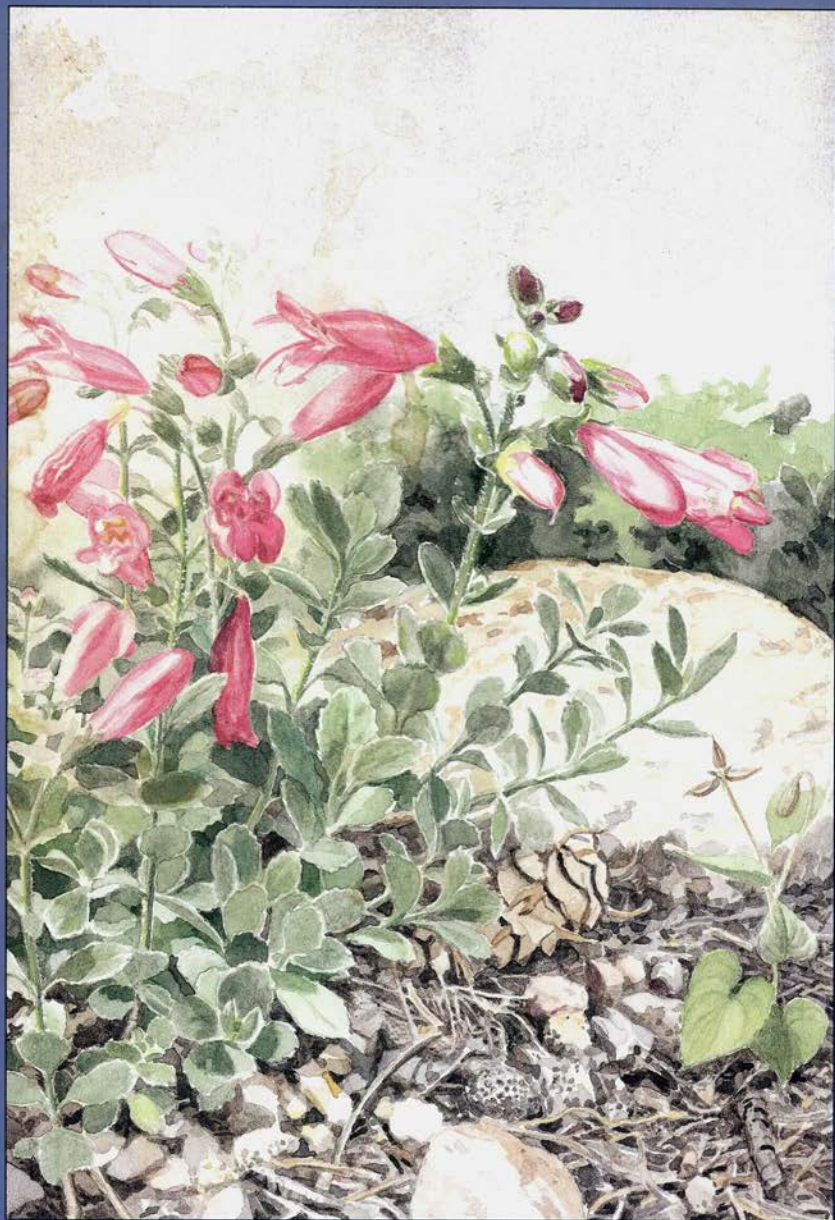


# ROCK GARDEN



## QUARTERLY

VOLUME 54 NUMBER 4

FALL 1996

COVER: *Penstemon rupicola* 'Diamond Lake'  
by Paul Martin of Golden, Colorado

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# ROCK GARDEN

## QUARTERLY

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BULLETIN OF THE NORTH AMERICAN ROCK GARDEN SOCIETY  
formerly Bulletin of the American Rock Garden Society  
VOLUME 54 NUMBER 4 FALL 1996

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# PINKS AND GILLIFLOWERS:

## AN INTRODUCTION TO DIANTHUS

by Nancy McDonald

The pinks that inspired my infatuation with *Dianthus* are neither alpine nor perennial; they are not fragrant nor even particularly showy. Deptford pinks (*D. armeria*) had naturalized in the fields around my childhood home, escaped perhaps from some settler's garden. The tiny, hot pink stars of these annual British natives joined chicory, Queen Anne's lace, and ox-eye daisies in being flowers we were allowed to pick; their one- to two-foot stems provided satisfying lengths for bouquets. Now, decades later, I still rejoice to see those blazing sparks in the tall grass of our orchard and even welcome the occasional specimen into the wilder parts of our garden.

Later in childhood I met sweet williams (*Dianthus barbatus*) growing near an old farmhouse. As a young adult I encountered the old fragrant cottage pinks and tiny, prickly alpine buns. Once I had seen them, I could not let them go. So when I saw an announcement in *National Gardening Magazine* that the American Dianthus Society had recently been formed and was seeking members, I sent them a check and found I was the eighth person to join.

The American Dianthus Society

In 1991, Rand Lee went looking for an American Dianthus Society to join. There was none. Frustrated by the lack of information about pinks in many general gardening references and by the relatively few plant choices available on the market at that time, Rand wrote a letter to *Organic Gardening* magazine, mentioning his interest in forming a society. Seven people responded. The first bulletin was an eight-page, stapled newsletter called *The Gilliflower Times*. (The G is soft, as in the name Jill. Gilliflower is the old name for a number of scented herbaceous perennials, including pinks, stocks, and sweet rocket.) For the first two years, Rand himself largely financed the non-profit society, which had 100 members by the end of the second year. By the end of the third year, there were 250 members, and membership has stayed around that figure ever since. Dues now cover almost all costs. *The Gilliflower Times* has doubled in size and contains articles and letters by members, excerpts from historic documents, and Rand's wonderful *Dianthus Encyclopedia*, which covers (usually) one letter of the

alphabet per issue. Two round robins travel the country; indeed, one sails around the world to an Australian member. New members from all nations are most welcome.

#### The Northern Test Garden

My husband Ira and I garden in Zone 4b, in far northern Michigan. We wanted to grow more pinks and were frustrated to find how little information there was about cold-hardiness of the various types. In addition, much of the available information seemed incorrect, judging from our own gardening experiences. In 1993 we decided to begin systematically testing species and cultivars of *Dianthus* in our gardens, checking both for cold hardiness and for optimal soil mixes.

The pinks we grew already were scattered in various garden beds around our property, each with its own microclimate and slightly different soil. In order to better compare and contrast the behavior of the plants, we decided to build separate beds in just one area. Two existing garden beds were cannibalized and expanded for this purpose. They lie side by side northwest of our house and receive very nearly full sun. Our native soil is essentially sand, with the merest nod at loam, and extremely acidic. Wild blueberries, notorious lovers of acid soil, thrive in an unmown area just a few feet from the dianthus test beds.

The first bed we took over was full of bearded irises, and we called it the Iris Bed. We still do, though all but the standard dwarf irises have been removed; it seemed too much of grind to change the name in all my notes and records, so the Iris Bed it shall remain. It is a raised bed, the sides formed of very large glacial rocks that we dig up everywhere here. In shape it is between a kidney bean and a lop-sided triangle.

The iris bed wasn't much of a success as an iris garden, and it hasn't been much of a success as a dianthus test garden either. I did everything wrong that could be done. Knowing that pinks require good drainage and aeration, I did nothing at all to the soil, which is certainly free-draining, but is also acidic and poor. It grows beautiful moss wherever a plant gets tall enough to shade the surface, but the pinks struggle along with minimal nutrients and low pH. Pinks in general do not require high alkalinity; neutral soil is fine for most. However, our native surface soil tests 5.5–6.0 pH. Acidic soil, provided it is well-drained, will not kill most pinks, but they fail to thrive in it, rendering them easy prey to the first disease, frost, or insect that comes along. Amendment with lime or limestone gravel is a simple thing, if only one knows enough to do it.

My next mistake was to choose seed mixes such as Thompson and Morgan's Rockery Mix, rather than individual species. Many lovely little plants have resulted from that and other seed mixes, but I haven't the faintest notion what they are. I imagine they are second-generation plants from named cultivars: fine for the garden, but useless for testing. In addition, because of the garden's odd shape, it's almost impossible to get close to individual plants to compare them with others. And I failed to map my plantings, so when the deer held evening dances (or whatever it is they did) on top of the garden and lost or destroyed the labels, even those few identifiable species became muddled. This garden is scheduled for renovation next summer; I shall move the pretty pinks to other garden beds where the exact name is immaterial, and start afresh.

The second bed, the Zephyr garden, has been much more of a success. It



was named for Zephyr, the god of the West Wind, because it is one of the westernmost beds in our mowed area. I later learned that in Greek mythology, Zephyr was the husband of Iris. He was the rival of Apollo for the love of the beautiful youth Hyacinth or Hyakinthos—which provides a name for the next bed of the test garden.

The Zephyr is long and narrow and further divided into seven smaller beds, separated by straw paths. Each smaller bed is raised, with large rocks surrounding it. All pinks are close enough to the paths to be admired, compared, and smelled with ease. Each section is mapped as it is planted. Small plastic labels are buried north-west of each plant; in addition, large zinc labels are set out during the growing season, so the plants are readily identified by visitors (and us). And, best of all, the pinks seem abundantly happy with the soil mixes we have made for them.

To ensure that we're comparing apples with apples, we try to grow pinks with similar size, habit, and cultural needs together. Thus one section is devoted to tiny alpine buns; another contains *Dianthus gratianopolitanus* and its cultivars; another is devoted to heirloom garden pinks, and so on. We're still in the process of refining these divisions. Unfortunately, we've already run out of room in several of the sections, so a couple of sections contain a mix of plants. To avoid a pest-attracting monoculture, about a third of the plants grown in the test beds are not dianthus. This gives us a chance to evaluate suitable companions, as well as providing interest over a longer season.

The soil mixes we've used with best success differ only in the amount of limestone gravel incorporated into them. For most pinks, a mix of one part of our native sandy soil, one part

3 *Mermeria rubra latifolia*.  
Broadleafed Sweetc Williams.



very well rotted compost, and one part limestone gravel has proven to be excellent. The sand and gravel provide perfect drainage and aeration; the limestone provides an antidote to our acidic soil, and the compost provides nutrients and enough water-retention to keep the plants happy even during dry spells. Despite the gravel, the beds are full of beneficial earthworms. For the beds containing the smallest, fussiest alpines, we add an extra part of limestone gravel, making that component one half of the soil mix. To supply further soil conditioning and perfect drainage around the crown of the plants, all beds are mulched with a layer of limestone gravel. This is particularly important for the alpine pinks.

#### TRUE ALPINES

True alpine pinks generally form tight, tiny buns or low mats beloved of serious rock gardeners. Our collection of these is small but steadily growing. Trying to grow tomatoes and melons in Zone 4b is a frustrating experience, but it's a great climate for alpines.

4 *Caryophyllus plumaris purpureus*.  
Purple jagged Pinks.



Most years we have little of the muggy heat that elsewhere kills so many mountaintop treasures. We expect to add many more plants as space becomes available, particularly now that we have found a soil mix they like. They take up little room and are delighted with crevices, so one small bed holds a great many.

*Dianthus alpinus* (photo, p. 279) seems happy here once established, though we hear many complaints from gardeners elsewhere. I suspect that even under ideal conditions, *D. alpinus*, like many other pinks, is a rather short-lived perennial. It produces lots of seed but doesn't seem to come entirely true. The cultivar 'Joan's Blood' is particularly bright and floriferous. Like all other color forms of *D. alpinus*, 'Joan's Blood' must be propagated by cuttings; we have found it wise to take cuttings of all our favorite alpine pinks just in case. *Dianthus callizonus* (photo, p. 279) is to my eye even prettier than *D. alpinus* and has done well for us. It is slightly more graceful in form (the flowers seem in better proportion to the size of the plant) and

delicate in color than the types of *D. alpinus* we have seen. Both species are extra-fussy about humidity around the crown, so we make sure to mulch them particularly well with limestone chips.

*Dianthus freynii* has presented a bit of a problem: we have ordered it from three different sources and wound up with three quite different plants. All were very pretty, and the one that most closely matches the description is a delicate, graceful little thing.

*Dianthus subacaulis* (*D. brachyanthus*), which appears under an interesting array of names, is one of my favorites. The growth habit is quite different from the normal run of pinks. Its tiny, glaucous leaves and oddly branching stems present an almost crystalline effect. They are adorned with small, rounded flowers. *Dianthus erinaceus* 'Alba' blooms heavily for us, over its good, tight, 1 1/2" foliage mat.

We think we have at last acquired the true *D. myrtinervius*, an utterly adorable little pink that hails from the high mountains of Macedonia. Its flower stems reach at most 2 1/2" here, though our source (Siskiyou) says they may reach 8", presumably if grown in overly rich soil. It is often said to look like—or even be—a miniature form of *D. deltoides*, the maiden pink (which is what we had always wound up with before), but the description doesn't do it justice. The tiny, bright green leaves do resemble those of maiden pinks, but the flowers are on proportionally much shorter stems, and the growth habit (so far) is much more bun-like.

#### SMALL PINKS

Aside from the genuine alpine are a number of small species that like similar conditions, but which are native to less lofty regions. These we also grow with good results in extra-gravelly soil. They are a mixed lot,



ranging in size and growth habit from alpine-type buns to those with flower stems as much as 10" high. Unlike some of the larger, more carnation-like pinks, these still fit in well with the true alpires.

