. If some supplier grows a batch of seed to near flowering, the small plants will appear at retail somewhere, perhaps as holiday color, perhaps as a spring perennial. They are not regularly presented at a given time by all the nurseries, nor even as a reliably repeated annual specialty by any particular nursery. The consensus is that primroses will not grow here. And since the

familiar species and hybrids "won't," there is no interest in other more challenging species. The consensus, of course, is quite wrong.

The polyantha and acaulis (*vulgaris*) primroses have been coaxed and tarted up into large-faced, brilliantly colored vulgarians whose ancestors would truly not know them nor wish to admit their blood ties. One of the lessons repeated endlessly in plant cultivation is that this kind of hybridization is an unbalanced selection process, and for most of the clones so produced there is an exchange of the plant's natural hardiness (adaptability?) for its gain in size, color, or uniqueness of form. So it is with primroses. A Silver Dollar primrose may be bigger and brighter than its forebears, but like the dollar in our pockets, it is less competitive. This genetic loss of vigor contributes to the difficulty of growing the plants here. Then there is the unfortunate combination of early spring with brilliantly colored bloom, tempting people to plant these selections in sunny border beds, in conditions meant for similarly bright marigolds and snapdragons. By the time the annuals start to make a

display in midsummer, the primroses are a lost cause. Our hot sun, muggy July weather, and sandy, low-humus soils are not about to foster primulas in beds marginally prepared for annuals. So the primulas themselves degenerate into "annuals." Finally, the bad reputation that primroses carry owes a lot to four decades of rapid residential growth on Long Island. The new gardener with a new home runs to the local nursery and buys the brightest colors to be seen. But new properties have lawns, few trees, sunny flower beds with builders' mix instead of good topsoil. The commonly sold primroses are more suited to established properties with partially shady areas and more organic (or compost-enriched) soils.

The solutions, if one wants to grow primroses, are for the most part as recognizable as the problem. We first became aware of one avenue to successful primrose gardening a dozen years ago through the garden of Marilyn Held, one of our all-time best friends in the ARGS and then a near neighbor: FIND WILLING PLANTS. Marilyn had a lovely light yellow *P. x polyantha* form, in her garden, in quantity. She found the original plant in an old garden in Maryland years earlier, a relict plant in an area no longer tended. It greatly resembles *P. elatior*; Kris Fenderson some years ago guessed it to be *P. x variabilis*, which is a mating of *P. veris* and *P. vulgaris*. It grows happily anywhere, for anybody—well, within reason. Look for this kind of plant amongst your gardening friends and in catalogs. Often you will see "found in an old garden in the area," or some other hint that it is a locally widespread clone, in a nursery description. Get those plants first. Then go back and try growing the original species or the early generations of species crosses. In the first crosses, hybridization often enhances rather than saps adaptability.

Once you have a few reliable forms for the backbone of your collection, it is time to experiment with less dependable, more tampered-with forms, looking for the one in many that has retained adaptability or hardiness along the path of its development of fashionable size and color.

Of course, it takes a few growing seasons to perfect this selection process, and during that time you can travel a long way down the second road to success with primroses: create a highly organic soil based on the formula H³: humus, humus, and more humus. Our friend Marilyn operated as many as four compost piles, their product liberally applied to her primroses. Her soil was so full of organic matter and so loose that she could dig and transplant with her bare hands.

Then in May of 1983, the eastern regional meeting of the American Primrose Society was hosted by Lou Hindla in Bohemia, Long Island, a sandy outwash plain area. Lou's stand of *P. x polyantha* and *P. vulgaris* hybrids and species forms, including many doubles, was quite beyond anything in our experience (photo, p. 100). Some of those present vouched for it as more than equalling what they had seen in England. When asked what he had done so special to produce all this color and vigor, Lou gave a gardener's answer. He said that he hadn't done anything special. He'd double dug, of course. A friend of his had some cows, so Lou had incorporated a lot of well-decomposed cow manure. He grew rhododendrons and azaleas and they seemed to enjoy super-phosphate, so he'd put in some super-phosphate, and added some peat moss, and some 5-10-5 fertilizer. The bed was watered regularly during the summer when he watered the rhododendrons. Oh, and he had big pines on his property, so he mulched heavily with pine needles in

the winter. But he really didn't do anything special at all! In retrospect, I realize how right he was; far from special, it was merely reasonable—a good deal less special than the preparations for a rock garden scree or moraine, which so many of us now consider as ordinary. But it was far more than we had ever done for our squinny primroses.

Inspired by both Marilyn and Lou, we set out shortly thereafter to create a better primrose bed than we had, or than even Lou had—we hoped. The proposed bed was about 6' x 15', a bit less than 100 square feet and in the shade of tall deciduous trees. We had read about super-absorbents in the March 1982 *American Horticulturalist* and, after a minor controversy



between the head primrose gardener (Joann) and the head garden preparations engineer (Fred), we decided this secret ingredient might help us achieve the best of all primrose soils. Here's the head primrose gardener's description of the birth of our first primrose bed, adapted from her report in the Spring 1987 *American Primrose Society Quarterly*:

"Early one fine morning Fred announced to me that he had purchased all of the necessary materials and that he was taking that day off from work to dig the new primrose bed. I suppose it should have come as no surprise to me that he didn't mention a super-absorbent in the list of materials. Our relationship frayed somewhat along the edges during the next five or ten minutes as I reminded him of the marvels of super-absorbents and of our joint decision to use them. He firmly pointed out to me that he never remembered any such decision; we didn't know they were marvelous; he didn't have any or know where to get any; and he was dressed and ready to go out and dig NOW! The upshot of the conversation was that if I could find a source, he would go purchase some super-absorbent and add it to his materials. After a rather lengthy phone call, I told Fred that Slater Supply, our local source of all things horticultural, had Planta-Gel available for sale at \$85 for a 15-pound box. I had carried out my end of the bargain, and acknowledging a definite chill in the air, skulked off to work, knowing full well that Fred had no desire to waste half the day driving back and forth to Amityville, 45 minutes away, for Planta-Gel.

It's a good thing for married gardeners that digging is so therapeutic. By the time I got home from work, Fred was eager to show me the freshly planted primroses and to tell me about the

goodness of their beautiful fluffy bed. It was double-dug, of course, and contained a bale of peat moss, several bags of dried cow manure, maybe a wheelbarrow or two of chopped leaf compost, super-phosphate, 5-10-5, AND Planta-Gel applied at the recommended rate. The Planta-Gel looked a little bit like medium-grade perlite. We carefully watered in the new little plantlets as it began to get dark, and we could just see little specks of the super-absorbent in the soil.

Would that that were the end of the tale...

About three nights later it rained hard, but for the most part the weather had cleared by morning. As I walked out towards the primrose bed, I noticed in the path gobbets of stuff that looked like a cross between frogs' eggs and tapioca pudding. "Probably rain worm excrement," I muttered as I neared the primrose bed. In horror I realized my mistake, for the whole primrose bed was covered with about an inch of this jelly-like goo and I recognized it for what it was—super-absorbent that had super-absorbed. The primroses were dotted here and there in the bed like tiny green islands. The whole area jiggled when struck by the last few drops of falling rain. As I stood there trying not to giggle, I knew I was confronting the end of a 30-year marriage. When I scratched his grand piano, Fred forgave me; when our daughter wasn't born with beagle ears (the beagle slept between us), Fred forgave me; when I chased his son with a butcher knife, Fred forgave me; when I broke his favorite trowel, Fred forgave me; but this—never!

That evening we carefully dug most of the super-absorbent back into the soil, vowing to cut down on the recommended rate in later applications. Let it be

said for the record that although the primroses looked ridiculous, they acted as happy as clams. They have continued to perform splendidly since that day—no doubt why I was forgiven once more.”

Here is the one factor not initially obvious in our solution to the problems of growing primulas on Long Island. Super-absorbents were much praised when they first appeared on the market but have more recently been getting a very poor press. The usual conclusion of formal research articles is not so much that super-absorbents are harmful, but that they are useless. We have since dug three more beds, using less super-absorbent than in the first, but with the same success. Wildflowers and ferns, as well as primroses, are all growing much better in these beds. We've also used super-absorbent in the bottom of rhododendron planting holes to help the roots get through the shock of transplanting more easily. Unscientifically speaking, we are certain that super-absorbents help a great deal. Various gardening friends, including one prestigious nurseryman well aware of the inimical literature, confirm that for Long Island primroses super-absorbents work. All of us will give full honor to the H³ approach to soil preparation as well. The two techniques seem to couple together synergistically, to the great benefit of the plants.

If your primroses dwindle in size and number from June through August, fail to perk up noticeably in the cool of fall, and are on the casualty list the following spring, we will appoint you to the status of honorary Long Island primrose grower. For the good name of Long Island gardens, and of your own, please try our H³ plus super-absorbents method on selected hardy forms. Then move gradually to fancier hybrids. Start with smaller forms, some of the old-time juliana hybrids, if you can turn

them up. The newer groups of smaller plants are also usually based on at least some infusion of revitalizing *P. juliae* parentage and are usually hardier than monster plants. Go for 'Gold Lace' (photo, p. 100), 'Cowichan', and 'Garryarde' next, always keeping an interest in *P. juliae*, *P. veris*, *P. vulgaris*, and *P. elatior* forms as you go. Before you know it you will be into doubles—and probably giving away primroses like unto cucumbers and tomatoes.

What other primroses should one grow? For infallible success (!), add *P. kisoana*, which seems to enjoy the same conditions; most clones will spread stoloniferously (photo, p. 98). Try *P. denticulata*, and if it works for you, as it should, please call and boast to us, so we can figure out why it is still not happy here. Easiest of all are *P. japonica* (photo, p. 99), self-sowing in a wet spot streamside or poolside or any spot just a bit reluctant to drain, and *P. sieboldii* for any reasonable woodland site. *Primula sieboldii* (photo, p. 98), deemed worthy of its own society in its native Japan, is a good candidate for the most overlooked plant of the genus. Never has so much been made of a restricted color range, and never was a primrose so ready to flaunt its pretty faces regardless of hot or cold, wet or dry, rough or easy weather. If the world maltreats it, *P. sieboldii* will go dormant sooner, perhaps deeper, but will awake to the cues of spring with all forgiven.

That completes our case for Long Island primulas outdoors. Troughs and alpine houses are a bit more esoteric, but we want to mention our experiences there.

In 1986 we collected *P. mistassinica* along the St. John's River in upper Maine from a shaley river's edge shelf surely swept ferociously by every spring's meltwater flood levels. In a

large trough (of Ellie Spingarn's manufacture), this plant had thrived until this season, when the self-sown population shrank radically. Self-sowing was prolific the first two years. There are usually three bloom periods—early spring, early summer, and early fall. Next year, if the plants are still with us, is time to renew the moss-choked, compacted, and too well-leached mix in the trough. The same everblooming tendency shows up in *P. frondosa*, a kissing cousin of *P. mistassinica*. Grown in a bark-based mix in a whiskey half-barrel on my apartment patio in Los Angeles, its bird's eyes never seemed to close. Experimentation with trough culture will undoubtedly succeed with *P. mistassinica*, *P. frondosa*, and *P. farinosa* (if you are really sure which you received), and perhaps with other farinose types. *Primula marginata* persists here, if sadly, in open ground and could probably be coaxed into performing in a trough—but it is nicer in the alpine house, blooming before the outdoor season and conserving its attractive mealy overcoat. *Primula rosea*, to our considerable surprise, shows signs (two years now) of happiness in a sandy site—we should have known this, for Norm Deno, who has sandy soil, insists that it is an easy plant. Trough culture would be effective, and simple raised beds may be enough to satisfy this primrose.

The alpine house is now carrying about 12' of bench in show auriculas and near relatives; there is no intent to go outdoors with any of them, of course. The very first successful plant in our alpine house—persisting, flowering, and dividing happily—after we spent two or three years killing every conceivable green thing except mold on the sides of the pots, was *P. allionii*. It is by no means the cranky, difficult plant it is supposed to be, or that its so characteristic alpine charm implies. If you want

to try a classy plant, one that all ranks of growers can appreciate, *P. allionii* is the one to begin with. It is easy here, with the "wrong" mix, in a plastic pot, unplunged and too frequently watered as well. (We haven't found any reason to use super-absorbent in pots.)

We hope the reader has read between the lines and seen how what began as trials and tribulations has changed to fun. And we hope you may thus be inspired to try primroses, or try them again, or try more of them!

Drawing by Don Leake

Joann and Fred Knapp are former chairpersons of the Long Island Chapter of the ARGS. They have been gardening together for 35 years. Their current garden is two acres of woodland with many plantings of wildflowers and rhododendrons, as well as primulas.

Primulas for Mountain Gardeners

by Martin Jones

If you live in the mountains or anywhere in the western United States above 5000', you should be able to grow a variety of primulas. If you don't try them, you're missing out on some great plants. To me, nothing heralds spring more than the blooming of the primroses. In April, May, and June—even in July and August—primulas bring to the garden an array of color, fragrance, and growth habit equalled by no other genus. Tall and short, compact and open, large-flowered and small, red, pink, magenta, rose, yellow, white, blue, purple, even green or black—there is a primula for everyone's taste.

Most primulas thrive on the cool nights and even moisture of the mountains. Our climate gives us a distinct advantage over lowland gardeners. It is difficult to create our cool nighttime temperatures, high ultraviolet light, low humidity, and reasonably consistent snow cover at lower elevations.

The cool nights encourage compact and healthy growth of foliage for primulas as well as many other perennials. High ultraviolet light brings out flower color, while the low humidity reduces

fungus infections and slug problems.

Snow cover is probably the most significant advantage to gardening in the mountains. In October 1989, I placed a maximum-minimum thermometer on the ground under a large lodgepole pine in the Vail Alpine Garden in Colorado. When I recovered it the following March, the minimum temperature recorded at ground level was 5°F. Above the snow cover -27° had been recorded. That's a pretty substantial difference. And I'm sure that the low temperature on the ground was recorded after the snow melted. It stays 32° under a couple of feet of snow. It is after the snow melts that colder temperatures can cause substantial, even terminal, shock to some plants. Most of the primulas don't mind our weather but thrive on it. They will even bloom through temperatures as low as 10°F.