One of my favorites is *D. nardiformis* (photo, p. 277), from the lower regions of Bulgaria. Its wispy, much-branched foliage gives the effect of a little blue-green ground fog, much like *Petro-rhagia saxifraga*, though the dianthus flowers are much larger than those of tunic flower. It begins to bloom many weeks later than the true alpires in our garden, even later than many of the cottage pinks, giving a welcome extension to the season. *Dianthus arenarius* (photo, p. 280) bears lovely, fringy, lightly fragrant white flowers over blue-green leaves for a long period in midsummer here. It is far less fussy than the alpires, though like all pinks it needs good drainage and aeration.

*Dianthus monspessulanus* is a pleasing thing, reminding me of a smaller version of *D. superbus*—which, charming though it is, is too large for most rock gardens. *Dianthus monspessulanus* makes a reasonable substitute, with its grassy foliage and fragrant, deeply fringed flowers. (Though for your own sake, grow *Dianthus superbus* (photo, p. 279) elsewhere in your garden if you have any space at all.) Here again, though, there seems to be confusion—Liberty Hyde Bailey calls *D. monspessulanus* "a good, showy, scentless garden pink." Other texts insist it is fragrant, and certainly the plant we have here is well-scented.

*Dianthus arvensis* is another species we have found to be confusing. Bailey describes the true species, which is relatively large, and then goes on to say that the pretty mat-former available in commerce is something else entirely. But what? Our plant matches his second description, which



he says is similar to *D. freynii*. Rock gardening is fraught with interest.

*Dianthus sylvestris*, the wood pink, is a pretty little plant that did well with us for years and then incontinently died last winter. It wasn't just one plant, either, but a number of them, some from commerce and others from seed collected in the Alps, and even a subspecies. Not one survives. We had 16' of snow last winter, which may have done it, though all the other pinks enjoyed their heavy blanket. In any case, it is worth trying; we enjoyed it while we had it.

There are many other small species of pinks (and their cultivars), but I find in my notes an awful lot of statements like "Does not match description" and "Mislabelled." This confusion, of course, is what the test garden is meant to clear up.

A number of cultivars of mixed parentage are available to the rock gardener. Gary Eichhorn's wonderful 'Berry Burst', introduced in 1993, is one we particularly like. The foliage mat reaches about 3", but it's hard to judge, because almost every stem goes

on to bloom. Flowers stalks reach 8" here. The single flowers have a background of strong raspberry-pink, with a burgundy-red center that bursts: it shoots random streaks of burgundy out into the petals. Each flower is different. 'Berry Burst' is very hardy and very floriferous, and I recommend it highly.

*Dianthus x allwoodii* 'Alpinus Group 9' (photo, p. 278) is also fully hardy here and is another medium-sized pink that covers itself with bloom for a long time. The pale pink, single flowers have deeper tinted eyes and a nice fragrance. This would be another good choice for those who like the old cottage pinks but want a plant with a smaller growth habit.

'Queen of Henri' (photo, p. 278) and its near lookalike, 'Waithman's Beauty', are often confused in the trade. Both are well worth growing. Their flowers have a rich, plummy background adorned with paler fringe and two pale pink eyes in each petal.

'Ring of Fire' (photo, p. 275) is a remarkably floriferous cultivar with single, strong pink flowers, each marked with a strong central crimson ring.

'Pauline' (photo, p. 276) has 3" foliage and 5" flower stems, with pale lilac-pink, single flowers, each marked by a pentagonal, maroon eye. It is a cheerful little plant and satisfyingly floriferous.

The list of small pinks suitable for the rock garden is very long.

#### CHEDDAR PINKS

*Dianthus gratianopolitanus* (photo, p. 276) is native to Cheddar Gorge in England (also the original source of the cheese). It was once known as *D. caesioides*, a name whose loss is mourned by all; *D. gratianopolitanus* cultivars are now known mostly as "grats." The species forms particularly satisfactory mats of silvery, blue-green leaves and

sends up dozens of delightfully fragrant, medium-pink flowers. The color even in the wild population is quite variable. This species has been much used in breeding; the available cultivars bear varying resemblance to the original Cheddar pinks. It's hard to beat (though it's also hard to find) the true species, but we've had good luck with a number of cultivars. They are myriad; I shall only mention some favorites. 'Karlik' has gray foliage and covers itself with highly fringed, richly scented flowers every year. 'Rose Dawn' is similar to, and in my opinion nicer than, the popular 'Tiny Rubies'—the color is slightly less harsh. Both are well worth growing, with tiny double flowers over blue-green foliage. 'Petite' is really tiny, and in fact looks more like an alpine bun than a grat. In the three years we've had it, it's always been the first dianthus to flower. It is a charmer with—surprise!—small, blue-gray-green leaves and small, medium-pink flowers.

I would caution you against 'Bath's Pink'. It is a wonderful cultivar, and always blooms, even here, but it gets enormous. An acquaintance in North Carolina reports a single 'Bath's Pink' 5' across. It is a wonder and a joy—and the best pink for steamy climates—but it is not something to mingle with your alpine.

'La Bourboule' (often misspelled 'La Bourbrille' and 'La Bourbille') and its white form are both wonderful little plants and very floriferous. 'Oakington' (again with several similar aliases) is another charming double. 'Pike's Pink' is a fetching little semi-double, fragrant and small, and for some reason we find it difficult to satisfy, though other gardeners report good success. 'Fire Witch' ('Feuer Hexe' in the original German) has very bright pink—nearly magenta—flowers over nearly blue foliage. 'Crimson





Old *Dianthus plumarius* cultivar (p. 281)

photos, Nancy McDonald

*Dianthus barbatus* 'Homeland' (p. 282)





*Dianthus deltooides* ex 'Steriker' (p. 283)

photos, Nancy McDonald

*Dianthus* 'Aqua' with *Thymophylla tenuiloba* (p. 281)







*Dianthus* 'Ursula Le Grove' with lavender  
(p. 281)



*Dianthus* 'Prairie Pink' (p. 283)  
photos, Nancy McDonald

*Dianthus* 'Ring of Fire' (p. 72)  
with *Scutellaria alpina* 'Alba'



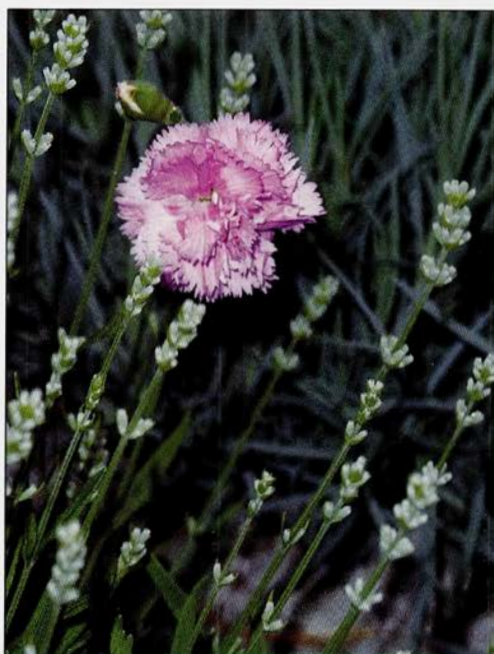
*Dianthus* 'London Lovely' (p. 281)  
with an unnamed *Dianthus gratianopolitanus*







*Dianthus* 'Dad's Favorite' (p. 281)  
with *Nepeta reichenbachiana*



*Dianthus* 'Rose de Mai' (p. 281)  
photos, Nancy McDonald

*Dianthus gratianopolitanus* (p. 272)  
with *Alchemilla mollis*



*Dianthus* 'Pauline' (p. 272) with mossy  
saxifrage and *Veronica spicata* 'Nana'







*Dianthus nardiformis* (p. 271)

photos, Panayoti Kelaidis

*Dianthus anatolicus*







*Dianthus*, sops-in-wine type,  
possibly 'Queen of Henri' (p. 272)



*Dianthus* 'Lady Granville' (p. 281)

photos, Nancy McDonald

*Dianthus* x *allwoodii* 'Alpinus Group 9' (p. 272)



*Dianthus haematocalyx* var. *sibthorpii*







*Dianthus superbus* (p. 271)



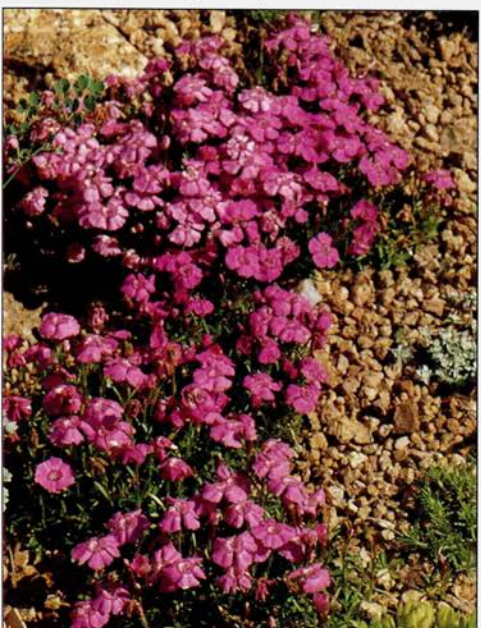
*Dianthus pavonius*

photos, Panayoti Kelaidis

*Dianthus callizonus* (p. 270)



*Dianthus alpinus* (p. 270)







*Dianthus cf. arenarius* (p. 271)

photos, Panayoti Kelaidis

*Dianthus carthusianorum* (p. 282)





Treasure' is a real favorite here; the plentiful flowers truly are crimson, and are finely dusted with tiny hairs that glint golden in the sun. 'Little Boy Blue' has especially blue foliage, with small white, pink-centered flowers on relatively long stems for a grat. 'Spotty' and 'Dottie', bred by the Fleming brothers, are widely available under a number of aliases and are certainly worth growing. 'Spotty' is a good choice for those who like the look of old cottage pinks with double-eyed petals, but want a plant sized for the rock garden. There are many more fine grats than could be mentioned in this brief listing. I never met one I didn't like.

#### COTTAGE PINKS

*Dianthus plumarius* (photo, p. 273), the cottage pink, is the original parent of many of the finest old fragrant garden pinks. Many plumarius types are too large and carnation-like to fit in with small alpine plants; but for those who grow larger plants among rocks—lavenders, hyssops, thymes, and so on—cottage pinks can be used to good effect. I shall mention just a few of our favorites. *Dianthus plumarius* var. *lumitzeri*, from Austria, is small enough to fit well somewhere in most rock gardens. It's more the size of a large grat and is entirely graceful and lovely with its blue-green foliage and finely fringed, white flowers. 'Ursula le Grove' (photo, p. 275) is a floriferous single white with varying burgundy-red markings, reminiscent in that respect of 'Berry Burst'. She has a rather lax habit, so I grow her through and around lavender, which we also test here. (Fifteen cultivars of *Lavandula angustifolia* have proven hardy so far. The secret is the same as for *Dianthus*: full sun, good drainage and aeration, and neutral to alkaline soil; large rocks around the base of the

plant help provide the baking this Mediterranean plant needs.) *Dianthus plumarius* 'Rose de Mai' (photo, p. 276) is fully double, creamy pink, and intensely fragrant. 'Queen of Sheba' is one of my favorites. She dates from the time of Shakespeare and bears single burgundy flowers with two distinctive flame-like eyes on each petal. 'Lady Granville' (photo, p. 278) is a very pretty, mid-nineteenth century pink. She bears semi-double, white flowers strikingly marked with intense, red raspberry centers and lacing. 'London Lovely' (photo, p. 275), like all the 'London' series, is beautifully marked. It is single to semi-double, its pristine white background showing off the deep crimson centers. 'Dad's Favorite' (photo, p. 276) is one of my favorites. It is fairly double and, like so many of my favorites, it, too, is white with crimson-maroon markings. Though extremely showy; I do wish it were more fragrant. 'Aqua' (photo, p. 274) is a good double white for those who cannot bear the calyx-bursting tendencies of dear old 'Mrs. Sinkins'. For more information about these entrancing pinks, see Rand Lee's article.

#### CLUSTERHEADS

Sweet williams (see below) and many other species are known as clusterhead pinks, because they bear clusters of flowers, instead of just one or two, at the top of each stem. The individual flowers in the cluster open over a period of weeks or months. In general they are not fragrant. They tend to be strong-stemmed meadow plants—my *D. armeria* is one—and able to withstand drought and rough weather with impunity.

Most of the clusterheads are inappropriate for the rock garden (well, not for mine, but maybe for yours). The yellowest dianthus, *D. knappii*, is one of these, and although it is a pret-

ty, pale yellow, it is really best grown in a meadow. Of greater interest to me are *D. carthusianorum* (photo, p. 280) and *D. giganteus* (sometimes considered a subspecies of *D. carthusianorum*). These odd plants produce tall, very strong stems—to 24" in *D. carthusianorum* and to 36" or more in *D. giganteus*—topped with burgundy buds and small, ultra-hot pink flowers. The stems grow out of a narrow base, perhaps 10" across in a large plant, but angle out to as much as 45°; the net effect is that of a partially buried Sputnik. The stems are strong enough to withstand even our nor'westers, which scream down across Lake Superior and flatten half the garden. (Our winds are so strong here that if we wanted to grow corn, we'd have to stake every plant.) My description of the plant is not appealing, but in person it has a certain *je-ne-sais-quoi*: a presence, a cheerfulness, a devil-may-care sprightliness. We keep one in the test garden largely to make people look twice; the rest grow in the meadow or in the main garden among such plants as sea holly, where the rather awkward habit is not apparent, but the tiny, hot pink sparks are welcome.