While many primulas prefer a peaty soil, many others are happy in a rock crevice. *Primula auricula*, with its large, yellow flowers (photo, p. 97), and *Primula marginata*, with blue to purple flowers and a thick coat of yellow farina on flower backs, stems,



and margins of the leaves, are two examples of the latter type. Crevices or dry-laid rock walls are great places for them to keep their roots cool. Almost any species can be planted in a wall. *Primula allionii* likes life a little on the dry side and responds well to a vertical home.

I always try plants in at least two or three different locations, sometimes six or ten. Especially with the more difficult species, minor changes can make the difference between life and death. I have found that over-caring for plants results in death more often than in success.

I first became enthralled with primulas while reading the *Quarterly Bulletin of the Alpine Garden Society* some years ago. The bright colors and fascinating growth habit intrigued me. Whatever started the fascination, I soon became possessed. I joined the American Primrose Society and got

plants and seed from every source I could. It took years, but I finally have developed a considerable collection. At the nursery we now grow over 40 species, plus many varieties of julianas and auriculas. The auriculas are particularly intriguing to me, especially the show types. Though not suitable for the garden, their beauty, fragrance, colors, and textures are unlike any other perennial I have ever seen.

Primulas have very diverse bloom periods. Here, species like *P. rosea* 'Peter Klein' are very early and bloom in late March or early April at 8200'. Then follow

P. marginata, *P. x pruhoniciana*, *P. farinosa* and a number of the smaller forms. Next are the auriculas and the species of the Sikkimensis section. In August the japonicas and *P. florindae* bloom. A Rocky Mountain gardener can have primulas in bloom for five months of the year.

Like other plants we desire the most, some primulas can be very frustrating. The Petiolaris section is the greatest challenge here. These species seem to prefer humid conditions, difficult to provide anywhere in Colorado without mechanical assistance. I'm still trying. Last summer I planted *P. scapigera*, apparently one of the more forgiving species. I'm hoping that place by the waterfall will be perfect. If this fails, I guess I'll try just a few more times before I give up.

I'm also just beginning with *Primula allionii*. There were wonderful photographs of this charming cushion

plant, covered with large flowers, in the AGS bulletin (Vol. 53(3). Sept. 1985). You may have read there how difficult these plants are to raise, and that they must never be watered from above. This last does not apply in our dry Rocky Mountain climate. I have grown various selections outdoors in pots, leaving them under my overhead sprinklers with no adverse reactions. Where we lose with the *Petiolaris* species, we might win with *P. allionii*. Perhaps that's not too bad an exchange.

There are many species that are beautiful and more adaptable than either the *Petiolaris* or the *Allionii* group. Take *P. sikkimensis*. A basal rosette of foliage reminiscent of romaine lettuce produces a tall, farinose stem with an umbel of large, wonderfully fragrant, nodding yellow flowers. It blooms for a long time and is not very demanding. It will grow in wet situations or in typical garden loam. It may require light shade in hotter areas; however, it does well here in full sun. Another reliable favorite is *P. yargongensis*. This plant is a member of the *Aleuritia* (*Farinosae*) section, subsection *Sibirica*. It is a small, sturdy plant 10-30 cm tall. It produces multiple stems with umbels of pink to purple flowers and blooms for up to two months. This wonderful plant is also tolerant of various light and soil conditions.

Also fairly easy are the *Julianas* or *Pruhonicianas*. They are one of the most widely hybridized groups of the genus. All are relatively small plants (10-20 cm) with tight clusters of foliage and large flowers. The flowers range in color from white to yellow to various shades of red and pink. Some forms are much more vigorous than others. 'Jay Jay' and its cousin 'Jay 1' are great plants for a moist, lightly shaded spot. However, they will also tolerate sunlight in cooler climates. This group, along with many other species of *Primula*, requires division to maintain

vigor. Dividing after three to five years will revitalize the plants as well as produce an abundance of new plants for other spots in the garden or for friends.

Like many other plants in our gardens, primulas are attractive to insect pests. They are relished by aphids, ravaged by slugs, and decimated by root aphids. The most difficult of these to control are the root aphids. Fortunately, I don't have much trouble with them in the ground, but mostly in pots in the greenhouse. I have had the best success controlling them by using a strong systemic insecticide. Some gardeners might be frightened off by these terrorist insect attacks, but the plants are well worth the risk. The effort to control pests is minimal compared to the joy primulas bring.

Obtaining primula species can be difficult. Most commercial growers grow only a few. Their excuses? "The seed is too expensive," "They are too hard to germinate," or "My customers aren't familiar with the plants." Such thinking explains why horticulture has stagnated on a commercial level for so many years. It takes people like rock gardeners asking the growers repeatedly for the plants they want to change the nurserymen's view. Educate the growers on the value to them of offering a more diverse selection of plant material. Let them know that there is an ever more sophisticated clientele ready to buy new plants as soon as they become available. Many wonderful genera are neglected by the horticultural industry, but, in my opinion, *Primula* is one of the most valuable.

Drawing by Panayoti Kelaidis.

Martin Jones is proprietor of Colorado Alpines in Avon, Colorado. He gardens at 8000' as Director of Vail Alpine Gardens.



A New View of an Old Garden

by Robert Bartolomei

Early in the 1930s T.H. Everett came to the New York Botanical Garden because he was promised that he could build a rock garden. The garden as it exists today took almost three years to build. The technology for construction was horses and manpower. What was created was an alpine fantasy. As you enter the garden you come to a pond. By the visual trick of a very slight increase in grade, the visitor seems to travel upward as he strolls through a montane woodland and emerges into an open alpine glade. To the right is a 30'-high natural outcrop. Water cascades over supporting ledges. Across a lawn, a large moraine opens up and spreads down to a rocky stream below. We move along, passing a 40-year-old whitebark birch (a hybrid of *Betula papyrifera*) through a stretch of alpine meadow. As the path twists around we reach a knoll dominated with windswept mugo pines. Below this is a series of vertical crevices, built by Everett. An enormous scree spills out to the edges of the path. A large heath winds into the distance. As we reenter the glade we start to move downwards again. Craggy outcrops overshadow a

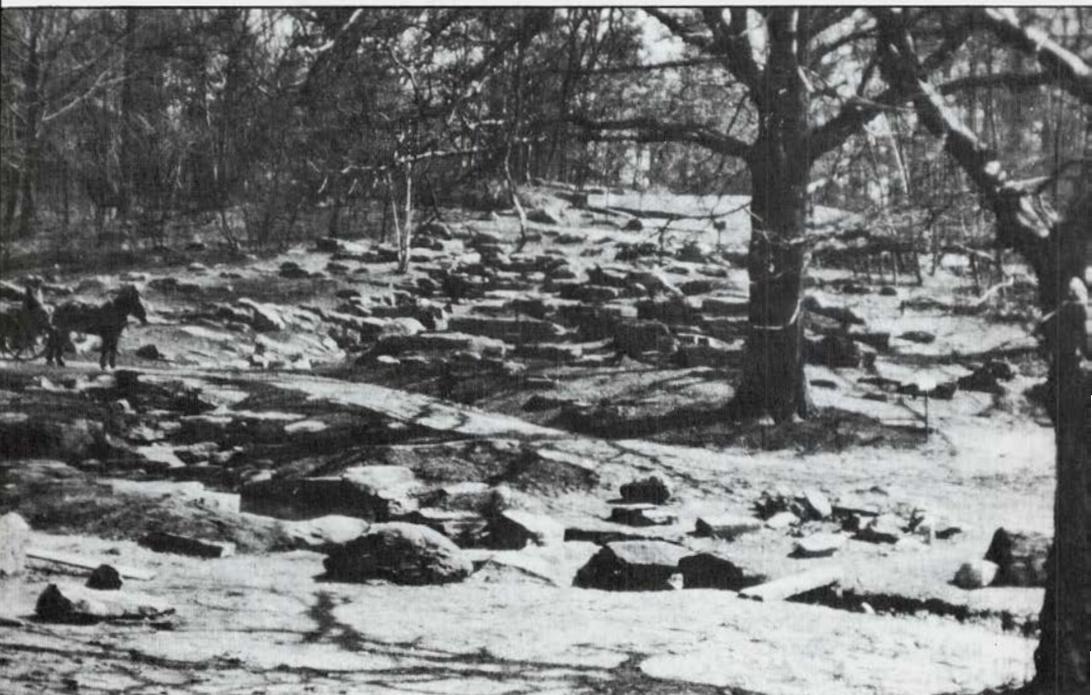
dry sandy bed where the stream originates. To the right a bank spills down with campanulas, candytuft, *Arabis*, spring bulbs, and more. Walk across the gravel of the moraine. Reenter the wood, and back to the pond.

Nearly 60 years after the garden's creation the sharpness of the fantasy had begun to fray. The garden was being swallowed up by overgrown plants. Everett, the wizard of the fantasy, is gone. The streams dry up as cracks form in their artificial bottoms. Woodland trees die, and the hot western sun burns up all the delicate woodland ephemerals. The moraine ceases to drain and becomes a sump. The children of the high hills have all retreated, disappeared with lack of support, the neglect of a garden without a vision.

Yet wonderful things have happened, too, in the intervening years. Fifteen-foot kalmias form a marvelous backdrop to parts of the garden. An *Enkianthus perulatus* planted all those years ago is now the largest in North America. A *Chamaecyparis obtusa* 'Nana Gracilis' has reached the full potential of its slow-growing, dwarf character stretching to 25' in height.



Construction of the cascade slope, New York Botanical Garden, 1932
From lantern slides in the T.H. Everett collection.





The cascade slope, 1960s.
Photo from the New York Botanical Garden.



I came to the rock garden as the new curator, nearly twenty years after Everett left, my purpose to restore and revitalize. It has taken me three years of living with this garden to glimpse the vision that was used to create it. We're just beginning to bring the fantasy back. The cascades are now once again splashing with water. Alpines are nestling against the surface of the moraine. The ledges are back in order and supporting a host of rock plants. Soon a new scree will be filled with the plants this garden was created to house.

But enough! This is not all coming together at once. It's happening in bits and pieces as money and support slowly gather. The garden is coming back with a difference. The fantasy should be intact, but this will be a garden for the 1990s, a garden for a different audience. Today, people want not only a beautiful picture, they want to walk away with an understanding of what they've just seen. This garden has to be three gardens at once—a great landscape garden in the tradition of the rock and alpine gardens of the beginning of the century, a living herbarium of rock and alpine plants, and an educational display of plant diversity, ecology and horticultural technique. Plants have to be mapped, accessioned, and verified as well as planted for effect.

The first project started, almost immediately on my arrival at NYBG, was the moraine bed restoration. The moraine was built with the original garden in 1932. The water system was no longer functional, and this bed was full of stagnant water. Old photographs of the original construction were confusing, showing galvanized pipes running across the rim of concrete basins. The function of these pipes seemed mysterious and gave the excavation the feeling of an archaeological dig. After the mucky mess was shoveled

out, three tiers of 8"-deep basins appeared. They were each about 35' long and 8' wide. They were designed so that the top basin filled with water which then overflowed into the next basin, then the next, eventually draining into the stream below. The mysterious pipes had no function at all relating to the moraine but just traveled across the construction to supply water to another part of the garden. Truly amazing in the design of this moraine was that each basin was drained for the winter through a single 3/4"-diameter drain plugged with a wine cork!

Once the cracks in the basins were repaired and new 4" plunge drains installed, test runs were done on the plumbing system, and the basins were filled with 2"-diameter trap rock. A layer of smaller gravel was used at the top to help keep some of the finer particles from sifting through and silting up the basins. I avoided using sand or loam in the growing mix for this reason. I finally gambled on a combination of 3/8" river gravel and calcined clay particles (a horticultural grade of kitty litter) that provides smaller particle size and has a great capacity to absorb water and retain nutrients. A little compost was added to mellow the mix and help get the plants started. This mixture was laid on 8-10" deep above the water level. The moraine is large, at least 25' x 35'. There was no guarantee that anything would grow in this experimental mix.

Since this was my first season at the garden and my first major project, I wanted to ensure against complete loss of face. I planted any and every plant available that seemed even remotely appropriate to a moraine. Besides, at this time, this newly restored moraine was the only area of the garden prepared to receive alpines. There was a liberal sprinkling of sempervivums, to be sure that at least some plants would

survive. All the newly installed plants seemed to be hiding in the shade of their display labels. The effect of the whole was more like a cemetery for parakeets than any kind of alpine simulation. The reaction from visitors seemed to be more puzzlement than pleasure. But to my great relief, everything began to thrive. Instead of great survivors, the sempervivums turned out to be the first casualties. The squirrels seemed to believe they were miniature artichokes set out for their dining enjoyment. Androsaces, penstemons, and gentians made great strides in their first season and overwintered well with few losses. This evenly moist bed turned out to be a fabulous seedling medium. Along with thousands of birch and weedy *Oxalis*, lewisias and other choice plants have managed to self-sow. This year I was able to refine the bed, transplant the more rambunctious plants to other areas, and try new, more challenging plants. I think it's important to give the moraine the look of an alpine area. It's nice to have a collection of interesting plants, but it's just as important to give this area a visual appeal. Then everyone who looks at the bed, rock gardener or not, can get a feel for the ecology of an alpine habitat in nature.

Next, the waterfalls were restored, carefully comparing the oldest photographs available with the new construction. The extensive ledges that run alongside were scarred by the necessary placement of a large white plastic pipe for recirculating the water. Many shrubs that hid the ledges had to be removed, and serious erosion and shifting of rocks were revealed here. There wasn't much choice but to restore this area immediately. Five truckloads of standard rock garden mix (1 part sandy loam: 1 part 3/8" gravel: 1 part leaf compost) were pushed up the slopes in wheelbarrows. Huge rocks

were reset and terraces were rebuilt. This is a very central feature of the rock garden. Visitors take many pictures of the dramatic waterfall. The surrounding slope rises up and back at least 50' from the path. Much of the inspiration for the new plantings in this area came from Millstream—a tumble of phloxes and a succession of other showy rock plants that made the overall picture of the Fosters' garden so memorable. The areas closest to the path at the base of the ledges are being developed into a collection of sturdy sun-loving rock plants such as irises, veronicas, *Aethionema*, and *Helianthemum*.