#### SWEET WILLIAMS

*Dianthus barbatus*, the sweet william, is again not a plant one considers for the rock garden. Yet it has great charm; for those with a partly shaded nook and room for a slightly larger plant, it is a welcome source of color. The many modern cultivars range from overloaded dwarf monstrosities to tall plants bred for the Japanese cut flower trade. Older cultivars and old seed mixes gathered in cemeteries and at old home sites tend to be my favorites.

Incidentally, sweet williams are not sweetly scented. Liberty Hyde Bailey

insists the wild form is scentless. The Dianthus Society is trying to locate a true sweet william with more than a tiny bit of fragrance; everyone remembers the fragrance from childhood, but somehow no one can produce a fragrant plant. It is our hypothesis that nostalgia provides the sweetness. In addition, sweet williams cross fairly readily with other pinks that do possess fragrance, so people may be remembering crosses and not the species. We're working on stabilizing a seed strain that is a cross between the supremely fragrant *Dianthus superbis* and sweet williams of the old 'Harlequin' type. The flowers of 'Harlequin' open white and age to pink, producing flowers of several different shades on each flower head. The seed strain we're working on produces lusciously fragrant flowers that change color, in forms intermediate to the two parents. Watch for 'Harlequin Superb' in the next few years.

Among my current favorite sweet williams is 'Homeland' (photo, p. 273), which bears strong, deep crimson flowers with pure white central eyes. It is a striking and much commented-on plant in the garden.

#### MAIDEN PINKS

*Dianthus deltoides*, the maiden pink, is a showy, drought-tolerant, easy plant, but it is emphatically not for the rock garden—though it is entirely appropriate for a garden containing rocks. It rather alarms me how often I see it listed in rock gardening texts and articles. I am fond of the bright, small, cheerful flowers of maiden pinks, but they seed themselves far too freely to be trusted amongst smaller or rarer plants. I make an attempt to shear them back after bloom to prevent seeding, but always seem to miss enough pods or late blooms to provide dozens of seedlings. The foliage is



bright green and vigorous, and quickly becomes attractive again if the plants are sheared after bloom. In our garden, maiden pinks grow prettily among old rambler roses, in a bed far removed from the test gardens. I particularly like the white form with a bright pink or crimson eye; two forms of this are 'Red Eye' and 'Arctic Fire'. 'Steriker' (photo, p. 274) is unusual among maiden pinks in having flowers an inch across. It is easy to please and floriferous, but the color is too intense for me: a fuchsia pink that is as near to neon as possible in the botanical world.

#### CARNATIONS AND BORDER CARNATIONS

*Dianthus caryophyllus*, the carnation, and its descendant, the hybrid border carnation, can have beautiful flowers but have proven not to be cold-hardy in Zone 4b. I occasionally buy one to treat as an annual, but none has ever survived our winter. In addition, they seem too heavy and congested somehow to fit into any but the most liberal rock garden schemes. 'Prairie Pink' (photo, p. 275) is a new carnation-like pink introduced by Dale Lindgren of the University of Nebraska. It is certainly very pretty, with its large, bright pink flowers. I am skeptical that it will be hardy here, but Nebraska is no picnic, either.

#### CHINA PINKS

*Dianthus chinensis*, the China pink, is a biennial or short-lived perennial generally treated as an annual. Most available cultivars are complex hybrids that as often as not prove to be reasonably perennial. Here they occasionally overwinter, particularly when we have good early snow cover, but again, few of them would fit into the classic rock garden.

#### Confusion in the Trade

When I first started collecting pinks, long before we founded the test garden, I noticed that there was considerable confusion in the nursery trade. Not only are the names confused and confusing, but the plants themselves have added to the problem; they are completely promiscuous. No, I exaggerate: not all species of pinks will interbreed. But enough will that it is generally unsafe to rely on collected seed of species except in isolated wild populations. I have learned to either obtain wild-collected seed or to buy plants from a specialist nursery that has taken the trouble to confirm identifications. For the gardener who just likes pinks, this is no doubt less troublesome, but we feel that the test gardens are meaningless if names are inaccurate. I do not wish to sound as if we are policing the industry (heaven forbid!), nor would it be possible, but one of the goals of the American *Dianthus* Society is to attempt to straighten out the muddle and gently notify nurseries of incorrectly labelled plants in their stock. Most nursery owners have been glad to have help with identifications.

The naming problem becomes even worse with named cultivars, particularly the older ones. No old cultivar of *D. plumarius*, for instance, will come true from seed; they must be vegetatively propagated. Vendors who are either unaware of or unconcerned about this can distribute hundreds of misnamed plants in a hurry. In addition, well-meaning but unenlightened gardeners save seed of named cultivars and distribute them through the seed lists. In this way, many fine, old—and not so old—cottage pinks have been lost.

The names themselves lead to great confusion. "Sops-in-Wine" was originally the common name for any clove-

scented pink used to flavor wine. In more recent years it has come to mean any small-flowered pink with two regular "eyes" on each petal. 'Pheasant's Eye' is another old name that once could mean any of a wide range of cottage pinks but is now generally used for a particular cultivar. Even modern names get corrupted. The Fleming brothers, honored members of the American Dianthus Society, bred the charming 'Spotty'. The name is commonly seen as 'Spottii' or the completely invalid *D. spottii*, even on commercially printed plant labels.

I do not mean to blame the nursery industry for identification problems. Pinks look an awful lot alike when not in bloom, leading to much confusion. We are grateful to receive excellent forms of dianthus even if the identity is uncertain. For example, the plant we know as *D. gracilis* 'Alba' is one of our favorites. It has produced a delightfully tight, silvery blue-green mat fully 24" across, with very fine foliage about 3 1/2" high. Over this it sends up 8" branching stems, each bearing six buds. The softly scented flowers open palest pink and rapidly fade to white with a pale green eye. The petals are very fringed, so although the flower is about an inch across, it appears smaller. It is altogether satisfactory in and out of bloom. There is only one problem: the plant doesn't match its description in reference books, and Montrose Nursery, from whom we bought it in 1993, said they were unsure of its identity. We encourage other nurseries to follow suit: distribute worthy plants by all means, but admit to any uncertainty in identification. This plant deserves to be in commerce, whatever it is—but it also deserves to bear its proper name, or at least not an improper one.

The prolificacy and promiscuity of pinks is a problem not only in com-

merce, but also in the garden. If you let your pinks go to seed, you may find a wide array of offspring, some closely resembling the seed parent and others very different. Undoubtedly all will be charming, and most gardeners don't care. But if you are very interested in keeping track of species, or are growing plants for sale, or if, like me, you have a botanic-garden-style planting, you'll want to control the seedlings. I use kitchen shears to dead-head my pinks. I wait until the first seed pod on a given plant begins to open, then shear them all off. I wait that long because I do save seed, but only in broad categories: alpine and small rockery pinks (including the smaller grats); larger grats and *plumarius* types; sweet williams; *deltoides* types; other clusterheads; and superb pinks. Because the pollen of so many kinds of pinks is available in our garden, I don't trust any of the seed to come true. (The one exception is the yellow *D. knappii*, which is stingy about crossing with other pinks; it invariably breeds true, in my experience.) Perhaps I am overcautious, but until I have learned more about the crossing of pinks, I'd rather err on the side of caution than distribute misnamed dianthus seeds.

### Propagation

Dianthus are among the easiest plants to start from seed. Use well-drained, soilless mix (I mix one part milled peat, one part fine vermiculite, and two parts coarse sand.) Just cover seeds, water, and keep at about 70°F. Most seed will be up within a week.

Cuttings (or pipings, as they are known to dianthus growers) can be a little tricky, as they are prone to rotting. I've had good luck rooting them in both coarse sand and with Oasis Rootcubes. Simply tug a non-blooming stem apart; with even pressure, the



stem will pull out just above a leaf node. Shorter cuttings are most effective, and non-blooming stems make the strongest plants. Be conservative with water (do not place under mist) and keep at around 70°F. In non-sterile home conditions, I have a 50–70% success rate. I do not use any rooting hormones.

#### Diseases and Pests

Other than crown rot caused by soggy soil, I've never had trouble with disease in the garden. Pests include rabbits, deer, and spider mites. The spider mites can be controlled by spraying plants regularly with the hose; I suppose deer and rabbits could be, also, but you might get tired of sitting outside all night.

#### Companions

Approximately one-third of the plants in the test garden are not *Dianthus*. We believe that this is safer than growing a pure monoculture of pinks, though here again perhaps we are overcautious. In any case, it adds considerable interest to the garden and lets people see the kinds of plants that work well together. Neighboring plants can also help set off the pinks, and emphasize the choicest blue-green foliage and delicate flowers.

Any plant that is fond of the same conditions—sun, good drainage, and neutral to sweet soil—can co-exist with *Dianthus*. Of course you must be cautious about overly rampant neighbors, particularly those that invade by root or stolon. We're particularly sensitive to this in the test garden; far more so than in our regular garden beds. Many of the older cottage pinks are superb weavers; indeed, many work best if used that way. We also take considerable care to grow similarly sized plants together; it doesn't take much to overshadow an alpine bun.

It's fun to search for plants with complementary form and color. In general, the only other things we avoid are masses of flowers in shades of harsh yellow-gold, orange, and scarlet (orange-red), though pale apricot and pale or straw yellow can be lovely with pinks. But even clashing colors can work well together in small, delicate flowers. The possibilities for companions with pinks of any size are virtually endless, so I list here only a few favorites that have done well with us.

Buns, of course, are fun to grow with other buns. For some reason I'm much amused by planting things with *Dianthus*-like foliage among the pinks, so I like *Edrianthus pumilio* (which I sadly lost in the relatively snowless, particularly cold winter of '94-95) and *Acantholimon glumaceum*. Some drabas can look vaguely *Dianthus*-like out of bloom, as well. *Armeria juniperifolia* is said to prefer peaty soil, but both it and its cultivar 'Victor Reiter' seem perfectly content amid the limestone chips. *Campanula trogerae* also seems to like it there. I am a great fan of hens-and-chicks, unpopular though they may be (too easy, right?). With the truly tiny pinks I like to grow the minuscule *Sempervivum x barbulatorum*, whose largest hens are barely more than half an inch across. Sedums are generally too robust to go here, but I do allow the fetching little *Sedum corsicum* as well as *S. hispanicum* var. *minus*.

It is much easier to find companions for pinks that are larger than buns but still small. Many of the rockery penstemons are logical first choices. *Penstemon crandallii* ssp. *procumbens* is a particular favorite, as are *P. davidsonii* and *P. fruticosus* cultivars 'Holly' and 'Purple Haze'. Among these larger pinks I plant sempervivums with slightly larger rosettes; *S. ciliosum* and its hybrids are especially choice, for all



that they present no challenge. We've tried some of the creeping veronicas here, but I fear they may prove too invasive and will need to be placed among the largest pinks; but *Veronica liwanensis* and *V. oltensis* are certainly attractive. More well-behaved is 'Waterperry Blue', which seems to keep itself to itself, at least here. *Nepeta phyllocllamys* is another good companion and very pretty. *Dracocephalum botryoides* is one of my best-beloved plants of any kind. *Plantago bautii* and *P. carinatum* (another look-alike) are among my favorite new acquisitions. And there is a saxifrage for nearly every situation.

The larger grats and the *D. plumarius* hybrids offer still more scope. Favorite companions are the showy *Tanacetum haradjanii*; *Achillea x kellereri*; *Scutellaria alpina* 'Alba'; *Dracocephalum renatii*; *Penstemon* 'Prairie Dusk' and others; *Centaurea simplicicaulis*; the larger sempervivums (far too numerous to list); *Veronica spicata* 'Nana'; *V. 'Pavane'* and *V. 'Giles van Hees'*; *Lavandula angustifolia* 'Nana' and 'Nana Alba', and even some of the larger cultivars, which look superb with old pinks interwoven among the stems. We continually experiment with new plants from seed. I think we will like *Stachys iva* and *Zinnia grandiflora*, new to us this year.

I am also experimenting with annuals here: some of the smaller, politer *Linaria* species and cultivars; *Eschscholzia caespitosa* 'Sundew'; *Ionopsidium acaule*; *Tetranneuris* (syn. *Hymenoxys*) *linearifolia*; and *Zinnia peruviana*, which, despite being scarlet, is so delicate and pretty as to win the heart of the staunchest annual-despiser.

#### For Further Reference

If you are more than slightly interested in *Dianthus*, you will want to join the American Dianthus Society.

Membership is \$15/year US, US\$18/yr. Can, Mex.; US\$20/year elsewhere; contact Rand B. Lee, PO Box 22232, Santa Fe, NM 87502.

By far the most useful reference book for rock gardeners (other than floras and entries in general rock gardening encyclopedias) is *The Garden of Pinks*, by Liberty Hyde Bailey (MacMillan, 1938), unfortunately out of print. The book gives considerable detail about the species as well as cultural information. Of course some names have changed since this book was published. Bailey was clearly infatuated with the genus, so we get his usual careful writing enlivened by his fondness for pinks. The book is illustrated by wonderful line drawings.