An area at the head of the stream is dominated by rugged outcrops. In this space about 20' wide and 25' long there was originally a small moraine. Here now is a sand bed, thanks to a generous donation of the Hudson Valley Chapter of ARGS. Physarias, eriogonums, acantholimonas, and *Phlox bifida* are gaining a strong foothold in the beautiful gray, pebbly sand. *Psilostrophe cooperi* has been especially rewarding with a nonstop display of starry yellow flowers. The sand bed ought to prove an interesting experimental area and I hope to report more details of the success and failures.

A prominent crevice in one of the outcrops posed a particular problem: It was a nice arrangement of rock jutting out from the main outcrop but exposed to air on all sides. The soil was sitting like peanut butter in a sandwich, not connected to any soil below or behind the outcrop, with no place for roots to go. Many plants met their death here. A bridge of soil was built up against the back of the rock, connecting it to the soil behind. A piece of polyester blanket was laid into the crevice and extended into the soil behind to act as a wick to bring moisture up into the crevice and to provide a path for roots to grow back into the main body of soil.

On a north-facing aspect behind the knoll dominated by mugo pines, a new scree is being created. Many years ago a scree was abandoned here because of slow-draining clay beneath. The soil is now raised to about 2.5' above the path level. It is supported by a jumble of large rock fragments of the sort you might expect to see in a natural rock slide. The mix is composed mainly of bankcut gravel (natural glacial till with gravel in every size from fines to fist-sized rocks). One difficulty in reworking rocks in an old garden like this is that the old rock work has developed a natural patina over the years. To match it you must look hard to find rocks with similar surfaces. We've done the best we can. The perimeter of this scree is about 90' long. This soil mix combined with the protection of the northerly slope should result in an outstanding display of a great variety of choice alpinists.

As well as trying to bring back an interesting and sophisticated collection of plants, I am trying to put in a model of each of the most important features that have become rock garden traditions. Once each of these features is interpreted the public will walk away with an education in rock gardening. The existing alpine meadow had eroded to well below path level and it had become difficult to grow anything interesting in the overly moist soil. Forty cubic yards of a very sandy loam mixture have raised this 1000-square-foot area about 12" above the path. Now we can demonstrate the concept of an alpine meadow or alpine lawn, an area where thousands of crocus, reticulate iris, and other small bulbs come up through a ground cover of various other plants that flower after the bulb foliage has faded away.

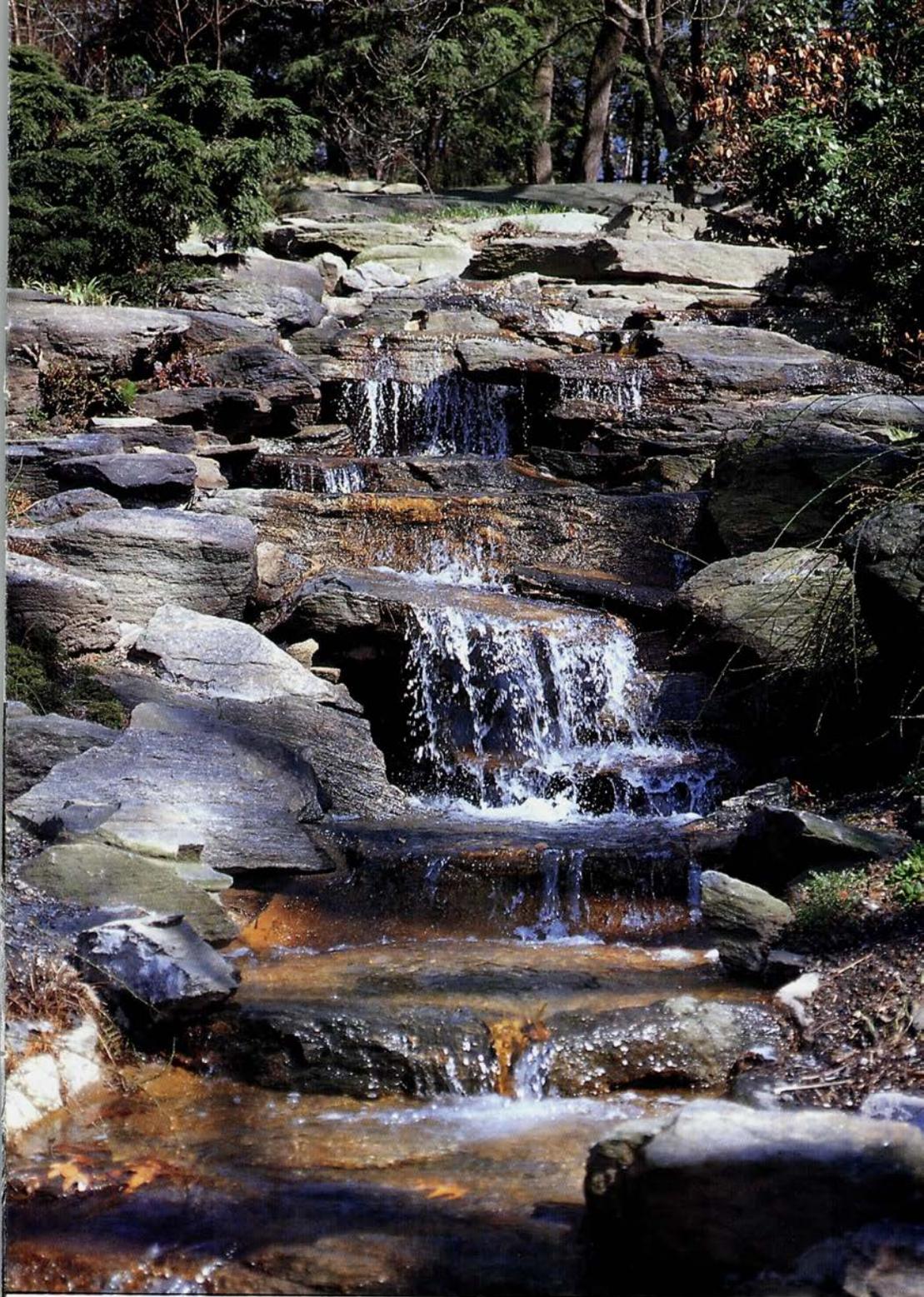
The peat bed is to be started in the spring of 1991. It will be shaded on the west by large specimens of *Enkianthus*. Its acid nature ties in natu-

rally to the neighboring bed of heaths and heathers. It will not be a bed with banks built up of peat blocks as in the United Kingdom. Rather the changes in level will be accomplished with rocks. The soil mix will be a very sandy acid loam combined with liberal quantities of peat moss. There are *roscoeas*, *asarums*, *arisaemas*, and *shortias* currently in propagation, waiting to be planted out in this area.

I feel very lucky to be here at NYBG at a turning point for this garden, for its stability and support. Every day starts out with a walk around the garden. I look to see what needs to be done, what's in flower, and so on. I try to view the garden the way a visitor might. While I work, I am always observing visitors. How fast do they move, where do they stop, what questions do they ask? Being New Yorkers, they tend to move fast. How can I change the garden to slow them down, what makes them stop and take notice? A change in texture of the path, a bridge over water, a view to the distance? This garden was built with a very ingenious design. My goal is to turn a walk through the garden from a casual visit to an experience that touches each and every person with the beauty and the satisfaction of rock gardening.

Photos from the NYBG archives from the collection of T.H. Everett. Photos of the original construction are prints from lantern slides.

Bob Bartolomei's interest in rock gardens dates back to his childhood when he spent summers playing in the Niagara Gorge, where he admired the natural limestone gardens filled with *Asplenium* and *Campanula rotundifolia*. He has gardened since the age of four. He is now the curator of the T.H. Everett rock garden at the New York Botanical Garden.



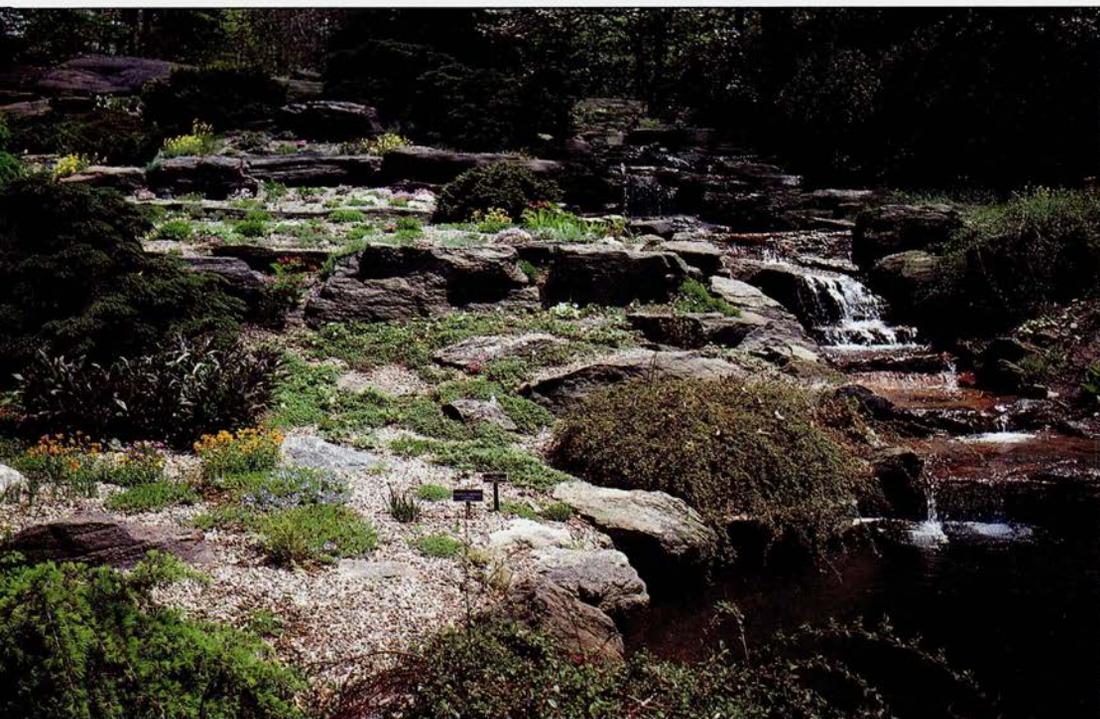
Waterfall at New York Botanical Garden (pp. 111-116)

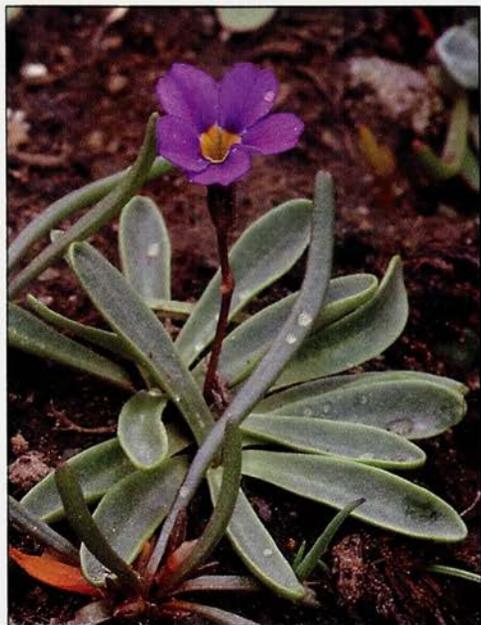
Robert Bartolomei



Cascade Slope, New York Botanical Garden (pp. 111-116)

Photos by Robert Bartolomei





Primula capillaris
(pp. 127-128)

Jay Lunn



Primula parryi (p. 125)

Loraine Yeatts

Primula specuicola
(p. 130)

Jay Lunn



Primula ellisiae (p. 128)

Jay Lunn





Primula nevadensis (p. 127)

Primula angustifolia (p. 128)

Photos by Loraine Yeatts





Primula angustifolia (p. 128)

Loraine Yeatts



Primula maguirei (pp. 126, 127)

Primula cusickiana (p. 126)





Primula maguirei (pp. 126, 127)

Primula cusickiana (p. 126)

photos by Jay Lunn





Primula domensis (p. 127)

Primula domensis (p. 127)

photos by Jay Lunn



Wild Primulas of Western America

by Jay Lunn

There are fourteen recognized primula species found in the contiguous United States between the Rocky Mountains and the Pacific Ocean. Although they exhibit wonderful displays in the wild, few are well known to gardeners. This unfamiliarity can be attributed largely to two factors: they are not commonly available from nurseries in the form of seed or plant material; and many are difficult to satisfy in cultivation.

All members of the Parryi section of the genus are found exclusively in western America. This section is comprised of the species *Primula angustifolia*, *P. capillaris*, *P. cusickiana*, *P. domensis*, *P. ellisiae*, *P. maguirei*, *P. nevadensis*, *P. parryi* and *P. rusbyi*.

Primula parryi (photo, p. 119) is the largest primula of this region, although individuals vary considerably in size. This species was first collected by Dr. C. C. Parry in Colorado and described by Asa Gray as a new species in 1862. It is the most widely distributed primula of this area, occurring from Montana and Colorado to northern Arizona and New Mexico through eastern Nevada. Although rendering an

offensive odor, it was once considered the most magnificent of the American species. With subsequent discoveries of other members of this section, it has lost some stature. *Primula parryi* is a plant of alpine and subalpine meadows, talus slopes, stream banks, and lake margins at elevations from 8,500'-13,000'. The scape of larger plants, which may reach a height of almost 2', bears an umbel of three to twenty reddish-purple flowers with a yellow center surrounded by a dark halo. Leaves are spatulate to oblanceolate, 4-20" in length and roughly one-sixth as wide. When I saw this plant in the Great Basin National Park of eastern Nevada, I initially thought it was *Mimulus lewisii* but upon approaching it realized it was a primula—only the flower color resembled the *Mimulus*. It was growing near the water that cascaded over limestone, along both sides of a small stream. Although *P. parryi* can be easily grown from seed, it does not seem to be as floriferous in cultivation as in its native habitat. Also, it is not long lived in cultivation, and the flower buds are caviar for the indiscriminate slug.



*Primula
cusickiana*

Primula cusickiana, *P. domensis*, *P. maguirei*, and *P. nevadensis* belong to what has been referred to as the *P. cusickiana* complex. All are quite small and more or less similar in form, stature, and flower. *Primula cusickiana* (photo, pp. 122, 123), the namesake of the group and the only primula found in Oregon, is distributed from the Willowa Mountains of eastern Oregon to the high plateau region of central Idaho. Asa Gray published a description of it under a varietal name in 1886 from a collection made by William C. Cusick in Union County, Oregon, in 1881. In the western portion of its range, it grows at elevations of 4,000'-6,000' on south-facing, subalpine, rocky slopes that are moist in the spring but become very dry in the summer. I have seen it in bloom, with water from melting snow running past the base of the plants and an *Allium* species as its companion, but this is not its typical habitat. Farther east into Idaho, this species assumes a more diminutive form and grows in sagebrush (*Artemisia*) near 5,000'. The soil in this habitat is slightly to moderately acid.

Primula cusickiana proudly displays an umbel of one to four bluish-violet to purple flowers, darkening toward a yellow, star-shaped eye. The flowers are held above rather thick, fleshy, oblong to oblanceolate or spatulate leaves 1-2.5" in length, with margins entire to denticulate. It rarely reaches a height of more than 4". Mrs. A. C. U. Berry, a world-renowned Portland gardener and plantsperson, claimed to have smelled the fragrance of "Cookie," as she called it, before she had seen the plants. I consider it to have a slight violet-like fragrance, but I would never depend on my sense of smell to find this somewhat elusive plant. Few people see it at its best in its native habitat, because it blooms in early April to early May when access to the mountains can be difficult. Even fewer could find *P. cusickiana* after it is dormant. There have been published reports of the successful cultivation of this difficult plant. These successes were undoubtedly wild-collected plants that bloomed sparingly the first blooming season after collection, then steadily declined in vigor each succeeding year until they finally failed to reappear from dormancy. Seeds from this species germinate poorly, and seedlings tend not to survive to become mature plants.

Primula maguirei (photos, pp. 122, 123) is endemic to one canyon of the Wasatch Mountains in northern Utah, described by a friend of mine as

"rattlesnake infested." It grows on ledges and in crevices of limestone boulders on the steep, north-facing wall. The lowest elevation plants are found scarcely a hundred feet above the valley floor; the species occurs from 4,500-5,500'. From a specimen collected by Maguire and Maguire in 1932, Louis O. Williams published a diagnosis for this species in 1936. *Primula maguirei* is similar to *P. cusickiana*, except that its umbels rarely have more than three flowers and the corolla is rose to lavender with a dark ring surrounding a yellow eye. The corolla tube is twice as long as the calyx, instead of about the same length as the calyx in *P. cusickiana*. With its pedicel, calyx, and corolla tube dusted with a white farina, *Primula maguirei* must be considered one of the most beautiful of our native primulas! One can only wonder how the roots penetrate the crevices of the steep, rocky slopes upon which the plants cling. How did the plants manage to become established there in the first place?

In the Grant and Snake Ranges of east central Nevada, *P. nevadensis* grows in limestone outcrops and nearby gravel slopes at 11,000-11,600' (photo, p. 120). This plant was first described by Noel Holmgren in 1967. Although he, James Reveal, and Charles LaFrance collected the holotype for this species, Rogers McVaugh had made an earlier collection in the summer of 1945. The scape is usually overtopped by erect, oblanceolate to linear-oblanceolate leaves 1-4" in length with coarsely toothed margins. The umbels commonly contain two or three flowers, and the corolla is purple in bud and violet in full bloom with a dark purple ring around a yellow throat. It normally blooms from the latter part of June to mid-July.

An undescribed primula was collected in the House Range of western Utah in 1981. Although it was similar to *P. nevadensis*, which occurs 50 miles to the west in Nevada, it was given species status by Ronald J. Kass and Stanley L. Welsh in 1985. This endemic to the House Range was named *P. domensis* (photo, p. 124), the epithet taken from the word "house," *domus* in Latin. It differs from *P. nevadensis* in that the inflorescence overtops the foliage and the leaves are spatulate to oblanceolate. It produces umbels with one to five flowers. The corolla is purple in bud, rose to lavender when open. It is a plant primarily of the subalpine zone, growing among limestone rocks and under trees on east-facing slopes at elevations of 8,200'-9000'. The plants grow next to rocks, logs, or trees, where they gain some relief from the hot summer sun. They bloom from the middle of May to early June.

Although an unnamed species had been collected in the Ruby Mountains of northeastern Nevada as early as 1942, no account of it had been documented until Margaret Williams described it in her presentation to the Fourth International Rock Garden



Primula capillaris

Conference in 1971. The report of the conference was the first published use of the tentative name *P. capillaris* (photo, p. 119). That name was adopted by Noel H. Holmgren and Arthur H. Holmgren when they published their diagnosis in 1974 for this, the smallest primula in the region. It is endemic to a very small area in the alpine zone of one canyon in the Ruby Mountains at an elevation of 10,000'. It blooms in July, bearing one or rarely two flowers on a leafless flower stalk less than 2" in length. Its corolla is bluish-purple, aging to violet, with a yellow eye. The leaves are linear or somewhat wider, 0.5-1.5" in length. It grows on a gentle, north-facing slope in slightly acid soil containing humus and pieces of small to moderate size granite. Although some plants are growing in an area where there is little competition from other plants, many will be overtopped by their companion plants shortly after they bloom. When I visited this little niche of the world, I was amazed to find *Primula capillaris* growing beside what I believed to be *Lewisia nevadensis* and *Marchantia polymorpha* (liverwort). One must get close and use reading glasses to enjoy this little charmer.

Farther to the east is the related *P. angustifolia* (photos, pp. 120, 121) of rocky slopes and meadows in the Rocky Mountains of Colorado and northern New Mexico. This species is confined mostly to elevations of 10,000-14,000', where it blooms in late June through July. It was described by John Torrey in 1823 from a collection made in 1820 by Edwin James, the first botanist in Colorado. It was the first species of the Parryi section to be described. Although its leaves are almost twice as large as those of *P. capillaris*, it is nevertheless a dwarf plant. Even though they usually bear only one flower on each scape, plants

with multiple crowns will produce several 1.0-1.5" wide, funnel-shaped flowers raised just above the leaves. The corolla is bright rose-pink to purple-pink with a yellow eye surrounded by a white ring. Plants can be grown from seed, which occasionally appears on seed lists.

The remaining members of the Parryi section are *P. rusbyi* and *P. ellisiae*, two species very similar to each other. They can be distinguished by the size of the calyx, length of the corolla tube, shape and margin of the leaves, the color of the corolla, and time of blooming. I have grown plants from seed obtained under each species name, but the resulting plants all appear to be *P. ellisiae* (photo, p. 119). Most of these primulas have been planted under the eaves of the northeast side of the house. There they receive morning sun and irrigation in the summer, but little rain reaches them when they are dormant in the winter. They have grown in that site for several years, have bloomed profusely and developed multiple crowns.

Henry H. Rusby is credited with the discovery of *P. rusbyi*, which he collected in August of 1881 from the Mogollon Mountains of New Mexico. Edward L. Greene published a description of this plant in November 1881 and commemorated Mr. Rusby by naming it after him. A slightly earlier collection may have been made by Cyrus G. Pringle in the Santa Rita Mountains of Arizona of a plant now considered to be this species. It was described by John K. Small in 1898 as *P. serra*. Included in Greene's description was the following commentary:

"Since the discovery of *Primula Parryi* of the Colorado Mountains, that superb species has held an unquestioned title to the first rank, in point of beauty, among American species of this elegant genus. In *P. Rusbyi* it has a formidable rival."

Primula rusbyi occurs in the mountains of southwestern New Mexico and southeastern Arizona, where it grows on shaded hillsides, damp cliff ledges, and in moist rock crevices at elevations of 8,000-11,000'. It has even been found as far south as the State of Zacatecas in central Mexico. Although cold hardiness of this species might be questionable, it appears to be quite hardy. *Primula rusbyi* has thin, oblanceolate to spatulate, 2-6" leaves that have denticulate margins. Its scape reaches about 8" in height. The umbel has four to ten rose-red, magenta, or purple flowers with a yellow eye surrounded by a crimson ring.

Primula ellisiae was described by Charles L. Pollard and Theodore D. A. Cockerell as a distinct species in 1902 (photo, p. 119). The name commemorates Miss C. Ellis, who collected it about 1901 in the Sandia Mountains of New Mexico. Its distribution is limited to central and south central New Mexico, where it grows at sites and elevations similar to those of *P. rusbyi*. It is a somewhat larger plant with more upright leaves. The flowers are rose-violet to rose-magenta darkening toward a yellow eye. The larger calyx of *P. ellisiae* is almost as long as the corolla tube, while the smaller calyx of *P. rusbyi* is much shorter than the corolla tube. The plants in my Pacific Northwest garden have survived, without artificial protection or snow cover, during prolonged periods when daytime temperatures remained below freezing and dipped as low as 6-8°F at night.



Primula rusbyi

There are three members of section *Aleuritia* subsection *Aleuritia* in the region, *P. alcalina*, *P. incana*, and *P. specuicola*. This section was once known as the *Farinosa* section, a name that was descriptive of farina or meal exhibited by many of the species. *Primula incana* was given specific status in 1895 when Marcus E. Jones published a description of this plant, formerly considered a variety of *P. farinosa*. The material used in his diagnosis was collected by him in Utah. Although this species is distributed as far north as Alaska, where it may grow close to sea level, it also occurs in Montana, Wyoming, North Dakota, Utah, and Colorado, where it grows along streambanks, in wet meadows, and in calcareous bogs at 6,000-9,000'. Plants have a rosette of 1-3" long, oblanceolate to spatulate leaves, the lower surface of which is covered with white meal. Out of the rosette rises a 4-14" flower stalk holding an umbel of two to fifteen lilac flowers that

fade toward the center and have a yellow eye. The meal, or farina, is also present on the flower stalk and the flower clusters. If the form of this plant appeals to you, it can be grown from seed, but it is not often available.

Primula alcalina was described by Anita F. Cholewa and Douglass M. Henderson in 1984 from collections made in east central Idaho. Its distribution is limited to that area and southwestern Montana. The plants at these sites were once considered to be *P. incana*, which they closely resemble. *Primula alcalina* is distinguished from *P. incana* by its smaller flowers, white instead of lilac. It also has a much lower chromosome number. It grows in moist, highly alkaline soils at 6,000-7,000'.

The type material of *P. specuicola* (photo, p. 119), which was described by Per A. Rydberg in 1913, was collected by him in 1911 near the community of Bluff, in southeastern Utah. Miss Alice Eastwood made collections of this species in the same locality in 1895, but she considered it to be *P. farinosa*. It is an endemic of the canyons of the Colorado River in southeastern Utah and northern Arizona at 3,700-5,500'. It blooms in April and early May. One reference indicates that the specific name for this plant means "watch-tower dweller." It grows on moist sandstone cliffs and alcoves near streams and under bluffs in loose soil consisting mostly of disintegrating sandstone. Some of these plants cling to strata lines in the sandstone cliffs where there is almost no humus to provide nourishment for their existence, except for that provided by water trickling from above. The plants are 3-11" tall with 1-8" long, spatulate to oblanceolate leaves, with margins crenate-serrate and crinkled. The leaves have white meal on the lower surface. The umbels consist of five to forty flowers. In a single population the flower color may be

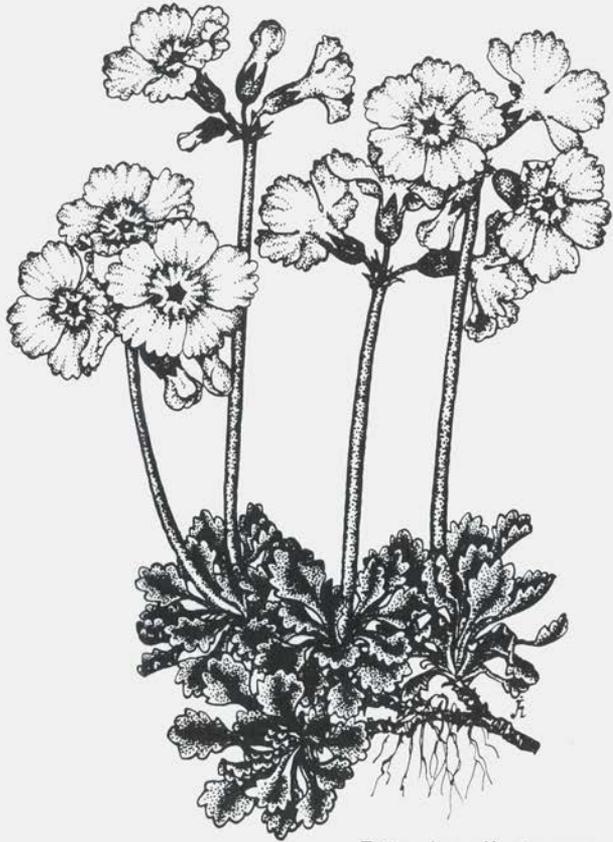
lavender to rose, pink, or white, with a yellow eye. The flower stalks and tan, papery leaves of the prior season's growth persist during the growing season, and the meal is conspicuous on the dried leaves. This species has been cultivated at Denver Botanic Gardens, but a source of seed may be difficult to find.