For photographs and information about both old and modern cultivars of garden pinks, I recommend Richard Bird's *Border Pinks* (Timber Press, 1994), Sophie Hughes' *Carnations and Pinks* (Crowood Press, 1991), and Phillips and Rix's *Random House Book of Perennials*, Volume 2 (Random House, 1991). There are a number of other, older books on the genus, but they tend to emphasize carnation culture and are probably of minimal interest to the rock gardener.

Drawings on pp. 269-271 from John Gerard herbal, 1597. Drawings p. 266, 291 from *The Garden of Pinks* by L. H. Bailey. Copyright 1938 by Macmillan Publishing Company, renewed 1966 by Ethel Zoe Bailey. Used by permission of Macmillan USA, a Simon & Schuster Macmillan Company.

Nancy McDonald is an avid gardener, who loves to grow and collect any plants that will survive in her zone 4b garden. She gardens with her husband, Ira, in Grand Marais in the Upper Peninsula of Michigan. Nancy is editor of *The American Cottage Gardener*, a meaty quarterly available for US\$40, £25 overseas.

# SMALL HONESTIES:

## FRAGRANT SPECIES PINKS

by Rand Lee

I wish I could tell you that I spent my Connecticut childhood planting dianthus slips with my wee fingers, but I did not. I came to a gardener's appreciation of the genus rather late. I knew what pinks were, of course: My late mother, who taught me to garden, had a few clumps of single cottage pinks in her rock garden, along with sheets of pastel *Phlox subulata*. I also know sweet williams. My grandmother had swiped some sweet william seeds from Mount Vernon after the war, and I can still see the rich green succulence into which they grew, feel the velvet of their white and maroon petals under my fingers, and smell their astonishing perfume. I have never met sweet williams as fragrant since, and that is a great pity, because then as now, fragrant flowers are my greatest love.

When I moved in 1987 to Santa Fe, with its 15 inches of rainfall annually (in a good year), I learned a new word—xeriscaping—and began a rather frantic search for fragrant flowers that could withstand drought and high-ultraviolet summer light. In the course of this, I rediscovered the genus *Dianthus*.

I learned that many species in the genus had evolved under dry mountain conditions somewhat similar to those facing me in Santa Fe. I learned that the heavy, concrete-hard clay of my rented 300-square-foot yard was far too poorly drained to be suitable for dianthus culture. I would have to dig in a great deal of coarse sand, crusher fines, and compost before I could plant my first test specimens. I learned that in-depth literature on the genus applicable to North American gardeners was virtually impossible to find. I learned that if I wanted to join a North American dianthus society I would have to start one myself. And I learned that of the approximately 300 *Dianthus* species, only a handful have evolved scent.

*Dianthus caryophyllus*, the five-petaled "single" wild carnation, was perhaps the first scented dianthus brought into gardens. It may or may not have been the divine flower (Di + *Anthos*) mentioned by Theophrastus, the pre-Christian Greek naturalist, but according to Mark Griffiths in *The Index of Garden Plants*, something like it is found still in the Mediterranean area. The original appears to have



been a vivid purplish-red and deliciously fragrant. Five-petaled carnations still crop up occasionally in some of the modern, mostly double, open-pollinated carnation seed strains, such as the Victorian *D. caryophyllus* 'Grenadin' or the more recent 'Vienna' (syn. 'Early Dwarf Vienna', 'Vienna Dwarf') and 'Fragrance' (syn. 'Dwarf Fragrance').

However, none of the carnations make particularly good garden plants. The tall ones, sturdy stems notwithstanding, have a noodly way of flopping about when rain, wind, or dog brushes against them. This is useful if you are a wild carnation growing on a castle wall, but it is irritating in the border, stake or no stake. Moreover, the short bedding forms, like the 8" tall 'Monarch' strain, look ghastly anywhere but in a pot—which, not coincidentally, was a favorite method of carnation culture for many centuries.

The second scented species to find its way into cultivation is also fairly untidy. It is *Dianthus plumarius* (syn. *D. hoppei*, *D. hungaricus*, *D. lumnitzeri*, *D. praecox*). This flower has had many common names down through its long history—feathered pink, grass pink, snow pink, and single cottage pink—but my favorite is one coined by the Tudors: small honesties. In the wild, *D. plumarius* makes loose, bluish-green tufts of narrow pointed foliage on branched stems to about 16" tall. Its small, sweetly-scented, five-petaled, toothed flowers are held in loose clusters. They open plain pink or white, sometimes with a darker eye-zone. The dark-zoned forms gave rise very early to the pheasant-eye pinks, which boast a circle of contrasting color around the center of each flower. These wild feathered pinks are a far cry from the luscious, named, double forms developed by gardeners through the centuries, but every gen-

eration rediscovers their refreshing simplicity and directness.

Another old denizen of Western gardens, grown since the mid-17th century, is *Dianthus gratianopolitanus*, the rosy and beautifully scented Cheddar pink. I have never seen the pure species, which makes low gray mats 4-6" tall when in flower. As Nancy has told you all about the grats elsewhere in this issue I will not repeat her efforts here. However, I must put in a good word for 'Tiny Rubies'. Not only is it a good beginner's rock plant, and not only do its fully double, sweetly perfumed, delightfully vulgar little blossoms resemble those of the carnation, but unlike the flowers of carnations, the flowers of 'Tiny Rubies' taste like cloves when fresh or candied. Who could resist growing a plant of which that could be said?

A fourth early fragrant introduction is the superb pink or sweet john, *Dianthus superbus* (syn. *D. speciosus*), an undisciplined but winsome flower distributed very widely throughout Europe and Asia. The books call them short-lived perennials usually grown as biennials, but they are extremely cold-tolerant and bloom the first year from seed sown indoors under lights in February. Their foliage is tender, narrow and green, resembling that of a starved sweet william or China pink; the basal leaves are about 3" long. The flowering stems start by wandering a bit along the ground; then they turn skyward, and by the time they have reached 2' tall, they have put out branches and loose bud clusters. It is then that superb pinks earn Linnaeus's accolade. The buds open into ethereal confections of white, pink or purplish rose, petals so deeply fringed one wonders how they stay attached. Best of all, their perfume is as soft, as sweet, and as penetrating as fairy music, particularly before and after the

full blaze of the day. Hawk moths go nuts for them.

*Dianthus* x 'Loveliness' (syn. 'Rainbow Loveliness') is a complex, open-pollinated *D. superbus* hybrid that illustrates not only the wonders hidden in dianthus DNA, but also the folly of imagining one can tell at a glance whether something is a pink or a carnation. 'Loveliness' yields plants that are larger, more colorful, and longer-blooming than *D. superbus*, and the flowers are very nearly as fragrant. It springs (hold onto your hats) from a cross between a white-flowering superb pink and the sweet Wivelsfield. The sweet Wivelsfield, first raised by the United Kingdom's Montagu Allwood in 1920, is itself a secondary hybrid of a perpetual-flowering Allwood pink and a sweet william. The Allwood pinks (*D. x allwoodii*) arose from the blood of an old fringed white garden pink and a perpetual-flowering carnation. It is very likely that the perpetual-flowering carnations are the product of experiments with the carnation and the scentless China pink.

So *D. x 'Loveliness'* is sort of a dianthus United Nations, a *wunderkind* born of *D. superbus*, *D. barbatus*, *D. plumarius*, *D. caryophyllus*, and *D. chinensis*. It is any wonder that I felt we needed a dianthus society in this country?

Lesser known than *D. superbus* are a number of spring and summer blooming pinks that can be much longer-lived than the superb pink. *Dianthus arenarius*, the sand pink, is one of the easiest to grow. It is hardy to Zone 3 at least. It has been found dependably perennial in Finland. Despite its name, it does not need dune conditions in order to thrive. Even in my soil, which is still essentially alkaline clay (despite having been much augmented with mushroom compost and sand), *D. arenarius* makes lovely, grassy emerald

tufts to about a foot high, topped in early to midsummer with five-petaled, deeply fringed, bearded, white flowers of exquisite scent. After a mild Santa Fe winter some years ago, I was surprised to see my sand pinks in bloom as early as April. In cool climates, late summer to early autumn rebloom is not uncommon.

*Dianthus fragrans* is a rarity that I have yet to grow, but I have longed for it ever since I ran across mention of it in L.H. Bailey's *The Garden of Pinks*. It is not mentioned in Mark Griffiths's *Index of Garden Plants*, possibly because the name has been flung around casually for years, but the *Flora of USSR* notes it as a legitimate species and so does *Hortus III*. *Dianthus fragrans* is by all accounts a lime-loving, many-stemmed perennial growing 12" or more tall, bearing in summer rounded, rose to white, very fragrant flowers deeply and sharply toothed, held singly or in twos or threes at the end of their stems and frequently spotted with purple. The species is said to be native to the subalpine meadows and limey rocks of northern Africa, the Caucasus, and southern Russia.

*Dianthus furcatus* (syn. *D. alpester*), literally the forked pink, is another rarity in the dianthus trade. It comes from the eastern Pyrenees and is described in the literature as a variable, spreading mat-former 6-8" tall with more or less four-angled stems. The fragrant, clear rose flowers, occasionally white, are born on long stalks June to August, usually one per stem, sometimes two or three. The petals are nearly smooth-edged; where dentate, the teeth are short. It is native to the mountains of southwest Europe. Two related species are *D. pungens* (translates as the sharp pink) and *D. hispanicus*, the Spanish pink.

The Gallic pink, *D. gallicus*, is easier to locate, but not by much. It is native



to the Atlantic coasts of the Iberian peninsula from Portugal to northern France. The whole plant is a rough, loose, trailing mat of dark bluish-green, with short, narrow, rather blunt leaves, hairy at their bases. The fringed, rose-pink flowers, one to three of which tip each branchlet in summer, are about an inch wide and sweetly scented. The Gallic pink prefers a sandy soil and excellent drainage; give it what it needs, and it can be hardy to Nebraska. For a perennial it is a pretty quick bloomer, opening its first flowers in August from a February sowing under lights; and it is perfect for planting in walls and rock crevices, where it can droop downward to its heart's content.

*Dianthus petraeus* (syn. *D. bebius*, *D. kitaibeli*, *D. noeanus*) hails from Croatia and environs and is hardy at least to Zone 4. It makes a loose, green, prickly basal mat about an inch high. From this arise 6-10", leafless stems, each terminating in one beardless, evenly notched, perfumed, white flower—except when the flowers are pink, bearded, held in clusters, deeply divided, or nearly smooth-edged. This dianthus species, like all too many of the others, is notoriously variable from seed. The way to tell if you have the real *D. petraeus*, rather than some other floppy little pink, is to look at the leaves. In the true species, each has three prominent little ribs or nerves, no matter what the flowers look like.

Very closely related to *D. petraeus* is another fragrant species, *D. spiculifolius*. In summer it bears deeply cut, distinctly bearded, pink flowers to about an inch broad. Presumably, the leaves are distinctly spiked-looking, but to be perfectly frank I have never located it in commerce, so I do not know if the leaves of *D. spiculifolius* are more narrow and spiked than leaves of the other dianthus species, just as I

do not know if the flowers of *D. fragrans* are more fragrant than the flowers of other dianthus.

I do know that the Ukrainian wildflower, *Dianthus squarrosus*, is rock-hardy and easily grown on well-drained soil, because it is growing in my garden as I write. It forms dense, grass-green tufts to 8" high, topped in summer by white, deeply fringed, five-petaled blossoms possessing all the delicacy of fine lace. Like many of the shorter, fragrant pinks, it is best planted *en masse*, so that you can receive the full impact of its perfume when you walk through your garden, particularly at night.

When the *Index of Garden Plants* fails to mention a dianthus appearing in all my other authorities, I begin to get nervous. Nonetheless, *Dianthus acicularis* deserves mention, if only because some of you might have something out there labeled that, and could send me a division or two of it. According to Bailey and two floras, *D. acicularis* inhabits rough ground and sandy woods of eastern Russia, the Ural Mountains, and western Siberia. It is a perennial, making attractive, dense thickets of tufted clumps from about 5-11" tall, bearing fragrant, white, somewhat rounded, deeply fringed flowers on one to three erect, smooth stems. The needle-like leaves are narrow, elongated, sharply pointed, and usually folded in half lengthwise.