Primula egaliksensis, of the subsection Chamaecome, is the only other member of the Aleuritia section in the region. Morten Wormskiold described this species in 1816. Although its main distribution is farther to the north, there are two disjunct locations, one in Wyoming and another in Colorado. Like *P. incana*, it grows near sea level farther to the north, but in the southernmost part of its range it occurs at 6,500-8,000' in wet meadows and along streambanks. This slender efarinose (devoid of farina) plant is 1.5-5" tall, has elliptical leaves .75-2" in length and has umbels of one to three relatively small, usually white flowers with yellow centers. Its flowers do not exhibit the pin-eye, thrum-eye arrangement of the style and anthers that is so common in members of the genus *Primula*. This plant will never be the belle of the garden but might make an attractive trough plant.

The most unusual primula in the region is *P. suffrutescens* of the Cuneifolia section. It is the only primula found in California and its distribution is entirely within that state. It occurs primarily in the Sierra Nevada in the east central part of the state, from as far south as Mt. Whitney to near Lake Tahoe in the north. It is also found farther to the northwest in the Trinity Alps. This plant is scattered through its range at elevations of 8,000-13,000', where it grows in rocky ground and beds of disintegrating granite near or above timberline. Asa Gray described this species in 1868 from specimens,

some of which were collected by William H. Brewer between 1860 - 1862. However, this primula may have been discovered by other collectors as early as 1856. It grows long, branching, rhizomatous stems that bear leaf rosettes near the tips. The leaves are thick and fleshy, cuneate to spatulate, with the upper half of the blade being crenate-dentate or serrate. The 1-4" scape is crowned by an umbel of two to seven flowers three-quarters of an inch in diameter, rose-pink to red with a yellow eye. It can be easily propagated from cuttings taken in late July and placed in sharp sand, but it can also be grown from seed. This plant is best grown in a pot and protected from excess moisture in areas that experience winter rains. In cultivation it flowers sparingly over an extended period of time, never producing the magnificent flush of bloom that it exhibits in the wild.

If you have the opportunity to grow any of these charming plants, you should be conscious of their plight. Some of these species have been recommended for inclusion in the List of Endangered and Threatened Plants under the Endangered Species Act of 1973. At this time, *P. maguirei* has been listed as threatened and *P. alcalina*, *P. capillaris*, *P. domensis*, *P.*



Primula suffrutescens

hunnewellii, and *P. nevadensis* are designated Category 2 candidates. Category 2 indicates that "there is some evidence of vulnerability, but . . . not enough data to support listing proposals at this time." *Primula hunnewellii* is generally considered to be the same as *P. specuicola* and that rationale has been followed in this article. Although growing these primulas may be a challenge, I encourage you to try those that are not in jeopardy.

Drawings by Jarmila Halda.

Jay Lunn gardens in Portland, Oregon. He has traveled extensively in quest of these primulas. He is currently treasurer of the American Primrose Society.

GARAGE



Walls: An Interview with Ellie Spingarn

by *Gwen Kelaidis* _____

How did you get started building walls?

When I first married, I found myself living in a house perched on an outcrop of rock. I had grown up in Danbury, Connecticut where the soil was rich and deep, but nevertheless I liked the rock. In fact, I love the look of stone. Next thing I knew, I was building a ledge into a rock garden. One thing led to another and I began building with stone. Projects became larger—quite large, in fact. The rocks were there, a beautiful granite rock of varying shades from steely blue to almost yellow.

The Brooklyn Botanic Gardens guide on garden construction was my best book. There was also an article on wall construction by Frank Cabot in the ARGs bulletin about the time I started.

If you build walls right, the work will still be there when you depart this earth. In the meantime, you have the pleasure of living with the finished product. There is little maintenance, since seeds can only reach the soil between the rocks when carried by wind or the sticky body of a slug. You can stand nose to nose with alpines growing happily. The only problem, really, is that you eventually run out of wall that hasn't been planted. Then you need to build more.

What was your first big project?

I had built a few garden walls before, but my first big project was the stonework on the house. When we moved in, the house was little more than a shed-like cottage, perched on blocks at the corners. I built a retaining wall 5' high and 40' long on one side. Then we jacked up the house, took out 1000 yards of fill, and I built the foundation underneath.

The first big garden project was the retaining wall for the kitchen garden. I wanted to create a level area where there was originally a slope outside the back door.

What was your method?

In our area a 3' footing is recommended to give stability in the frosty soils of winter. I dug a trench 3' deep and 3' back into the slope. I put in a layer of stones, fitting them together, then cemented the joints, and fit the stones for the next layer. You can do this layer without concrete, and by fitting the stones closely, get just as much stability. Now I don't use cement in the joints anymore, but rather sand and pea gravel. This actually provides better drainage. Stability is a must, however. You should be able to walk on the rocks in the trench without any of the rocks shifting from your weight. I have met stone masons who just dump rocks in the trench, but I don't believe that walls built on such a foundation would stand the test of time. Use any "clunkers" here in the trench—any rocks that are unattractive or don't have a good face. Work up to 4-6" below the ground and then start building.

You need batter boards to guide the building of the wall—straight boards to place at each end of the wall. Drive nails in each board every 6"—the two boards should have identical spacing of nails. Set the bottom of the boards exactly at the front of the wall. Pitch the boards back to the desired top front of the wall. I use a batter of about 1" back for 1' up. Tie strings between the first two levels of nails to show you where the face of the rocks should be. As you place each rock the face of the rock comes up to the string and not beyond. Try to get the whole of the flat face of the rock in the plane of the string, so that the face of the wall is absolutely straight. Never violate the plane of the front. Use two strings at a time so that you can draw a bead between them. As the wall grows, move the strings up.

It is critical that every stone in the wall be stable. Use chinks wherever necessary for stability. Very often you can find scraps or cut a rock down. Backfill the wall as you go. My backfill has gravel added to it for very good drainage. The backfill mix should extend about a foot behind the wall. The back of the wall will be irregular. With heavier soil, you may need a drain pipe here and there at the base of the wall.

How do you choose which rock to place next?

Building a wall is a lot like fitting a puzzle together. Aim to find a stone with a fairly good face, if not a great one. Consider the stones around the one you are placing. Mix sizes as well as shapes and don't put too many small ones in any one area. I work each layer for the entire length of the wall before building up. As you add another layer, stagger the rocks in layers so that there is never a crevice over a crevice.

I strive to lay each stone level. The middle line of each stone is level. Even if the stone is oval, keep a horizontal line in mind. With irregular stones, eye through the middle of the rock.

How can you build such high walls? Do you work from the top?

Even at the top of a 7' wall retaining a slope above, I do not work from the top of the wall. It isn't possible for me to get a good fit that way. I use scaffolding—cinder blocks with boards across them.



Spingarn Barn and Greenhouse

How do you get your stones to fit so well? How do you get such a flat face?

I chisel just about every stone. Mostly I chisel the edges to make them fit well, but I also take knobs off the faces. I use a 3-lb sledge with a short handle, called a cold chisel. Chiseling is good and it's bad. The uniform faces and close fit that result make a very handsome wall, but the crevices are then very narrow. It's almost impossible to replace plants when they die. You can choose to deliberately leave pockets in the wall for planting.

Anyone is going to learn an awful lot the first time she builds a wall. You're going to ruin some good stones—sometimes more breaks off than you think. My rock is a granite, or I've been told, a schist granite. I don't know anything about it, but the rocks do differ in color and density. Some you can't chisel.

Do you take any precautions when you are handling the stone?

I don't wear safety glasses, although I do wear glasses, but *you* should be cautious. Do as I say and not as I do. Be careful when you are trying to break a rock. On my clumsy days, I've picked up a blister or two. Work on a firm surface, always. The rock must be very stable when you are hitting it.

You have to learn how to pick up rocks. Don't take any chances. Don't stand up with straight legs and try to pick up a heavy stone. Bend your legs into a squat, grasp the rock, and then stand up, bringing the weight up with the strength of your legs. Be very careful. You've only got one back. If you hurt your back, all the fun of building walls is over.

I wear gloves, always, when building walls. I like rubber gloves because they grasp the stone best and they're thin. I got started using these because of the cement work. They are a must when working with cement. I use a wheelbarrow mixing either soil or cement.

My rocks weigh up to 100 lbs. I have used much larger rocks near the bottom of the wall. There I can use crowbars and rollers to tumble them into place. If you look closely at my walls you will see that there are more large rocks near the bottom.

How long does it take you to build a long wall?

Some days I get more done than others. It seems like I find wonderful fits at first. Then suddenly nothing fits, I can't find the right rock. I have learned to work on something else when that happens. I get a lot more done that way.

One long wall was started on Labor Day weekend and I worked on it every day as much as I could. I got it about 4' tall by spring and gradually finished it by the following year. There are 55 cubic yards of stone in that wall.

It took two years to do the foundation of the house. Those stone walls were about all I did those years—aside from caring for two small children!

When do you plant the wall?

Of course, as you are building the wall you are planting it. After each layer of rock in the wall, fill the nooks and crannies and sprinkle a layer of soil over all. I screen the soil before using it, usually with a 1/4"-3/8" screen. This means the

minimum depth of the soil layer is 1/4".

Plant and water plants as you go. I use a mist from a garden hose to water the plants if they have to be watered again.

Rooted cuttings or same-year seedlings are most desirable. A young plant can find its way, sending roots into the crevices. It's better not to bare-root plants if you don't have to. The plants start growing immediately. Replacements in a closely fitted wall must be tiny seedlings.

What soil mix do you use in the crevices?

You only have one chance to mix the soil in the wall. You can't replace it later without tearing the wall apart.

It's not good to use much sand because when the soil dries out the sand will dribble out. I use loam of a light texture, peat moss, compost, and bone meal (because my soil is acid). I test it as I mix it. I want soil that will barely hold together as a ball when squeezed hard. Plants seem to grow very well in this mix.

What time of year do you plant?

Spring is the ideal time to plant a wall. The plants are eager to grow then. Early fall is also good, into October in warmer parts of the country. If the construction of the wall is loose and there are wider crevices between rocks, the wall could be planted after it is finished.

What are some good plants for walls?

Good plants for walls include *Campanula portenschlagiana*, *C. garganica*, *C. cochlearifolia*, and *C. poscharskyana*. All are good, although the latter can be invasive. Alpine primroses, the auricula group, and other *pubescens* hybrids, *P. marginata* are all good.

I'll try pieces of things not considered wall plants. *Gentiana scabra*, *Daphne arbuscula*, have both done well for me.

Anything that grows in crevices in nature is an ideal candidate for wall culture. Plus be adventuresome—try other things. I even have a cow parsnip, 8' tall, that seeded into a crevice. It normally grows in damp places and ditches.

What sort of maintenance problems have you had?

I haven't had trouble with rodents in my walls. Once a rat lived in one because it was a convenient and short commute to the nearby bird feeder, where grain was so easily obtained.

From time to time, ants will inhabit the walls. I suppose one could poison them, but I have never bothered. I have so much wall.

Walls never need to be painted and many of mine have needed no maintenance whatsoever. I do have one wall where the soil has washed out. This one would benefit from a gutter in the gravel terrace above it. When we have heavy rains the water runs right down the face of the wall. The roof gutters of the house empty out directly onto the gravel terrace, so this is an extreme situation.

Why don't more people build walls?

Not everyone has access to stone and purchasing it is prohibitive. And it is hard work to build walls. I used 80 cubic yards of backfill for the kitchen garden wall.

Yet done one day at a time, the wall is finished in surprisingly little time, as long as you work at it every day. It's very satisfying, very rewarding. I thank the moon, the stars and the what-ever that I have the materials, the interest and the go-power. Do just a little bit at a time, never more than you feel comfortable with.

Drawings by Jack Lambert.

Ellie Spingarn is a long-time member of the ARGS and the Connecticut chapter. She gardens and builds walls near West Redding, Connecticut. She was interviewed in January 1991.

Gwen Kelaidis is a gardener and editor in Denver, Colorado.

Pests

Primula auricula root aphid (*Pemphigus auriculata*) by Stephen Doonan

Primroses of the Section Auricula are a very beautiful and desirable group of plants for the rock garden. They have appealing leaves and plant habit with large flowers for the overall size of the plant. The auricula section likes the same kind of soil that many other alpine plants require, a soil that is airy and well drained. These primroses are very hardy and make durable garden plants. Unfortunately, the root aphid can be a major problem with the auriculas' culture. The root aphid sometimes attacks primroses of other sections and can even be a serious problem with other Primulaceae, such as *Androsace*, *Douglasia*, *Dionysia*, and with mossy saxifrages.

Root aphids are in the woolly and gall-making aphid family (Eriosomatidae). They produce a woolly mass of wax that covers their body and the cavities they inhabit. The wax makes their bodies repellent to moisture and hence difficult to wet with liquid insecticide sprays. Not much information is available about this species, because it doesn't attack important agricultural crops and therefore hasn't merited more study. Most of the life-cycle is spent underground and the aphid's presence generally goes unnoticed until severe damage to the host plant has been done. Established colonies persist from one year to another. They produce winged

colonizers in the late summer that fly about in search of additional suitable host plants. These insects are distinct from the common green (or brown, or black) aphid, which belongs to another family (Aphididae) of the Superfamily Aphidoidea.

The auricula root aphid is generally hidden from sight under the soil on the main stem and roots. The first clue of infestation is the overall sickly appearance of the plants. The aphids can generally be detected by lightly digging around the crown with a finger; a whitish, cotton-like substance that readily stands out from the soil color is diagnostic. Turn a suspected plant out of its pot and examine the roots for occurrences on the roots lining the pot. A hand lens may be necessary to see the aphid proper. Individual insects are not readily discernible from the wax masses.

Once you determine that a plant has a root aphid infestation, it is well to inspect other susceptible plants. It is best if treatment for their control can commence early on. The laborious removal of soil and washing the crown and roots will not guarantee control of these difficult pests; plants so treated may be reinfected again in a short period of time.

One method that has proven effective has been the drenching of the soil with an insecticide and a surfactant mixed together. The surfactant, such as Safer Insecticidal Soap or a spreader sticker, will help break down the surface tension of the waxy material surrounding the aphid's body. The wax protects the aphid from wetting, and without a surfactant, the insecticide doesn't contact its body. The common green aphid can easily be killed with just Safer soap, but the root aphid needs the combination of both a poison and a wetting agent. The insecticide should have a residual effect and not readily breakdown on contact with the soil. One product on the market is MAVERICK, a synthetic *Pyrethrum*.