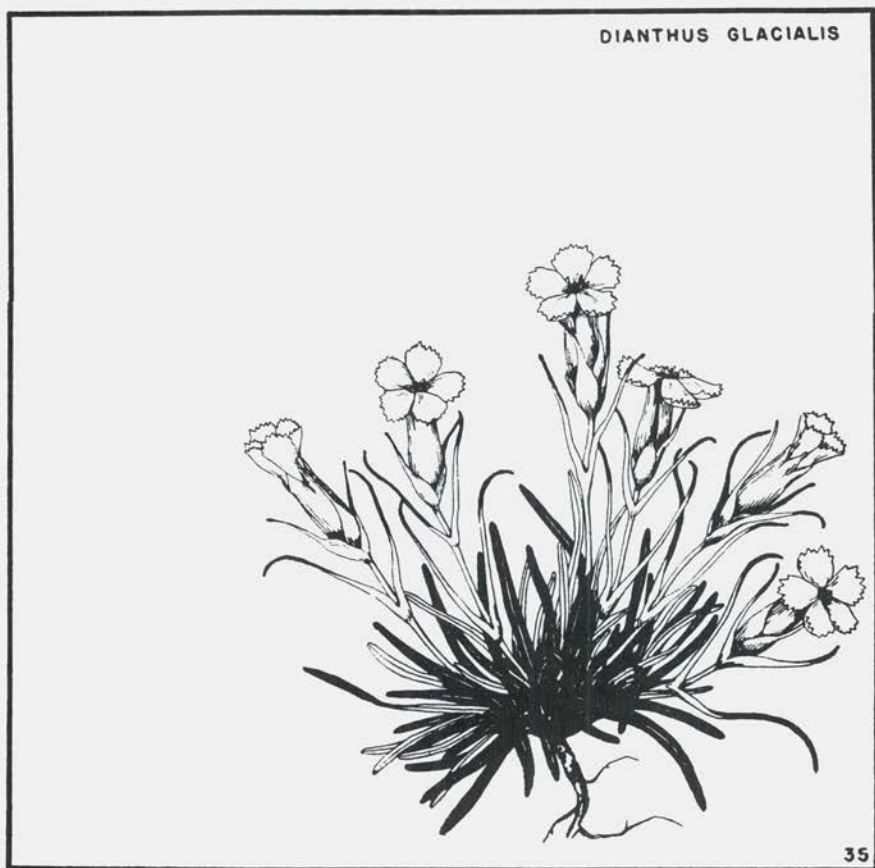
The Montpelier pink, *D. monspessulanus*, is another fragrant treasure. It is not a small plant—it can reach 2' tall if it likes you—but the impression it gives is of delicacy nonetheless. Its slender, branched stems are clothed with soft green leaves not unlike those of *D. superbus*. Its blossoms, pink or white, have narrowly segmented petals and are borne singly or in loose clusters. They can reach an inch and a half in diameter. *Dianthus monspessu-*

*lanus* ssp. *sternbergii* (syn. *D. sternbergii*) makes a tidier plant to 8" tall, with bluish-green leaves and flowers held mostly singly. The Montpellier pink is often mislabeled in the trade, and it seems often confused in the literature with *D. m.* ssp. *sternbergii*, and with *D. x arvernensis*, a compact cross of *D. monspessulanus* and the scentless *D. seguieri*. Here we follow Griffiths. I have ordered both seed and plants of *D. monspessulanus*, and they have usually been the taller, scented type, but *caveat emptor*.

If beauty and fragrance were not enough reasons to grow these and other species pinks, their rapid disappearance in the wild clinches the issue

for me. Given rampant urbanization, pollution, and the shrinking of Europe's wild lands, it is not difficult to imagine a world without wild pinks. The next century—perhaps the next 20 years—will decide the matter. The American Dianthus Society welcomes your help in locating, disseminating, and preserving these treasures wherever and whenever possible.

Rand Lee gardens in Santa Fe, New Mexico. To join the American Dianthus Society send \$15/year US, US\$18/yr. Can, Mex.; US\$20/year elsewhere to Rand B. Lee, PO Box 22232, Santa Fe, NM 87502.







# DAPHNE ARBUSCULA: AN ENCOUNTER IN THE WILD

by Joan Means

For most amateurs, to see a favorite garden plant growing in the wild can be an illuminating moment—even though it takes an expert to decipher all the nuances of geology, weather, and insect pollinators. In June 1995, a group of American rock gardeners travelling in the Slovak Republic were privileged to examine two wild populations of the very rare *Daphne arbuscula* in the company of Dr. Peter Turis, a young botanist who has studied this endemic under the microscope, in the wild, and in his own garden. What we learned, and much more, appeared a few months later in the botanical journal *Biologia*, in a monograph co-authored by Peter Turis with Olga Erdelska of the Slovak Academy of Sciences' Institute of Botany. The editors have kindly allowed us to reprint excerpts of the article.

But first, let's put some flesh on the rather dry bones of scientific discourse. We first met Peter Turis in 1993, while on a tour of the Czech and Slovak Republics ("On the Track of *Daphne arbuscula*", ARGS Bulletin, Summer 1994). At that time Peter was employed at the Protected Landscape

Area (the rough equivalent of a national forest) on the Muranska Planina (Murán Plateau), an isolated region of deeply eroded limestone hills where he grew up, and where small colonies of *Daphne arbuscula* decorate just eight peaks. Unfortunately, our 1993 group was more interested in ferns and orchids, and the daphne was given short shrift. We were determined to do better on this repeat trip two years later, accompanied by friends from the New England, Hudson Valley, and Berkshire Chapters of NARGS. Although Peter had been promoted to a post in the Low Tatras (where he later showed us great, deep-pink swathes of *Primula minima*, covering the short turf under a chair lift), he kindly agreed to travel to the Muranska and act as our guide.

It was early June, and although peak bloom was still weeks away, the Muranska was a delight. Swags of purple *Clematis alpina* draped trees and shrubs; the small pink flowers of *Primula farinosa* bloomed in bogs alongside *Pinguicula alpina* (white) and *Pinguicula vulgaris* (purple); dry banks were bright with short clumps of *Genista pilosa* raising yellow pea flow-



ers above the ample lavender blooms of an especially handsome and glossy-leaved form of *Thymus pulegioides*. In the little villages, tidy rows of vegetables and flowers filled cottage gardens; a woman shrouded in a net veil was tending her bees and agreed to part with some honey. We could have lingered in this pastoral scene for days, but our main agenda was on the white limestone escarpments which scarred the wooded hills.

Like its close cousin, the greatly coveted *Daphne petraea* of the Italian Alps, *Daphne arbuscula* is an ancient plant which survived the ice ages but never managed to really prosper afterwards. While other plants hybridized, mutated, and spread their seeds to extend their geographic range, this cushion shrub has stayed at home on just a few cliffs. The mystery is why. True, it grows in bare rock, but it also grows away from the brink in turf, at high elevations and low. A well-known rock garden plant, this little daphne is perfectly hardy to at least USDA Zone 4, and it is easy to grow—it doesn't even seem to demand lime. Indeed, its only horticultural drawback is that plants are expensive, because seed isn't set in cultivation and the slow-growing cushions offer a limited number of cuttings.

On the Muranska, perhaps the best known location for *Daphne arbuscula* is a wooded, hog-back ridge overlooking the ruins of Muran castle, a feudal fortress which has brooded above the valley since 1243. Steadied by the helping hands of Peter and our Czech guide from Atypus Tours, Borek Seihak, we scrambled up a steep slope made treacherous by deep layers of leaf mold and reached an opening where white-flowered sprays of *Saxifraga paniculata* hung over a drop of hundreds of feet.

*Daphne arbuscula* was everywhere:

on the cliff face, nestled under boulders, growing in grass accompanied by the plumed seed-heads of *Pulsatilla slavnica*. Only a few late clusters of rose-pink, tubular flowers were evident nestled among whorls of narrow leaves topping the rather naked, 6"-tall stems. We didn't mind, since many of us know the daphne from our gardens—plants which most likely were propagated from cuttings of cuttings taken from this very spot decades ago. What excited us was the fact that many of the shrubs bore seeds! Seeing these is special—indeed, neither *Hortus III* nor the *RHS Dictionary* describes them. Those we saw looked rather like wheat grains; Peter explained that they actually are drupes which dry up almost as fast as the waxy petals wither and turn brown.

Peter has been experimenting with the seed, and the next morning, on the way to a newly discovered daphne population which was still in bloom, we made a surprise detour to see the results. Behind a modest bungalow owned by his parents, Peter had made a small rock garden which was home to an array of daphne seedlings ranging in age from one to eight years. Seed production is often very low, he told us, and even under optimal conditions the germination rate is a dismal 10%. As in the work of commercial horticulture, in nature *Daphne arbuscula* tends to reproduce itself by vegetative means.

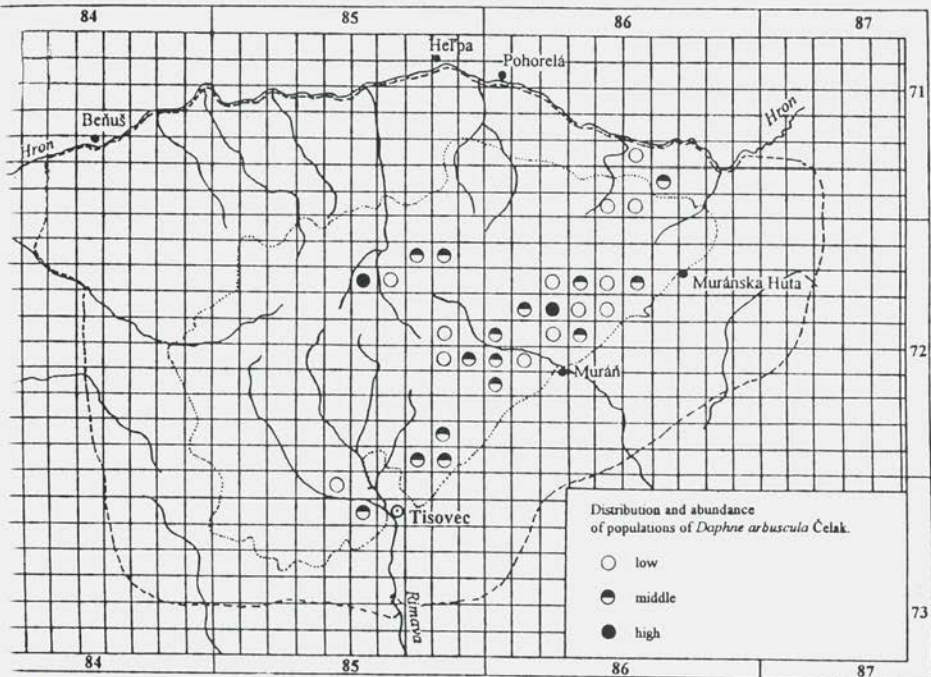
Clearly it wouldn't take much for the daphne population to crash into extinction—just a few hundred gardeners each taking "just a few" cuttings should do it. Of course this is a crime; *Daphne arbuscula* is protected as a "rare and vulnerable species." Unfortunately, horticultural thefts have been rising as travel restrictions in the Czech and Slovak Republics have eased. Near Prague, we learned

that groups of visitors are no longer welcome in many rock gardens; in Bratislava, the curator of the University's rock garden had meant to show us his private garden, but it had been ripped off a week before our visit. As for *Daphne arbuscula*, at least one North American gardener has boasted of taking cuttings in the company of a Czech enthusiast.

Behind his parents' house on the Muranska Planina, Peter Turis apologized for the tall weeds which nearly obscured the rock garden. He had hoped to hide his precious daphne

seedlings in the jungle, but somehow someone had dug 17 of 20 two-year-olds and a sampling 17 of others. The holes were still there to see. Clearly, there is a risk when botanical knowledge is shared with greedy gardeners. It is up to us, as individuals within the rock gardening community, not to use our new knowledge about *Daphne arbuscula* in ways that might imperil its tenuous life in central Slovakia.

Joan Means gardens in Georgetown, Massachusetts.



Map of geographical distribution of *Daphne arbuscula*  
Original by Peter Turis



# DAPHNE ARBUSCULA: ITS BIOLOGY AND DISTRIBUTION

by Peter Turis and Olga Erdelská

## Nomenclature

The first report of *Daphne arbuscula* in the botanical literature was by G. Reuss of Murán in 1853. He considered it to be *Daphne cneorum*, as did Szontagh (1866a, 1866b), Fábry (1867) and Richter (1887). The Hungarian botanist Borbas identified this species in his herbarium as *Daphne cneorum* var. *abietina*, because the shape of the leaves resembled the needles of the fir (*Abies*). Richter later labelled specimens collected in 1889 as *Daphne juranyiana*, in honor of his teacher of botany, Professor Jurany. Neither Borbás nor Richter published the above mentioned names. Professor L.J. Celakovsky from Prague studied the herbarium specimens collected by Richter and recognized that they represented a new, unpublished taxon and described it as *Daphne arbuscula*. Later Richter (1905) transferred it to the separate genus of *Rozalia arbuscula*. This transfer, however, was not sustained.

## Description

*Daphne arbuscula* is a cushion-shaped, prostrate shrub, 10-30 cm high. The root is woody, much-

branched, and grows into chinks in rock. The stem is woody, with dichasial sympodial branching. The youngest branches have green-brown bark, two-to-five-year-old branches have reddish-brown bark; older branches have grayish-brown, much cracked bark. The leaf scars are protruding and semicircular. The branches grow 2 to 10 mm, rarely up to 90 mm in a year. The leaves are coriaceous (leathery), alternate, congested at the tips of the branches, with extremely short internodes. The leaf blades are narrowly oblong to linear, obtuse or mucronate at the tip, cuneate at the base with entire, revolute margins, glabrous or sparsely hairy, dark green above, light green beneath, shiny or dull, with an obvious midvein below and with a furrow at the midrib above. Leaf blades are (1.5-) 8.0-20.0 (-38.5) mm long, (1.0-) 1.5-3.0 (-6.0) mm wide. Plants exposed to sunlight may have reddish-brown leaves; plants in shade have less congested leaves. Leaves persist on the branches for 13-15 months; thus the new leaves appear before the older ones fall, resulting in the appearance of an evergreen.