The plants should be thoroughly watered a day before treatment, so that the soil is moist and has no dry areas in it. The plant will absorb water before treatment begins, lessening the chance of insecticide damage to the plant. Mix the recommended rates on both the insecticide and the surfactant. The application of drench could be by watering can, but the best method is by a backpack sprayer or small pressure sprayer. The sprayer nozzle can be placed in close to the crown under the leaves and thoroughly wet the crown of the plant where the majority of the root aphid population will be found. Apply treatment in late afternoon and in a period of cooler weather. The spray will then stay effective longer and have less adverse effect on the plant.

Another method to control root aphids is used by Mrs. Beth Tate, a specialist in primroses. She carefully tips infected plants out of their pots and dusts a small amount of powdered Diazinon crystals on the bottom of the plant and then returns the plant to the same pot. The crystals of Diazinon fumigate the soil and have been an effective method for Beth. Be careful when using poisons not to breathe fumes, fine dust, or to get either liquid or powder on your skin.

Plants wintered in a frame should be given treatment in the fall and a watchful eye should be kept for reinfections. Check all new plants that you buy or are given to prevent the initial problem. Isolate any plant until you are sure it is free of the aphid. Vigilance for reinfection will always be necessary and a continued spray maintenance program may be required.

Plant Portraits

Primula minima

by Stephen Doonan

Primula minima is one of my favorite alpine flowers. It is very easy to grow in a temperate climate when one understands its simple requirements. This elfin plant forms mats on ridge tops, nestling in short grasses that afford protection from strong winds and excess sunlight. *Primula minima* occurs in pockets of soil where the humus accumulation is acid—it definitely likes a slightly acid soil.

It is distributed from the eastern half of the Alps, south to the Dolomites, the Julian Alps, and the Karwendel Alps of Bavaria, and to scattered outposts in Czechoslovakia, Poland, and Yugoslavia. This geographical range is shared with other choice primroses and interbreeding is common. Hybrids with eight other species have been found in nature (*P. daonensis*, *P. hirsuta*, *P. villosa*, *P. clusiana*, *P. spectabilis*, *P. wulfeniana*, *P. tyrolensis*, and *P. glutinosa*). Some concern can be voiced as to whether one has the "true" species because of possible pollution of genetic purity by hybridization. One outstanding hybrid that requires the same conditions in cultivation is *P. x forsterii* forma *bilekii*.

Primula minima is very distinctive. It has relatively large, rose-pink flowers, a white eye in the center, and the five petals are deeply split into two lobes (photos, p. 141). Such flowers borne on the smallest of plants are a real treat to the eye. The plant consists of small rosettes of small, leathery leaves. The leaf is wedge-shaped with the wide end tipped with three to nine teeth. A plant is made up of many rosettes and generally has only a single flower per stem in nature. It will have two per stem if the culture is to its liking. Several pure white flower forms are in cultivation, and surprisingly the albino forms are vigorous and multiply readily. A mature plant not more than 3 cm high can be completely covered with flowers.

A loose, airy soil medium has been proven very successful with *P. minima* and many other primulas of the Auricula section. A slightly acid growing medium consisting of 1 part sphagnum peat moss, 4 parts clean sand, and 4 parts granite chippings will produce a vigorous specimen. This soil mix is very open and good air exchange is achieved. The healthy root mass that develops might be compared to the iceberg of the analogy: The mass of roots is many times the volume of the surface portion of the plant. A deep pot with adequate room for the roots will provide a stable environment for many years, allowing the crown to grow quite large. *Primula minima* is famous for shy-flowering away from its mountain home. However, a plant grown to its potential in a well-aerated mix and fed a dilute 0-10-10 (N-P-K) fertilizer several times during the midspring growing season will reliably produce flowers.

Primula minima is extremely cold hardy. Plants live and multiply yearly. A clump can easily be divided in the early spring or a complete rosette can be cut from the main plant and rooted. Seed is offered in the seed exchanges. A seedling may bloom the third year. Look for variations of leaf form and of flower size,



Primula minima, white form and pink form
(p. 140)

photos by Phil Pearson





Ellie Spingarn

Ellie Spingarn's Walls (pp. 133-138)

Ellie Spingarn





Joel Spingarn



Judy Glattstein



Primula
minkwitziae
(p. 145)



Josef Halda

shape, and color. Mulch the plants with a good layer of stone to prevent mosses from competing and growing over the plants. *Primula minima* needs good light—early morning sun until about noon will produce a compact healthy plant that blooms. The biggest problem may be the prevention and control of the Auricula root aphid. The aphids form massive subterranean colonies that severely weaken the plant and if not treated may kill the plant.

Primula minkwitziae by Panayoti Kelaidis

The vast belly of the USSR that juts down towards the Middle East has traditionally been called Turkestan. It is an area of immense desert and cold steppe, where mountains are often treeless from their bases to their tops. It's something of a surprise that this region has primulas at all, let alone primulas new to cultivation.

Primula minkwitziae was described by William Wright Smith in 1934 from a single specimen he viewed in the Vienna herbarium. The plant had been collected in 1908 on high scree of Mt. Dschebogli in southern Kazakhstan by Madame Minkwitz near the borders of Uzbekistan—not too far distant from the western border of China. The plants were mistaken for *Cortusa mathioli* at the Leningrad herbarium and distributed under that name to Vienna, where Handel-Mazzetti alerted William Wright Smith to this novel taxon.

Four species of primulas in the *Cortusoides* section occur in Turkestan: the other three belong to the subsection *Eucortusoides*, which is distinguished by leaves with pinnate veining. *Primula minkwitziae* has palmate venation and a dense covering of hairs not only on stems and leaves, but even extending to the corolla. *Primula lactiflora* and *P. kaufmanniana* are more widespread in the Pamir-Alai mountains, with thinner, smoother leaves. The former is generally white flowered, and the latter has violet-purple corollas. *Primula eugeniae* is the fourth species in this section, a fabulously rare yellow-flowered *Cortusoides* that grows in the Alai mountains of Kirghizia at over 12,000' elevation. It is listed in the Red Book of the USSR.

Josef Halda photographed *Primula minkwitziae* in July of 1989 far above tree-line in the Ala Archa Valley of the Kirghizian Altai not far from Frunze at 3100m. Here, the primrose is a chasmophyte, growing in cool, north-facing crevices of sheer limestone cliffs. Josef considers this the gem of Central Asian primulas. Perhaps one year he will return late enough in the season to gather seed.

When the dust of the 20th Century has settled, I suspect we will look back and realize that the most travelled and wide ranging horticulturist of the century is this intrepid Czech who has explored, collected and written about more plants and mountains than I can imagine. Many botanists have had a chance to visit Central Asia briefly in their lifetime, but Josef and his family have come year after year for decades, exploring the remotest corners of this region for months at a time. This is the secret of how Josef has found so many rarities like this gem of Central Asian Primulaceae. Madame Minkwitz would probably be surprised to discover she has achieved immortality by means of this tiny alpine namesake. As I look at these pictures (p. 144), I think of her and realize how much there is yet to be learned and seen and grown. How fortunate that we have Josef to lead the way!

Labels

Towards the Perfect Plant Label

by Iza Goroff

A plant label in the rock garden must fulfill two conflicting requirements: it must be legible and it must be invisible. In addition it must survive for the life of the plant, fully identify the plant, and be easy, quick, and inexpensive to produce.

None of the commercial labels now available satisfy all of these requirements. The most permanent and least visible are the metal labels. However, text pencilled or penned onto one of these is difficult to read. Currently available plastic labels are easily broken and very prominent in the garden. Strategies to make them less of an eyesore include burying them in the ground or spray painting them a color matching the garden mulch.

Gardeners have attempted to make their labels more legible by using plastic tape label makers, devices that emboss text onto a narrow (1/4" or 3/8" wide) plastic adhesive strip, and attaching these strips to a plastic or metal label. My experience with these has been most inconsistent. Many of the strips loosen after a winter or two, while others last for as long as ten years. The pigment may wear off after five years or so. Embossing each strip is a painfully slow process, and errors are not correctable.

The solution? A label consisting of the following parts: the base stock, the text-bearing medium, the pigment displaying the text, and the text itself. These parts must work together to produce a workable label. No one part should take an inordinate amount of time or effort.

To make the label less visible I use a clear base stock, 1/8"-thick acrylic plastic (Plexiglas or Lucite). Although the clear plastic is not quite invisible (light is reflected from its surface), it is visually much less intrusive than white plastic or metal. Thinner plastic is too easily broken; plastic thicker than 3/16" is more difficult to cut, more expensive, and more prominent in the landscape. Polycarbonate plastic, which is more expensive and more difficult to cut, is also more durable for those situations that demand it.

The width of the label can be 1/2"-3/4", depending on the size of the print and the number of lines of text. The length of the label should be 7" or more with at least half of that length going underground; any less and you will find that too many of the labels have walked away from their host plants. The bottom end should come to a point to make it easier to force the label into the ground. This is done by cutting one end of the plastic strip at a 45° angle.

For people who lack calligraphy skills (such as me), it is impossible to write a clearly legible and attractive text directly onto the label. Instead the text is typed or computer-printed onto the text-bearing medium. The best such medium we have tested is clear adhesive Mylar plastic, available in stationery supply stores, sold for encapsulating photos or identification cards. I use a brand called Clear-Adhere; others may be equally satisfactory. But you should test these for adhesion and

pigment-bearing qualities before you commit any large investment in time and effort. Finding the combination of text-bearing medium and pigment has not been easy. For several years I used an IBM executive typewriter, using a foil ribbon onto adhesive polyethylene. The ink of other typewriters would not stick to the plastic. Currently, I am using a laser printer attached to a computer. Once an expensive and rare commodity, the laser printer has come down in price and is now found in many offices, attached to the home microcomputer. (WARNING: Do not try polyethylene in a laser printer—it melts, causing possible damage to the printer!) Labels are printed a page at a time. Immediately after printing the sheet is covered with a second sheet of Mylar to protect the pigment from weathering in the garden. Other kinds of plastic sheet may not be clear enough to allow for this type of protection, especially if the pigment has insufficient contrast. The sheet is then separated from its backing, cut with a scissors, and each label is carefully attached to its label stock.

If a computer is available, a word processing package is most useful in preparing text, especially using its ability to copy and edit. It is likely that future computerized plant records systems will have label text as optional output. They may also contain dictionaries of plant names to use in checking spelling.

The minimum information that a label should hold is the name of the plant. In addition, I also list the source or seed list number (e.g., ARGS 88 5022 lists seed obtained from the American Rock Garden Society 1988 seed exchange, #5022 on the seed list), the location where the seed was collected if from the wild (e.g., *Bighorns, WY), the date sown, and the date transplanted.

Some laser printers have the ability to print much more legible fonts. The most legible font is Helvetica, a proportionally spaced *sans serif* font that allows a larger print on a shorter line. I am currently using 18 point boldface print for the plant name and 9 point for the source and dates. One line of each size fits comfortably on a 1/2" wide label.

To get the hard plastic label cut to size you may try your local plastic processor. Recently we contracted for 1000 labels for \$300, or 30¢ per label. The cost of the plastic alone is much cheaper if you have the time and ability to cut the label stock yourself. There is a hand tool similar to a glass cutter that can be bought for around \$3 that does a very good (though slow) job in cutting the acrylic plastic, once you get some practice doing it. The plastic tends to melt if cut by a power scroll or band saw. In any case, saw-cut plastic needs a final step of sanding that is not needed with the specialized hand tool.

Examples of my earliest version of this label, the typewritten kind, have lasted seven years. We expect the new version to last 10 years or more.

Experiment with a small number of labels to get your technique established. Then you can quickly switch to quantity production of high quality labels.

Errata

#@!☆@#☆@!!!

Bulletin of the American Rock Garden Society 49(1):39 Winter 1990.
Photo Credits are reversed: top photo is by Lauren Springer, bottom by D. Jacobs.

A Rock Garden in the South, by Elizabeth Lawrence, ed. Nancy Goodwin, A. Lacy. 240 pp., \$19.95 list, \$17, ARGS Bookstore.

Obituaries

Deon Prell, 1936—1990

by Iza Goroff

Many ARGS members first met Deon Prell at the 1973 Annual Meeting in Milwaukee, Wisconsin, a meeting whose logistics and amenities were largely organized by her. Deon was an artist and a landscape designer who developed many large private gardens, all of which showed her unerring design skill as well as her use of a very broad palette of plant material. She made heavy use of native plants as well as exotic plants of character.

Deon was an exciting lecturer, giving many talks on rock gardens, shade gardens, and garden design, recruiting many members for the ARGS. She served on the ARGS Board of Directors and as chairperson of the Wisconsin-Illinois chapter for several terms.

ARGS Coming Events

1991 Annual Meeting

A Kaleidoscope of Gardens

White Plains, New York
May 10 through May 12, 1991

Featuring the gardens of *Wave Hill*, *Stonecrop*,
The New York Botanical Garden—and more!

For more information write:
Michael Donovan, 214 Highbrook Avenue,
Pelham, NY 10803





P. chionantha

We can help you
grow primulas!

American Primrose Society
offers a quarterly, seed
exchange, slide library--
all for only \$15 a year.

Treasurer: Jay Lunn
6620 NW 271st Ave.
Portland, OR 97124

Plan now to attend our 50th anniversary
International Primula Conference
Portland, OR April 10-12, 1992

OFFERING COLLECTOR'S PLANTS FROM
AROUND THE WORLD



COLLECTOR'S
NURSERY

MAIL ORDER CATALOG - \$1.00

*
1602 NE 162ND AVENUE
VANCOUVER, WASHINGTON 98684

*
ALL PLANTS NURSERY PROPAGATED

Maple Leaf Nursery

Unique ornamentals
for your garden

- Deciduous Azaleas Species & Hybrids
- Drought Tolerant Plants
- Trees, Shrubs, & Hardy Perennials

U.S. mail order only Catalog \$1.50

Maple Leaf Nursery

4236 Greenstone Rd. • Placerville, CA 95667

American Rock Garden Society



Join Today!