The terminal buds are ovate,

mucronate at the apex, 5 mm long, and protected by congested leaves and bracts. Leaf bracts are obovate, green-violet, densely white tomentose. The leaf bud, or both the flower and leaf bud, seldom only the flower bud is in the terminal position. From one to as many as 11 flowers, conspicuously scented, are clustered into a head. The flowers are radially symmetrical and bisexual. The corolla is not developed, but the calyx is salver-shaped, with four parts united into a tube which is glabrous inside, hairy outside, and pink to dark pink, seldom white. The calyx is 23 mm long, and laciniate, the divisions 11-16 (-28) mm long and 9-13 (-25) mm wide. There are 8 stamens, with oblong anthers, united to the calyx tube in two rows, four in each row. The pistil is bicarpellate, the ovary superior, dark red, sparsely hairy, with a short style and a globular, two-lobed stigma. At the bottom of the calyx tube are the nectaries. The fruit is a one-seeded drupe, its surface with thin hairs, 5 mm long and 2-3 mm wide. The pericarp is fleshy, dark red, and after drying appears light gray.

#### Variability

*Daphne arbuscula* is a very old taxon with a small, isolated distribution, and therefore the variability of its qualitative characters is very restricted. Morphological deviations which appear incidental to its evolution are used in horticultural selections.

In 1890, Celakovsky described two varieties, differing in the presence or absence of hairs on the hypanthium, the ovary, bracts, lower sides of the leaves and the young shoots, namely variety *glabrata* and variety *hirsuta*. Variety *hirsuta* is hairy and Borbás (1891) considered it as the typical variety [according to rules of botanical nomenclature this would now be des-

ignated variety *arbuscula*—Ed.]. The glabrous variety is very rare and, according to the original description, is completely glabrous ("*glaberrima*"). There are different opinions concerning the taxonomic validity of these varieties. Tuzson (1911) treated them on the level of forms and considering forma *glabrata*, he admitted the possibility that plants belonging to this form are not *completely* glabrous ("*plus-minus glabra*").

Besides the above mentioned morphological variability, various abnormalities in the growth and shape of branches, flowers, the number of stamens, pistils and laciniae of the calyx of *Daphne arbuscula* are known. In 1902 individuals of this species with fasciate stems had been collected (Bogsch, 1916). Such branches can be as wide as 24 mm. The leaves are then small and their radial orientation becomes crested. When in flower, fasciate branches can bear more than 100 flowers (Halda, 1976). Fasciation does not necessarily include the whole plant; more often it occurs only on some branches. For instance, there is a specimen in the herbarium SAV in Bratislava (coll. Magic, 1960) with a fragment of the fasciate branch which bears the remark on the label that most of the plant was not fasciated. For more detailed discussion see Turis (1994). On several occasions thickenings of the stem, resembling galls, were discovered and also such abnormalities as 3-9 calyx laciniae, 2-18 stamens, or two pistils could be found. On one occasion two flowers growing together with a common calyx tube were found.

In the horticultural literature (Halda, 1976) several cultivars were described., e.g., 'Grandiflora' (with large dark rose flowers), 'Albiflora' (with white flowers) 'Platyclada' (with fasciate branches), 'Platyclada



Albiflora', 'Radicans', 'Pleniflora' (with amplified laciniae of hypanthium). Some of them were formally published as taxa (Halda, 1972; Kummert, 1990). They are propagated by cuttings.

In spite of the fact that in some localities *D. arbuscula* occurs together with *D. mezereum*, no hybrids of these two taxa have been reported. Hybridization is most probably prevented by the different flowering times and genetic differences.

#### Chromosomes

The first chromosome count for *Daphne arbuscula* was published in 1978 (Murin in Majovsky et al., 1978) and shows that it is a diploid species ( $2n=2x=18$ ). In the development of the genus *Daphne* polyploidy has not been so important as in the other genera of the family Thymeleaceae. *Daphne arbuscula* has a relatively well differentiated karyotype and the majority of chromosome pairs can be distinguished easily (Murin, 1990).

#### Geographical distribution

*Daphne arbuscula* is distributed over the limestone and dolomitic areas of the Murán Plateau in Slovakia. It occurs in a 95 kilometer square area northwest of Bratislava and south of Krakow, Poland, south of the High Tatra Mountains. Some former populations have now disappeared entirely, others have been severely reduced. Several populations new to us have been discovered.

#### Habitat

##### Climatic conditions

*Daphne arbuscula* occupies a relatively broad climatic range of habitat, from open rocks with southern exposure, to cold, shady northern slopes. The climatic data from two localities, one on the southern slope, 920 meters

above sea level, and the other on the northern slope, at 1330 m., have been chosen as examples of the extreme habitats.

The shrubs are most vigorous on the southern slopes and rocks, where the maximum temperature in August reached over 33°C, and the average minimum temperature in 1990-1993 was -3.9°C in the month of December; and the maximum average temperature during the same years of observation was 19.5°C in the month of August. The annual precipitation in 1990-1993 varied from 765-950 mm. Plants were under snow cover until the end of February. On northern slopes the minimum temperature in December was -13°C and the maximum mean temperature in August 16.9°C. The annual precipitation was higher (915-1070 mm) and snow cover on the slopes lasted until April.

The precipitation has a low ion content, and the pH is on average 6.28 on southern slopes, 5.82 on northern slopes.

Factors with a negative influence on *Daphne arbuscula* include the long-lasting, deep frosts of winter and spring and long periods of hot, dry weather in summer. In shady areas shrubs of *Daphne arbuscula* are less robust and bear fewer flowers than in sunnier sites.

#### Substrates

*Daphne arbuscula* grows most successfully on the mineral soil with a high content of carbonates. It prefers a mildly alkaline soil with the pH above 7.0 (the lowest found was 7.06, the highest 7.92). The depth of the soil is, as a rule, less than 10 cm. Humus content is relatively high, between 32-54% in the upper 0-5 cm of soil.

#### Plant communities

*Daphne arbuscula* also shows its

adaptability by its occurrence in various plant communities. *Daphne arbuscula* occurs as the dominant in a *Pulsatillo slavicae*-*Caricetum humilis* grassland association, which is widespread on south-facing, rocky slopes with steep inclination (70–80°). In this type of community the *Daphne arbuscula* forms healthy populations. The other dominant taxa represented here are graminids, *Sesleria albicans*, *Festuca pallens*, and *Carex humilis*, together with herbs *Pulsatilla subslavica*, *Phyteuma orbiculare*, *Polygala amara* ssp. *brachytera*, *Genista pilosa*, *Asperula cynanchica*, *Seseloisseum*, *Tithymalus cyparissias*, and other heat- and drought-loving plants. The cover of mosses on the soil surface is very low. On the cold and semi-shaded slopes these plants are replaced by mesic taxa of the *Seslerio-Festucetum tatrae* community, such as *Festuca tatrae*, *Anthyllis vulneraria* ssp. *alpestris*, *Saxifraga paniculata*, *Asplenium viride*, *Campanula cochleariifolia*, and typically a higher density of mosses and lichens. In the extreme habitats in respect to climate and soil conditions, on northern slopes with shallow soil and in the rocky exposures, *Daphne arbuscula* grows in a community with *Dryas octopetala*, *Carex firma*, and *Pedicularis verticillata*.

#### Pollination and fertilization

*Daphne arbuscula* requires cross pollination. In structure, color, odor, and the production of nectar the flowers of *Daphne arbuscula* are adapted to insect pollination. As the anthers and stigma are arranged in a relatively long and narrow calyx tube, the range of potential pollinators is limited to insects with small body size or with a long proboscis.

Turis and Smetana have observed the following insects on the flowers of *Daphne arbuscula* during sunny, calm weather: *Papilio machaon*, *Pieris brassi-*

*cae*, *P. rapae*, *Anthocharis cardamines*, *Inachis io*, *Aglais urticae*, *Lasiommata petropolitana*, *Hemaaris tityus* from the order Lepidoptera (butterflies and moths). From the order Diptera (flies) they observed relatively infrequent visits to the flowers by two species of *Empis*, less frequently a few other species.

We consider the active pollinators to be *Apis mellifera* (the honey bee), *Bombus terrestris* and *B. lucorum* (bumblebees), *Pyrobombus lapidarius*, *Megabombus pascuorum*, *M. hortorum*, *Anthophora pilipes*, *A. crinipes*, and *Osmia caerulea* (a leaf-cutter bee). The digger bees from the genus *Anthophora* are considered the most important pollinators of *Daphne arbuscula* because of their relatively high occurrence on inflorescences.

#### Seed production and germination

Reproduction by fruit is rather limited in *Daphne arbuscula*, and vegetative reproduction predominates. Mean weight of a seed is 0.0048g. Mean production of seeds per shrub is 143 for one population and 13.7 seeds for another.

#### Vulnerability and protection

All populations of *Daphne arbuscula* are in protected forests where economic exploitation is eliminated. The greatest dangers for *Daphne arbuscula* are unintentional trampling and digging of plants by rock gardeners, although most attempts at bringing uprooted plants into cultivation are unsuccessful. Red deer are a serious threat, as they break and graze off the young shoots.

After deterioration in the 1980s, air quality has recently improved in all localities within the geographic distribution of *Daphne arbuscula*. It is supposed that this is a consequence of technological improvements by indus-



trial pollutants in the vicinity. Populations of *Daphne arbuscula* could be endangered by either gas or solid emissions. Admissible concentrations of toxic elements (Fe, Zn, Pb, Cu, Cd, As) in solid emissions were not exceeded. Rainfall contains low quantities of ions. Information about increased emissions (mainly magnesium) by Pelikan (1985) encouraged

the establishment of permanent plots for monitoring of *Daphne arbuscula*.

*Daphne arbuscula* is referred to in the IUCN Plant Red Book (Lucas, Synge, 1978) as a rare species. Because of its restricted distribution it is classed among the most vulnerable of rare and endemic species of Slovakia and is appropriately protected by the state.

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# DAPHNE ARBUSCULA

## NOTES ON FORMS AND HYBRIDS

by Fritz Kummert

*Daphne arbuscula* grows wild in a very small, restricted area of north-eastern Slovakia, the Hills of Muranyi, and is often stated in older European literature to be native to Hungary, to which country the region belonged until the end of World War I. I have never personally visited the native habitats of the species, but good descriptions of the localities were given in several articles and books, together with illustrations of the rocks, in whose humus-filled pockets the plants grow.

*Daphne arbuscula* was very often grown in the gardens of plant lovers of my youth, about 40 years ago, especially a form with leaves 3 cm or more long and pale lilac pink flowers. This form was always connected with Mr. Wetter, an old and very keen amateur of Vienna, who was very kind in giving away rooted layers of this special form to other lovers of alpine plants.

After intensive research into *D. arbuscula* by Czechs and Slovaks (then Czechoslovakians!) other forms reached our gardens. I received a form called var. *prostrata*, which has smaller leaves and flowers and an even more creeping habit than the 'Wetter Form'.

By contacting plant lovers of the Czech Republic I was able to obtain other forms as well, which have slightly larger flowers in a perhaps lighter color and in one case also hairier leaves than the 'Wetter Form'. One I got from Josef Holzbecher of Brno (lighter in color, large-flowering, hairy leaves), another from Mr. Sussmilch of Prague.

Visiting gardens, especially in the Czech Republic, several times I saw very pale-flowered forms, nearly white in some cases, and I received at last a small plant of the form 'Alba' from one source. This is a very slow growing plant with me and, although I have grown it now for three years, it has showed no sign of flowering up to this time.

In our garden daphnes are very heavy fruiters, and it is no problem to collect drupes of *D. cneorum*, *D. petraea*, and even *D. x burkwoodii*. Seedlings of *D. cneorum* come fairly true; seedlings of *D. petraea* are nearly always hybrids with *D. cneorum* and therefore *D. x hendersonii*; *D. x burkwoodii* comes more or less true, curiously enough the seedlings usually flower merely one year from germina-



tion! *Daphne arbuscula* very rarely sets drupes in our garden, although a large *D. collina* is planted not far away, a species which has very often crossed in gardens with *D. arbuscula*. Only once was I able to collect seeds resulting from self-pollination of *D. arbuscula*. One of the drupes germinated, and the result was a very fine, true *D. arbuscula* with the habit of blooming twice a year, even more heavily the second time in June than in early spring. It was named 'Libussa' in honor of Libuse Paclowa, a lady botanist who twice guided us in the Tatras and who has now retired and moved to the Czech Republic. Libussa was a famous fairytale queen of Bohemia, who, so it is told, proposed marriage to a simple farmer and founded thence the reigning line of the Przemislids.

*Daphne arbuscula* very often crosses with *D. collina*, as I already mentioned above, and I know at least four different forms of this hybrid, each slightly different from the other. The hybrids are usually clearly intermediate between the two species and form upright, floriferous shrubs, very often flowering twice a year, producing large flowers. The first of these hybrids came to me about 20 years ago from Tage Lundell of Sweden, for which I propose the cultivar name 'Tage Lundell'. Later, in visiting Robin White at Cheriton in England, I became acquainted with *D. arbuscula* x *collina* 'Cheriton' and the result of the vice-versa-cross, 'Tichborne'. In visiting the garden of Lawrence Crocker at Medford, with Baldassare Mineo, I was shown another form of this hybrid, which should, if ever distributed, receive the name 'Lawrence Crocker', to commemorate this famous gardener!

From Tage Lundell in Sweden we received many years ago the hybrid between the wild collected hybrid *D. cneorum* x *striata* 'Leila Haines', and *D.*

*arbuscula*, of which Tage obviously raised several forms, as the one we got was labeled 'Leila Haines' x *arbuscula* II". This plant is, in my opinion, the most beautiful compact-growing daphne of all the relatives of *D. cneorum* and strongly deserves further distribution.

In the 1950s a gardening amateur of Vienna, Dipl.-Ing. Jenisch, from the Liebhartstal in Vienna, very keen on the propagation of dwarf conifers, was distributing a curious daphne, which ran about under the name of *D. petraea* 'Jenisch Form'. It took me much research to find out that this was the cross between *D. petraea* and *D. arbuscula*, crossed in the first quarter of the century by Sundermann at Lindau, Germany and named by him *D. x suendermannii*. During a visit to the nursery of Sundermann I was shown, in one of the stone groups, a very old plant—perhaps even the original seedling—of this hybrid, which is now offered on rare occasions by specialized nurseries in Europe. It is a very dwarf plant with the typical succulent leaves of *D. petraea*, only slightly larger, and with lilac-pink flowers. The growth, although both parents are more or less decumbent, tends to be more upright.

Propagation of all these plants is not always easy. *Daphne arbuscula* in its typical forms with prostrate growth can be layered and will root within one year. Cuttings taken end of August or the beginning of September grow quite well. Grafting on *D. mezereum* can be done in April or also at the end of August or beginning of September. We are not too successful with February cuttings, mentioned in the monograph by Chris Brickwell and Brian Mathew.

Fritz Kummert gardens near Vienna, Austria.

# FIVE SISKIYOU TREASURES

by Phyllis Gustafson  
and Jerry Cobb Colley

No matter what I said I could not convince my frightened Mother that her precious preschooler did not deserve a spanking. After all, I was careful crossing the curvy country road that we lived on to see the 'Pinks'. I'll never forget that plant—it grew there for many years as I grew up, until the roadside spraying program got it. Although everyone in the family grew plants: from pear trees to primulas, from daphnes to calypso, I cannot remember anyone trying to grow *Silene hookeri* (photo, p. 307). On our west side of the Rogue River Valley it grew all around, just like the plant across the road under the scrub oak. Today it still grows wherever the landscape has not been "improved." Now I and many of our Siskiyou Chapter members do grow *S. hookeri* in our rock gardens and have found that it is not even very difficult.

At some point we have all seen the long, white strings of roots running up to 2' from one tuft to the next, and we know that the plant will not grow without every root intact. It becomes quite clear that you cannot just move a plant from the wild to the garden. So we tried seed. The seed is easy to col-

lect in late June or early July but need not be planted until late November or December. We have found that a very long, narrow pot or tube is the best container. Plant one to three seeds to each pot, and, when they are growing well, very carefully slip the contents into a well-prepared hole in the garden. Try not to disturb the roots. *Silene hookeri* needs good drainage, shade, some leaf-mold in the soil, and almost no water at all during the summer after it has gone dormant. It also needs protection from slugs, the worst enemy in the garden. It will often bloom the first year from seed, offering beautiful, slightly salmon-colored pink flowers. My five-year-old plant has not started to run yet. It has no competition. I do feed it once a year, so it may not need to run to find food. This year it had 52 blooms, lasting altogether about six weeks.

The Siskiyou Mountains are equated with beautiful plants that are worthy of rock gardens all over the world, and *Trillium rivale* is one of the best.

The first trip of the season by members of the Siskiyou Chapter is to see *Trillium rivale* (photo, p. 306). Always by the second week in March blooms



can be found in the Illinois River Valley in Josephine County. This is the smallest *Trillium* but not the hardest to grow. The small rhizome is often deep in the rocky, serpentine soils. It is usually under shrubs or trees and seems to grow best in some shade. The ripe seed, gathered in June, will provide blooming plants in about four years. As with other *Trillium* species, the seed first makes a radical root that grows deep into the soil the first year. The second year a single leaf will appear. If given a soil rich in leaf mold, the next year will find the typical stem 1-4" tall with three leaves. When flowering, the plant stem is divided with the leaves about an equal distance between the ground and the flower. There have been many forms of this lovely little plant offered to the gardening world. In some forms from near the Pacific Coast the whole flower will be pink. In others, it will have many very dark red spots toward the center of the white flower. Very rarely are plants found that do not have some red spots on the petals.

Growing this plant in a woody spot among rocks is most satisfying as the clump will increase in size over the years. The plant, while associated with serpentine, seems to be at home in any woody soil in the garden. The gardener who wants to increase his stock must beat the ants to the seed in June. Shortly afterwards the whole plant will go dormant until the next winter.

*Phlox adsurgens* is often said to be the most beautiful of all *Phlox* (photo, p. 305). Growing on the ground, the stems elongate to make mats each with a slightly different pattern to the flowers. All are pink, but of different shades, usually with white eyes and darker lines. The dark green leaves are glossy, elongate, and make a nice background for the flowers. In southern Oregon *P. adsurgens* is best grown

with winter protection. Our winters consist of intermittent rain and clear, cold nights that bring white frosts. This continually repeated sequence can severely damage garden-grown plants; in its natural habitat the phlox is covered by snow in winter. Whether a glass cloche or a square of plastic pegged over the few dry leaves, protection works wonders. *Phlox adsurgens* grown in a pot in an unheated greenhouse and allowed to root into the bench medium will be magnificently covered in flowers in the very early spring. Cuttings root only from late fall until the end of flowering.

*Kalmiopsis leachiana* (photo, p. 308) was not found and named until the 1930s. This endemic of the Siskiyou seems to be a relic plant from the ice age, an early relative to the *Rhododendron*. For many years gardeners have noticed some differences between the form found along the Umpqua River and the form originally found by Mrs. Leach in Curry County. The Curry County plant has now been designated *Kalmiopsis leachiana* (photo, p. 306) while the Umpqua plant has been renamed *Kalmiopsis fragrans*. *Kalmiopsis leachiana* is a shrub up to 2' high. The crinkled, campanulate flowers of rich shades of deep pink are accented by the pistil and stamens of bright red. This upright shrub with thick, elliptic leaves has been hard to tame.

*Kalmiopsis fragrans* from the Umpqua River drainage, mostly in Douglas County, has been accepted as one of the best garden and show plants since first being sent to England in the 1950s. The form 'LePiniac' has won many awards on the show benches. This small, almost vine-like shrub grows in deep cracks in hard rock walls and in scant soil over rocks on steep hillsides. The leaves are even thicker and deeper green than those of





Red Buttes in the Siskiyou Mountains (p. 312)

Phyllis Gustafson

*Phlox adsurgens* (p. 304)

Baldassare Mineo







*Trillium rivale* (p. 303, 304)

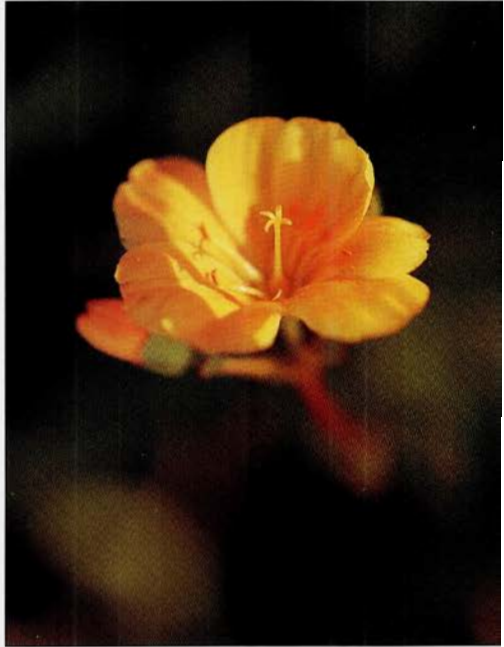


*Trillium rivale*  
photos, Phyllis Gustafson

*Kalmiopsis leachiana*, Curry County form  
(p. 304)



*Lewisia cotyledon*, yellow (p. 309)









*Kalmiopsis leachiana* (p. 304, 309)

Phyllis Gustafson

*K. leachiana*. Both sides of the leaves are slightly glandular on the surface. The flowers vary in color from pale pink ranging to almost red. The white stamens are almost twice as long as the petals. These mats are always a joy to visit, and even in flower it is a good idea to look carefully, as year old seed will sprout when planted. Hard experience by early plant collectors was won when it was found that even the most thoroughly rooted side piece will not grow when cut and brought home. Plants in the wild, even though small, are usually very old and simply are not transplantable.

Although ericaceous, *Kalmiopsis fragrans* grows in rocky, serpentine soils on rather dry-looking hillsides. The areas where both species are found really receive high rainfall but are very fast draining. The fine seed germinate easily the first year. Gardeners usually treat this seed the same as *Rhododendron*. Cuttings taken in November will root throughout the winter and can be potted on the next year. Many members of the Siskiyou Chapter have plants in the garden, grown either from seed or cuttings by members, and sold at our chapter plant sales.

*Lewisia cotyledon* (photo, p. 307) is the best known of all the plants native to the Siskiyou. In the wild the plants can be found on rocky, north-facing slopes at altitudes from 450' to 7,000'. Growing from the north edge of the Siskiyou Mountains south to the northern reaches of the Sierra Nevada Mountains in California, *L. cotyledon* not only has a wide range but also many forms. The most common variety, *L. cotyledon* var. *cotyledon*, has long, fleshy, strappy leaves that are smooth along the edges and ovate to spoon-shaped, then tapering to the base. Arranged in a rosette, they are attached to a thick caudex, which is

branched underground. The flowers of the wild forms are in flat-topped panicles of pink, with white stripes and darker veins. In some populations the color is very close to orange. Pure white, yellow, pure pink and salmon-colored flowers have all been found in the wild.

*Lewisia cotyledon* var. *heckneri* is found on a few rocky cliffs in Trinity and Humboldt counties in northern California from 900' to 6,300'. This rare variety has fine teeth along the edges of the wide, flat leaves.

In the third variety, *howellii*, the leaf margins are very crisped-undulate. This uncommon variety is found on outcrops and canyon walls at altitudes from 450' to 2,700' in Shasta and Siskiyou counties in California.

*Lewisia cotyledon* is easy to grow from seed and has been in cultivation since early in this century. The unusually colored forms have been crossed and re-crossed, until now flowers of every shade of red, pink, and orange are available. With stems long or short, big plants, and neat, smaller ones, the range is endless. With just a few to start with, any gardener can cross plants and come up with all sorts of forms and colors.

The plants grow quickly if given porous soil and heavy feedings. However, in our experience, plants grown too fast with too much fertilizer will not continue to prosper for more than two or three years. Plants brought along a little slower can live for many years in the garden, and in fact we have a number of plants from wild-collected seed that have been in the garden for over 15 years. Wild *L. cotyledon* plants are from areas with high summer temperatures and do go into a dormant period in summer after blooming. This dormancy is avoided if the plants are kept constantly moist, but never overly wet, and not stressed



by high temperatures. However, if the plant leaves become slightly limp, then the plant has gone into a state of minimal metabolic activity until the weather changes in September, when it will resume growing. If given too much water during this time, the caudex (the thick, carrot-like root) will rot. If this is noticed by the gardener in time, the plant need not be lost. Very carefully cut with a sharp blade all the brown and bright red areas from the caudex, as if cleaning the eyes from a potato before cooking. Let the root dry for an hour. A dusting with sulphur will help keep the rot from recurring.

Then place in a container 2-3" deep with coarse, clean, moist sand. Place out of the sun and keep moist. In about four to six weeks the re-rooted plant will be ready for potting. This is a good way to save that, "best-colored *Lewisia* I ever had," for it is always the one that rots.

Jerry Cobb Colley and Phyllis Gustafson invite all members of the NARGS to the Western Study Weekend, "Summit in the Siskiyou," to learn about more garden worthy and exciting plants from the Siskiyou and the world.



# SISKIYOU LORE

BY RAMONA OSBURN

The Siskiyou Mountains stretch along the border between Oregon and California, forming a bridge between the Coast Range and the Cascade Mountains. An area rich in history and lore, and generously supplied with endemics and rare plants, it is not surprising that the Siskiyous have been an irresistible attraction to plant lovers near and far.

Clarice Nye and John Heckner were two early plant enthusiasts to whom the North American Rock Garden Society owes a great debt. They both discovered many areas in the Siskiyous where rock plants abounded, brought them home to their gardens, and eventually started nurseries through which they were able to share these native plants with rock gardeners everywhere.

Clarice Nye lived near Prospect in southern Oregon, in a lovely spot that she called Highland Park. She started her plant explorations as a girl in her early teens, before the turn of the century. She had only recently moved to Oregon from the Great Plains states. In the July 1952, issue of the *ARGS Bulletin* (pp. 50-52. "Treasures Unawares."), she describes her excite-

ment on a trip to Iron Creek Mountain in 1890. Here, for the first time in her life, she saw *Lewisia cotyledon*. It was a clear, old rose, without any light striping, and the leaves were slightly ruffled. She wrapped the plant in damp moss and made a rock garden for it on the north side of the house. She remarks that visitors thought it "the nicest hen-and-chickens they had ever seen."

This was the beginning of a lifelong interest in native plants. Together with her son Waldo and her son-in-law Dee Hedgepeth, she tramped through woods and bogs, climbed rocky cliffs to find rare plants, and returned later to collect seeds and bulbs for her nursery. She traded plants, bulbs, and seeds with California nurseryman Carl Purdy and carried on an extensive correspondence with plant lovers in this country and abroad. She even received an order for the King of England's garden.