Benefits of Membership Include:
Beautiful, Colorful Quarterly Bulletin;
Seed Exchange offering Thousands of
Species of Seed at Low Prices; Spectacular
National Meetings; Full Participa-
tion in the American Community of
Rock Gardeners

Send \$25 to: Jacques Mommens, Executive Secretary,
PO Box 67, Millwood, New York 10546.

Very Choice Seed

Collected in Greece, Turkey,
Asia, or specially grown by
European experts. \$1.75-3.50.
Descriptive price list \$1,
credited on order.

Karmic Exotix Nursery

Box 146
Shelburne, Ont. L0N 1S0 Canada



SISKIYOU RARE PLANT NURSERY

An ever growing collection of over 1,000 varieties of Alpines, Ferns, Dwarf Conifers, Northwest Natives (as Lewisia cotyledon, pictured), and other hardy plants for the Woodland and Rock Garden. For our Annual Mail Order Catalog and Fall Supplement send \$2.00 refundable.

Dept 1, 2825 Cummings Road, Medford, Oregon 97501

Visitors Welcome by Appointment - Phone (503) 772-6846

SHIPPING TO U.S. and CANADA ONLY

A Distinguished Collection

**Over 1500 hard to find
and useful plant
varieties**

ROSLYN NURSERY

**211 BURRS LANE, DEPT. R
DIX HILLS, N.Y. 11746**

124 page Mail Order Catalog \$2.00

RICE CREEK GARDENS, INC.

Rare & Unusual Perennials

Rock Garden Plants

Dwarf Conifers

Hardy Rhododendrons

Shrub Roses

Wild Flowers

Herbs & Water Plants

Nursery Sales

11506 Hwy. 65

Blaine, MN 55434

Mailing Address

1315 66th Ave. NE

Fridley, MN 55432

*We Build Authentic
Rock Gardens
and
Complete, Distinctive
Landscapes*



Catalog \$2



**TIME TESTED HOSTAS
including VARIETIES
suitable for
ROCK GARDENS**

*Fresh Hosta seeds available
from January 1 to June 1.*

Homestead Division

9448 Mayfield Road, Chesterland, OH 44026

Catalog \$1.00 deductible from order.

**DWARF & RARE CONIFERS
ALPINE & ROCK GARDEN PERENNIALS
PLANTS FOR BONSAI**

Catalog: \$2.00 refundable on first order



PORTERHOWSE FARMS

41370 S.E. Thomas Rd.

Sandy, Oregon 97055

Telephone/FAX (503) 668-5834



Adonis vernalis

Very early blooming
Large, golden flowers.

Extremely choice—a must for every rock
garden.

3-5 year old plants; established, in pots.

\$12.50 each, 3 for \$30, 6 for \$54
Discounts on larger quantities.



Kurt Bluemel, Inc.

Rare Plant Division

2740 Green Lane, Baldwin, Maryland 21014

*For spring or fall planting. UPS delivery.
(No shipments to CA, please.)*

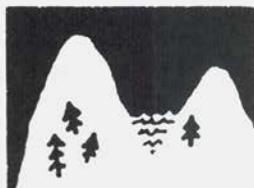


AMERICAN CONIFER SOCIETY

Interested in dwarf and rare conifers and
their companion plants? Join the American

Conifer Society. For information write:
American Conifer Society

PO Box 314, Perry Hall, Maryland 21128
Individual Membership, \$20; Firm, \$100



Kirk Fieseler
Owner

1950 Laporte Ave.
Fort Collins
Colorado 80521

Laporte Avenue Nursery

Rocky Mountain Alpines, Western High Plains
Plants, and Rock Garden Plants.
Catalog \$1.00 refundable with order.

CHEHALIS RARE PLANT NURSERY 2568 Jackson Hwy., Chehalis, WA 98532 Herb Dickson, Prop.

After 30 years of selecting and breeding,
I have developed an improved strain of
Garden Auricula with a complete palette of
color.

Mixed Garden	White Garden
Yellow Garden	Brown Garden
Blue Garden	Red Garden

Exhibition - Alpine

Petite Hybrids, a strain of small species
and hybrids in a wide range of color.
The above \$1.00 per packet of 50 seeds.

Primula Florindae & Mixed Candelabra
Generous packet \$1.00 each.

Hand pollinated Show Auricula

Red Self	Green Edge
Yellow Self	

\$2.00 per packet of 25 seeds.

Hand pollinated Double Auricula Mix
\$3.00 per packet of 15 seeds

MINIMUM ORDER \$5.00
Post free in U.S. and Canada
Overseas orders please add .50 cents.



Hypertufa Troughs
*Handcrafted with the look
of weathered stone*

Mail Order U.S. Only

For Further Information
Send SASE

KAREN HARRIS
200 East Genesee St.
Fayetteville, NY 13066



YORK HILL FARM

**1991
SPRING CATALOG**

- DAYLILIES
- HOSTAS
- IRISES
- LILIUMS
- HERITAGE ROSES
- RARE PERENNIALS

Simply the
"Best" Cultivars!

RETAIL NURSERY

*Specializing in Those Varieties
That are New or Hard to Find!*

271 N. HAVERHILL ROAD KENSINGTON, N.H. 03833

PERENNIALS

Top-quality nursery-propagated, northern grown
perennials for the fine and unique gardener.



Featuring
exclusively McEwen Siberian Iris

Informative catalog \$1.50

Fieldstone Gardens, Inc.

620 Quaker Lane Vassalboro, Me. 04989-9713
(207) 923-3836

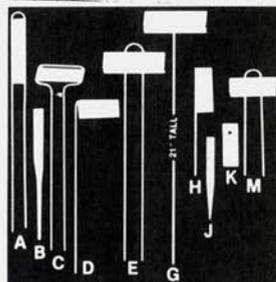
1991 FIELD TRIPS

"Cum lern botanic wi' me, in the mountains."

1. **June 22 - The Big Horn Mountains**
June 30 - Wyoming
2. **July 27 - Newfoundland, Canada**
August 4

WRITE FOR INFORMATION ON OUR
EXPERTLY-GUIDED, CONVIVIAL TRIPS
FOR ARGs MEMBERS.

HOWARD W. PFEIFER, 27 BEECH MTN. RD.
MANSFIELD CENTER, CT 06250



PO Box 93-E, Paw Paw, MI 49070-0093
Quantity Prices Available Postage Prepaid

PAW PAW EVERLAST LABEL COMPANY

- A- Hairpin Style Markers30 for \$10.00
- B- Plant or Shrub Labels100 for \$7.10
- C- Cap Style Markers30 for \$10.40
- D- Swinging Style Markers30 for \$8.60
- E- Rose Markers30 for \$9.50
- F- Tall Display Markers.....30 for \$13.05
- G- Tall Single Staff Markers30 for \$10.30
- H- Flag Style Markers30 for \$8.30
- J- Small Plant Labels100 for \$6.85
- K- Tie-on Labels100 for \$10.90
- M- Miniature Markers30 for \$8.10

Mt. Tahoma Nursery

Rick Lupp (206) 847-9827
Alpines, Washington State Natives, Species Primulas,
Troughs & Trough Plants
Custom Propagating

Nurseries Open Weekends and by Appointment
Mail Order: U.S. & Canadian Only
Send \$1.00 For List
28111-112th Avenue, E. Graham, Washington 98338

THE PRIMROSE PATH

R.D. 2 Box 110 Scottdale, PA 15683

Primula veris



Choice and unusual perennials, alpines, woodland plants, all nursery-propagated.
Specializing in new hybrids and selections from our breeding program, species
Primulas and Phlox, native wildflowers, western plants adaptable to the East.
Mail-order Catalog \$1.50 (412) 887-6756

THE CUMMINS GARDEN

DWARF RHODODENDRONS	Yes, We Ship!
DECIDUOUS AZALEAS	Catalog \$1.00
DWARF EVERGREENS	
COMPANION PLANTS	(Refundable With Order)

Phone (201) 536-2591
22 Robertsville Road Marlboro, NJ 07746

THE ALPINE GARDEN SOCIETY

Membership of the Alpine Garden Society puts the American Alpine gardener in close touch with those throughout the world who share his interest in one of the most absorbing branches of horticulture. The Quarterly Bulletin of the A.G.S. is respected internationally as one of the most informative publications of its kind. It will bring into your home a distillation of the experience and ideas of some of the finest gardeners, plant explorers, and horticultural thinkers of our time. Among the many other benefits of the Society, its uniquely comprehensive seed list alone is worth more than the modest subscription of \$23.00 US. For Overseas Members Apply to:

The Secretary, The Alpine Garden Society
Lye End Link, St. John's, Woking, Surrey, England.

ROCK PLANTS

For over 20 years we have specialized in dwarf Rhododendrons, Azaleas and dwarf conifers. We also have one of New England's largest selections of rare specialty Alpines, perfect for the trough or rock garden.

Free 120-page catalog when you visit us.

To send for catalog, include \$3.00

Oliver

NURSERIES, INC.

1159 Bronson Road, Fairfield, CT. 06430
(203) 259-5609 (Sorry we do not mail order.)



Saxifraga

Calochortus Fritillaria

Other Western Native Bulbs

C.H. Baccus
900 Boynton Ave.
San Jose, CA 95117
(408)244-2923

SASE For July mail order list. Spring container and Fall dormant bulbs sold by appointment only.

SANGUINARIA CANADENSIS MULTIPLEX (DOUBLE BLOODROOT)

Blooming-Age Rhizomes
Available in Early September
PLANT DEALERS ONLY

CHARLES F. ANDROS
BOULDER WALL GARDENS
McLEAN ROAD
WALPOLE, NH 03608-0165

Phone (603) 756-9056
(April 15 - November 15)



NATIVE PERENNIALS

For Woods, Meadows or Backyard Borders

Send \$2.00 for our 48-page catalog or visit us at our mountain nursery

Our barn is filled with plants and helpful information.

Open Mid-May thru Labor Day
Daily 10-4 Sun. 12-4 or by appointment

Brookside Wildflowers

Located Outside Blowing Rock
On Shulls Mill Rd. Near Hound Ears
704-963-5548, Route 3 Box 740-R, Boone, NC 28607



Idaho's White Cloud Peaks ALPINE SEEDS

Collected 8,000-11,000 ft. elevation

FIFTEEN WILD ALPINES FOR ROCK GARDENS*, e.g.

Dryas octopetala *Silene acaulis*
Eriogonum ovalifolium *Oxytropis campestris*
Haplopappus acaulis *Eriogonum flavum*
and others

*BONUS: FOUR SEEDS OF *Eritrichium nanum* OR *Phlox hoodii* WITH FIRST 100 ORDERS

\$50 postpaid -- mailed immediately

ALFRED SWANSON, GENERAL DELIVERY
CHALLIS, ID 83226

PERMANENT METAL FLOWER & GARDEN MARKERS

Style A Rose Marker

100 — 10" \$17.75
100 — 15" \$19.95
100 — 20" \$23.75

Style B Nursery

100 — 10" \$21.55
100 — 15" \$24.60
100 — 20" \$27.75

Style C Single Staff

100 — 20" \$21.40

Style D Swinger

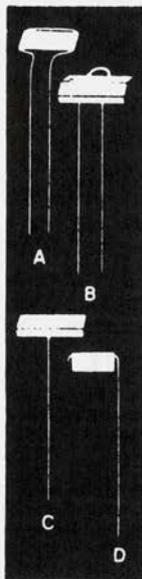
100 — 10" \$16.00

Shipping and Handling: Zip Codes under 75000 add \$3.55 per 100, over 75000 add \$5.20 per 100

Ohio residents add 6% tax.
SEND FOR FREE BROCHURE
Inquire about smaller quantities, high volume pricing permanent marking pens, and fund raising plans. Satisfaction Guaranteed.

EON INDUSTRIES

315 Dodge Street Dept. R
Swanton, OH 43558



Foxborough Nursery, Inc.



Growers of: **Dwarf and Unusual Conifers, Broadleaves and Trees**
Custom Grafting & Liners Available

LANDSCAPE DESIGN & INSTALLATION

W. David Thompson
Street, Maryland 21154

CONIFER & ROCK GARDENS

By Appointment Only
(301) 836-7023

Retail & Wholesale

COLLECTORS DWARF BULBS

Our 1991 catalogue contains many old favorites for garden and Alpine House.

In addition, we offer numerous rare and new introductions.

Full and Descriptive Catalogue \$2.00

POTTERTON & MARTIN

Nettleton, Nr. Caistor, North Lincs.
LN7 6HX, ENGLAND
tel 472-851792

Homeplace Garden

Exceptional List of Rhododendrons, includes Dwarf Species and Hybrids, Azaleas, Dwarf Conifers, Maples, and Choice Natives



Write for Catalog, \$2

Rt. 1 PO Box 300
Commerce, GA 30529
Phone (404) 335-2892



we ship almost
anywhere!

Send 30c
for NEW 100-cultivar descriptive
list of hardy heaths and heathers.

Heaths & Heathers
Box 850, L(ma. Wv. 98541
(206) 482-3258

CAMELLIA FOREST NURSERY

Hardy Camellias
Dwarf Conifers
Rare Asian Trees and Shrubs

茶
花
林

Catalog, \$1.00

125 CAROLINA FOREST ROAD
CHAPEL HILL, NC 27516
919-967-5529

LIFE FORM REPLICATORS

Write for Seed List with 2000 kinds
of perennials and rock plants
\$2.00

PO Box 857
Fowlerville, Michigan 48836

Also wanted: Seed collectors and
growers—let us know what you can supply.

Wildflowers of the Southern Appalachians

Choice, hardy, reliable, showy.
FROM OUR NURSERY TO YOUR GARDEN.
be it woodland, rock, moist or dry.

Send \$2 for 4 pp. illustrated descriptive catalog
or SASE for list of wildflowers, hardy ferns and
perennials.

Sunlight Gardens

Rt 1 Box 600-R3
Andersonville, Tenn. 37705



Marty and Sandy Jones

Colorado Alpines, Inc

Grown at 8,000' in the Rockies,
our plants are hard and hardy

Large plants shipped in 2-1/4" pots to help insure healthy arrival and transplant. Shipped regular or blue label U.P.S. Send \$2 (\$5 for overseas) for catalogue refunded with first order.

Featuring: Aquilegias, Dianthus, Hardy ice plants, Gentians, Iris sp, Mexican Phlox, Penstemons, and many interesting plants of the Rocky Mountains, and North America, Europe, Africa and Asia

(303)949-6464
(303) 949-6672

P.O.Box 2708
AVON CO 81620

American Penstemon Society



Learn all about the largest genus of flowering plants endemic to North America. Bulletins twice a year, seed exchange, round robin correspondence, and yearly meetings. Join us by sending \$10 to Ann Bartlett, 1569 South Holland Court, Lakewood, Colorado 80226.

PERENNIALS, WILDFLOWERS, ROCK GARDEN PLANTS, CONIFERS, FLOWERING SHRUBS

SEND \$3.00 FOR OUR
PERENNIAL REFERENCE GUIDE
SORRY, NO SHIPPING

Sam Bridge
437 North Street
Greenwich, Conn. 06830
(203) 869-3418

WILD FLOWERS

of

Forest Floors

Mountain Meadows

WOODLAND ROCKERY

6210 Klam Road
Otter Lake, MI 48464

MAIL ORDER CATALOG \$1.00

ALL WILDINGS NURSERY PROPAGATED

Rocky Mountain
Rare Plants



Wild Collected and Cultivated Seed of Cushion and Saxatile Plants
Send \$1 for November catalog to PO Box 200483, Denver, Colorado 80220.



KURT BLUEMEL, INC.
Rare Plant Division

Choice Plants
of the Northern and Southern Hemispheres

Write for List, \$2
2740 Greene Lane, Baldwin, Maryland 21013
301-557-7229

*For spring or fall planting. UPS delivery.
(No shipments to CA, please.)*

WOODLANDERS

NURSERY GROWN TREES, SHRUBS,
PERENNIALS,
SOUTHERN NATIVES & EXOTICS

Please send self-addressed 50¢ stamped
envelope for free mail-order list or \$1.50
to include Descriptive Catalog #2.

WOODLANDERS, DEPT. RG
1128 COLLETON AVENUE
AIKEN, SC 29801

Pacific Horticulture

a magazine about
plants and gardens of the west

illustrated color quarterly

annually, in US currency: US \$15;
Canada & Mexico \$18; overseas \$20
write to:

Circulation Department
PO Box 680, Berkeley, CA 94701



A • R • G • S BOOKSTORE

New Listings

*Botany for Gardeners**

by Brian Capon\$23.00

Make botany relevant, interesting, and above all accessible to amateur growers who want to understand the "go" of plants, but have been put off by boring, jargon-filled text. 220 pp., 121 color photos, 53 B & W illust. 6 x 9, hardbound

*Creative Propagation**

by Peter Thompson\$26.00

The text is clear and unthreatening, covering both basics and advanced material in accessible terms. This is an excellent all-around guide that will meet the needs of all but genus specialists. 224 pp., 65 line drawings, 6 x 9 hardbound.

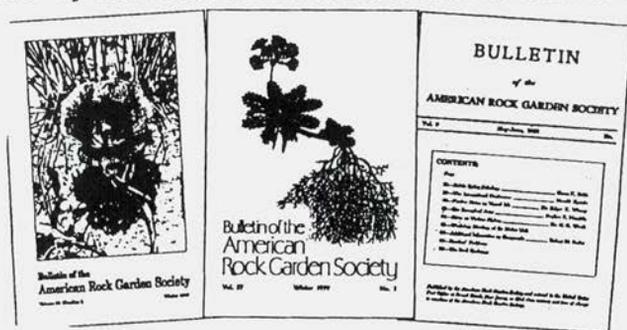
*The Alpine House**

by Robert Rolfe.....\$22.00

Covers all aspects of gardening in alpine houses, from site selection and details of construction, ventilation, and lighting to cultivation techniques and suggestions for particularly appropriate plants. 144 pp., 20 color photos, 18 line drawings. Hardcover.

Classic Issues

Bulletin of the American Rock Garden Society



Now Available from the Bookstore

1990 issues\$4.50 each
1970-1989\$2 each, or \$5 per year
1943-1969 (many issues no longer available)\$4 each

Shipping, First Issue, 75¢, each additional issue, 25¢. * denotes a hard cover



A • R • G • S BOOKSTORE

Additional Listings

<i>Alpine Nurseries of The United Kingdom</i> , comp. by P. Halladin	\$5.00
<i>A Rock Garden in the South</i> , by E. Lawrence, ed. N. Goodwin, A. Lacy	17.00
<i>Miniature Gardens*</i> , by Joachim Carl, trans. M. Kral	21.00
<i>Cuttings from a Rock Garden*</i> , by H. Lincoln Foster & L. L. Foster	23.00
<i>Alpine Wildflowers of the Rocky Mountains*</i> , by J. Duft & R. Moseley ..	7.00
<i>Auriculas*</i> , by Brenda Hoyatt	14.00
<i>The Genus Lewisia*</i> , by Brian Mathew	23.00
<i>The Iris*</i> , by Brian Mathew	23.00
<i>Iris*</i> , by Kohlein	27.00
<i>The Genus Cyclamen*</i> , by Christopher Grey-Wilson	22.00
<i>Vascular Plants of Wyoming</i> , by Robert Dorn	15.00
<i>Vascular Plants of Montana</i> , by Robert Dorn	9.00
<i>Utah Flora*</i> , ed. Stanley Welsh et al.	36.00
<i>Orchids of the Western Great Lakes Region*</i> , by Fred Case	26.00
<i>The Opinionated Gardener*</i> , by Geoffrey Charlesworth	14.00
<i>Rocky Mountain Alpines*</i> , publ. Alpines '86 Int'l. Conference	30.00
<i>Rock Gardening</i> , by H. Lincoln Foster	18.00
<i>The Bernard Harkness Seedlist Handbook</i> , by Harkness et al.	23.00
<i>Successful Southern Gardening*</i> , by Sandra Ladendorf	18.00
<i>A Manual of Alpine and Rock Garden Plants*</i> by C. Grey-Wilson	22.00
<i>The Rock Garden and its Plants*</i> , by Graham Stuart Thomas	26.00
<i>Modern Miniature Daffodil Species and Hybrids*</i> , by James Wells	26.00
<i>Campanulas*</i> , by Peter Lewis and Margaret Lynch	22.00
<i>Rare Plants of Colorado</i> , by Colorado Native Plant Society	6.00
<i>Alpine Wildflowers of the Rocky Mountains</i> , by Willard, Smithsonian	3.50

* denotes a hard cover

Please mail inquiries and orders to:

Jean Stevens
American Rock Garden Society Bookstore
Route 6, Woodland Drive
Eau Claire, Wisconsin 54701 USA

All orders must be prepaid in US dollars by check on a US bank or by international money order. Add postage and handling:

First Book, US	\$3.00
Outside US	\$4.00
Each Additional Book	\$1.50
Your zip code or postal code must be included.	

Chapter Chairpersons

Adirondack	William Dress, 716 Elm Street Ext., Ithaca, NY 14850
Allegheny	Walt Betzold, 131 Rochester Rd., Pittsburgh, PA 15229
Berkshire	Geoffrey Charlesworth, HC 66 Box 114, Sandisfield, MA 01255
Columbia-Willamette	Diana Reeck, 1602 NE 162 Avenue, Vancouver, WA 98684
Connecticut	Richard Redfield, 379 Brook Rd., Box 324, Scotland, CT 06264
Delaware Valley	Morris West, PO Box 75, Brogue, PA 17309
Emerald	Virginia Sebring, 463 Lindley Lane, Eugene, OR 97401
Great Lakes	Ken Nitschke, 1071 South Acaule Lane, Midland, MI 48640
Hudson Valley	Edith Young, Box 332, RFD 3, McDougal Ln., Peekskill, NY 10566
Long Island	Shelley Herlich, 43 Greenfield Lane, Commack, NY 11725
	Lillabeth Wies, Box 233, Cold Spring Harbor, NY 11724
Manhattan	Lawrence Thomas, 340 E. 74th, #11G, New York, NY 10021
Minnesota	Florence Keller, 6412 Indian Hills Rd., Minneapolis, MN 55439
Mt. Tahoma	Doreen Pohlman, 10623 125th Street East, Puyallup, WA 98374
New England	James L. Jones, 45 Middle St., Lexington, MA 02173
Newfoundland	Bodil Larsen, Site 78, Box 36, St. John's, Newfoundland A1C 5H4
Northwestern	Micheal Moshier, 815 17th Ave., Seattle, WA 98122
Ohio Valley	Harry Butler, Rt. 1, 2521 Penewit Rd., Spring Valley, OH 45370
Ontario	Trevor Ashbee, 57 Winston Cr., Guelph, Ontario, N1E 2K1, Canada
Piedmont	Bobby Wilder, 1213 Dixie Trail, Raleigh, NC 27607
Potomac Valley	Don Humphrey, 6540 Oakwood Drive, Falls Church, VA 22041
Rocky Mountain	Dick and Ann Bartlett, 1569 S. Holland Ct., Lakewood, CO 80226
Siskiyou	Vanca Lumsden, 625 Gibbon Rd., Central Point, OR 97502
Southern Appalachian	Ruth Samotis, 2618 Hebron Road, Hendersonville, NC 28739
Watnong	Barry Yinger, PO Box 565, Far Hills, NJ 07931
Western	Marian Reeve, 4325 Mountain View Ave., Oakland, CA 94605
Wisconsin-Illinois	Tom Horner, 25706 Malchine Rd., Waterford, WI 53185

Bulletin Staff

Editor	Gwen Kelaidis	(303) 322-1410
	1410 Eudora Street, Denver, Colorado 80220	
Advertising Manager	Al Deurbrouck	(412) 653-0281
	6915 Hilkdale Drive, Pittsburgh, Pennsylvania 15236	
Proofreading Assistants	Barbara and Ted Cochrane, Madison, Wisconsin	
	Bernice Petersen, Littleton, Colorado	
Editorial Advisors	Brian Bixley, Toronto, Canada	
	Margery Edgren, Woodside, California	
	Douglas Macdonald, Evanston, Illinois	
Guest Artists	Vickie Danielsen	Jay Lunn
	Martha Blake-Adams	Loraine Yeatts
	Jack Lambert	Donald Leake
	Jarmila Halda	Martha Oliver
	Phil Pearson	Joann Knapp
	Ellie Spingarn	Judy Glattstein
	Joel Spingarn	Dick Redfield
	Charles Oliver	Martin Jones
	Joseph Halda	Robert Bartolomei

Officers

President	Sandra Ladendorf	(919) 942 1734
	123 High Hickory Road, Chapel Hill, NC 27516	
Vice President	Norman Singer	(413) 258-4486
	HC 66, Box 114, Sandisfield, MA 01255	
Membership Secretary	Carole Wilder	(612) 437-4390
	221 West 9th Street, Hastings, MN 55033	
Treasurer	Diane D. Kern	(212) 799-2337 (518) 392 3516
	20 West 86th Street, #12A, New York, NY 10024	
Administrative Member-at-Large	Ernest O'Byrne	(503) 935-3915
	86813 Central Road, Eugene, OR 97402	
President Emeritus	Harold Epstein	(914) 834 1551
	5 Forest Court, Larchmont, NY 10538	

Directors of the Board

1988—1991	Muriel Milsted, Downers Grove, Illinois Nickolas Nickou, Branford, Connecticut Ramona Osburn, Jacksonville, Oregon
1989—1992	Nancy Goodwin, Hillsborough, North Carolina Joan Means, Georgetown, Massachusetts Sandra Snyder, Littleton, Colorado
1990—1993	David Vesall, White Bear Lake, Minnesota Morris West, Brogue, Pennsylvania Barrie Porteous, Agincourt, Ontario

Managers

Executive Secretary	Jacques Mommens	(914) 762-2948
	PO Box 67, Millwood, NY 10546	
Seed Exchange	James L. Jones	(617) 862-9506
	45 Middle St., Lexington, MA 02173	
Bookstore	Jean Stevens & Carole Wilder	(715) 878-4960
	Route 6, Woodland Drive, Eau Claire, WI 54701	
Archivist	Marnie Flook	(301) 778-4038
	RD 3, Box 278A, Chestertown, MD 21620	
Slide Collection	William Plummer	(607) 962-2640
	10 Fox Lane East, Painted Post, NY 14870	
Library	Janet Evans, c/o Pennsylvania Horticultural Society,	
	325 Walnut Street, Philadelphia, PA 19106	

You are invited to join the American Rock Garden Society. Membership includes a subscription to the *Bulletin* and participation in the seed exchange, as well as other benefits. Annual dues, to be submitted in U.S. funds by check on a U.S. bank or by International Money Order, are: General Membership, \$25.00 (domestic or foreign, single or joint); Patron, \$50.00; Life Member, under 55 years old, \$350.00; over 55 years old, \$300. Membership inquiries and dues should be sent to Secretary, ARGGS, PO Box 67, Millwood, NY 10546.

Address editorial matters pertaining to the *Bulletin* to Gwen Kelaidis, Editor, 1410 Eudora Street, Denver, Colorado, 80220. Advertising matters should be addressed to Al Deurbrouck, Advertising Manager, 6915 Hilldale Drive, Pittsburgh, Pennsylvania 15236. The *Bulletin* is published quarterly by the American Rock Garden Society, a tax-exempt, non-profit organization incorporated under the laws of the State of New Jersey. Second Class postage is paid in Millwood, New York and additional offices. Postmaster: Send address changes to *Bulletin of the American Rock Garden Society*, (ISSN 0003 0864), PO Box 67, Millwood, NY 10546.