If you visit her garden at Highland Park, as several of us from Siskiyou Chapter did in 1983, you get a strong sense of the devotion which she lavished on her "lovely wildlings." She died in 1953, but still there are the



long, winding mounds of mossy pumice rock, planted with lewisias, erythroniums, fritillarias, calochortus, and many others, their buds promising bloom again this spring.

Lawrence Crocker, one of the founders of Siskiyou Nursery (now 90 years old), says that he first heard about the Red Buttes (photo, p. 305) from Clarice Nye. This rich botanical area is on a high ridge between the Applegate and Klamath Rivers, and is now much visited by lovers of the rare and beautiful.

John Heckner, another early explorer of the Siskiyou and a fine nurseryman, came to southern Oregon from Australia, from which he is said to have departed rather suddenly. A government surveyor, his work brought him into contact with the many interesting plants of southern Oregon and northern California. The best of these he brought into his garden near Brownsboro, located in an area with sticky soil and very little water.

Heckner's name is commemorated in *Lewisia cotyledon* var. *heckneri*, which is described as having broad, dark green leaves, red beneath, margined with slender, brown-tipped spines. These tiny spines give the effect of a silky fringe. The flowers are rose-red to pink, either without stripe or with varicolored stripe.

Later, John Heckner and his wife moved to Jacksonville, Oregon, where he started a nursery. One of his catalogs, dated Spring and Fall, 1933 (the year before the American Rock Garden Society was founded), contains an excellent list of natives of Oregon and northern California. Included are suggestions for growing each plant. On one page he cautions: "SAFETY FIRST—Belated last-minute orders are always a sure indication of incompetence. June and November are in the danger zone. March-May, Sept.-Oct.

are safe." This admonition is one we might well keep in mind today.

The story of John Heckner has a sad ending. Distraught after his wife's death of a ruptured appendix, Heckner wrote a letter to the editor of the local newspaper. The letter, which appeared on the front page, said that he planned to kill himself, and that it would do no good to look for him. Many years later his body was found in the Siskiyou Mountains that he loved.

Lawrence Crocker, who wrote an article on John Heckner for the *Bulletin of the American Rock Garden Society* (Vol. 23[2], pp. 47, 48. April 1965), says that he is fortunate to have had Heckner as his first guide into the mountains of southern Oregon. It was Heckner who first took him to Pilot Rock, that huge, upstanding rock near the border with California that helped guide the pioneers on the way to the Applegate Valley. Pilot Rock is well-known for its many fine plants, particularly the lovely *Hesperochiron pumilus* and many native bulbs. Heckner also introduced Crocker to Eight Dollar Mountain and the rich plant areas around O'Brien and Oregon Mountain.

Many of our Siskiyou Chapter members were visitors at Mary Byman's garden on the slope of a wooded mountain near Canyonville, Oregon. In her younger years, Mrs. Byman made numerous pack trips into the mountains of Oregon, California, and Washington to find plants and seeds for her garden. She was not content to grow one or two plants of the more rare or difficult species. She had them by the dozen or by the hundreds.

Mrs. Byman is especially remembered for her work in developing a wider range of color forms of *Lewisia cotyledon*, using varieties *heckneri*, *howellii*, and Marcel Le Piniec's 'Apricot

Queen.' These hybrids, which Carl Starker distributed under the name of Mary I. Byman hybrids, were largely responsible for the citation and cash award for horticultural achievement she received in 1959 from the Oregon Federation of Garden Clubs.

Though she made no claim to be a botanist, she was familiar with an incredible number of rock garden plants from all over the world and succeeded in growing them beautifully. She managed to have plants bloom every month of the year.

Unfortunately, this lovely garden no longer exists, at least in its former glory. The same is true of the garden of David and Adelaid Crawford in Grants Pass, which our members visited with great enjoyment for many years. At the front of the house, in the small space between the walk and the foundation, rocks were laid against the foundation, and dozens of tiny plants set into the crevices. At the back of the house, the garden sloped toward a ravine. Many of the native trees were kept, and stumps and piles of rock and debris were disguised by creating miniature ridges and peaks which were planted with choice treasures. Good use was made of raised beds, constructed of rock. After David Crawford's death in 1961, Mrs. Crawford carried on the garden with loving care until one day while working in her garden she fell and broke her hip. She is now living in a nursing home, where a friend has made it possible for her to have a tiny garden outside her window.

The name of Dr. L. G. Gentner, former entomologist and assistant superintendent of the Southern Oregon Branch Experiment Station in Medford, is perpetuated in *Fritillaria gentneri*. This new species of *Fritillaria* was reported by Dr. Gentner in 1941. The previous year his daughter Laura

had brought home for her garden a plant which she thought to be *Fritillaria recurva*. When it bloomed, it was noticeably different from *F. recurva*, but by then Laura could not remember where she had collected it. The family made many unsuccessful trips to try to find the plant, until Katherine Gentner, another daughter, recognized it in a vase of flowers in the home of Pauline Bush, one of the charter members of our Chapter. Pauline had brought it from the garden of a friend who lived near Jacksonville. Thus was the new *Fritillaria* rediscovered.

*Fritillaria gentneri* has a flower with petals gently flaring, rather than curving back, as in *F. recurva*. The basic color of the perianth is red, but tends toward the bluish end of the spectrum, whereas in *F. recurva* the red tends toward the yellowish end of the spectrum. In *F. gentneri* the style branches are widely spreading and equal nearly half the length of the style. In *F. recurva* the style branches are erect and shorter. The seed capsule of *F. gentneri* is larger than that of *F. recurva*. (see Helen M Gilkey, "A *Fritillaria* from Oregon," reprinted from *Madroño*, July 1951, Vol. No. 3, pp. 137-141).

The two plant species can be seen growing side by side on a road near Gold Hill, in southern Oregon, vividly demonstrating the differences between them. There is no evidence of hybridization at this station. A friend who has both species growing on her property near Jacksonville believes she has seen some intermediate forms. This may, however, be due to the greater variability of *F. recurva*.

One of the most colorful plantsmen to make his home in southern Oregon was Marcel Le Piniec. After a successful career as a textile designer in New York, and another as the owner of Mayfair Nursery, he "retired" in 1944,



and went West, on a 15,000 mile exploration tour to find a place to make his home. It was the plants of the Siskiyou, in particular *Phlox adsurgens*, *Ceanothus prostratus*, and *Silene hookeri*, that drew him, perhaps inevitably, to southern Oregon. Back East, these three plants had offered a challenge that he hadn't quite been able to meet. Perhaps, if he could see these plants in their native haunts and study the conditions under which they grew, he might be able to figure out how they could be grown in eastern gardens.

Some notion of the flavor of his writing and the extent of his enthusiasm can be gained by reading his two articles on "Plant Hunting in the Siskiyou." (*Bulletin of the ARGS*, Jan.-Feb., 1948, and May-June 1949). The latter article has a special quality. In it he tells us that he had never seen *Lewisia cotyledon* growing in the wild. Le Piniec had a cowboy friend named Kurt, who had for years driven cattle and hunted bear and cougar throughout the Siskiyou. Kurt thought he knew where "Louisa" could be found, in a place called the "Middle of Hell." So off they went, high on the ridge above the Klamath River to a deep canyon "surrounded by perpendicular cliffs," which, viewed from the rim, appeared to be "an elongated pot hole some 3000 feet deep, with no apparent outlet." Here they found an incredible sight, thousands upon thousands of *Lewisia cotyledon* in full bloom. Le Piniec's ecstatic joy did not dim his scientific curiosity. He immediately set about observing how the plant grew and recording the information to put in the article. Middle Hell and Alex Hole may not be 3,000' deep, but they are indeed an awesome sight, and some exaggeration can be forgiven.

Marcel Le Piniec stayed in southern Oregon, built himself a house, and

opened a nursery and landscaping business. His plant explorations led to the discovery of good color forms of *Lewisia cotyledon*: yellow, apricot, and a pure white. The yellow form known as 'Carroll Watson' was found by Mr. Watson and introduced by Le Piniec. Later, a natural hybrid between *Lewisia cotyledon* and *L. leana*, with leaf forms intermediate between the two species and flowers similar to *L. leana*, was found in the same range where Le Piniec saw his first *Lewisia cotyledon*.

In June 1955, Le Piniec, Warren Wilson of Maplewood, Oregon, and Floyd McMullen of Portland were exploring the rugged country north-east of Roseburg. On the cliffs above the Umpqua River they found the form of *Kalmiopsis leachiana* which is now called 'Le Piniec'.

One of the men attracted to Le Piniec's nursery was Boyd Kline, who had gone there one day in 1956 to find out what Le Piniec knew about the native lilies of special interest to Kline. This meeting was the beginning of a fruitful association of plantsmen, soon to include Lawrence Crocker. They went on many trips together, to the peaks along the Coastal Range, Oregon Mountain, Pearsoll Peak, Vatican Peak, Snow Camp, the Red Buttes, and others.

Le Piniec, a true Frenchman, invariably took a jug of wine with him on these trips to the mountains. Lawrence Crocker tells about one such trip when he, Le Piniec, and Boyd Kline went to Cinnamon Butte north of Diamond Lake to get a load of red lava cinders. During the trip Le Piniec polished off the entire jug of wine. On the way back Le Piniec was driving. As the car approached the Crater Lake turnoff, Boyd and Lawrence uneasily noticed they were going faster and faster. Then Boyd glanced over and saw that Le Piniec's eyes were glazed and

unseeing. Passing his hand in front of Le Piniec's face and receiving no response, Boyd decided that it was time to change drivers. They returned home without further incident.

For a time, Crocker and Kline helped Le Piniec in his nursery and landscaping business, their enthusiasm for native plants growing day by day. With Le Piniec's encouragement, they decided to open a nursery of their own. In 1964, the first plant list of the Siskiyou Rare Plant Nursery, Crocker and Kline, Prop., was made available to the public.

In the beginning, they specialized in the native plants of their area; propagating by seeds, cuttings and division. Their collected material was obtained only from areas being destroyed by logging and development. Ardent conservationists, they made strong efforts to re-seed disturbed areas in the wild with appropriate native plants.

They selected especially fine forms to propagate intensively. Among these were *Phlox adsurgens* 'Wagon Wheel', 'Red Butte', and a fine white form which is proving more vigorous than most white forms. They included: *Trillium rivale* 'Purple Heart,' the white forms of *Lewisia cotyledon* and *L. leana* and selected yellow and red forms of *L. cotyledon*. Also, they had a distinctive collection of native ferns—a special interest of Lawrence, as the native lilies are a special interest of Boyd.

Later, they added plants from all over the world. Their sources were the seeds of rock garden societies in the United States, England, and Scotland, various collecting expeditions in Asia and elsewhere, and trading with world-wide plantsmen.

From a friend in Japan, they obtained the lovely *Corydalis ambigua*, a worthy companion to *C. cashmeriana*. They were among the first to introduce *Asperula sintenisii* (syn. *nitida*

*puberula*), *Salvia caespitosa*, and several of the *acantholinums*—notably from a Turkish expedition.

It is most fitting that in 1969 these distinctive plantsmen, Lawrence Crocker and Boyd Kline, were the first recipients of the Marcel Le Piniec Award from the North American Rock Garden Society.

When Crocker and Kline felt it was time to retire from the nursery business, they looked for new owners to carry on their proud tradition. In January 1978, two visitors appeared at the home of Boyd Kline. These two young men, Baldassare Mineo and Jerry Cobb Colley, were nurserymen in California and had heard of the Siskiyou Rare Plant Nursery from a friend. After showing them around the nursery and noticing their enthusiasm for the plants, Boyd told them that the nursery was for sale and said: "Why don't you buy it?" This offer was totally unexpected by the two Californians. Intrigued with the idea, they went back to California to think it over. In April, they came back to buy the nursery.

Having wrapped up operations in California, Baldassare and Jerry returned to Medford in October to find a location for the nursery. After a seemingly fruitless search, they heard of a good possibility from Evelyn Watson, Carroll Watson's wife. This turned out to be perfect—a dignified white house on several acres of fertile Rogue Valley soil close to the freeway. In January 1979, they took over the operation of the Siskiyou Rare Plant Nursery. In 1987 they received the Marcel Le Piniec Award as the excellence of the nursery continued. In January 1990 Colley sold his interests to Mineo.

Another excellent nursery offering western native plants is Forest Farm in Williams, Oregon, run by Ray and Peg Prag. A great many of the plants they



sell are trees and shrubs, and in order to sell them at a reasonable, affordable price they offer small-size starter plants. These are put up in "tubelings" 2"x2"x6" deep plant bands of a material similar to that used for milk cartons. The plant bands are as deep as a gallon can, permitting more root growth than do small pots, and are inexpensive to ship. The Prags also do a brisk wholesale business, offering plants in one-gallon and five-gallon size cans.

Ray and Peg Prag are ardent conservationists and are members of the Siskiyou Chapter of the Native Plant Society of Oregon. All of their plants are grown from seeds or cuttings.

Today the lure of the Siskiyou continues with interest in the rare and

endemic plants persisting. Some people come just to enjoy and photograph the plants, others to see how they grow. Maybe, even more secrets can be learned and more plants from this area grown in the gardens of the world.

Reprinted with permission from "Sentimental Journey," the 50th Anniversary publication by the Northwest Chapter for the 9th West Coast Winter Study Weekend, 1984.

Ramona, having served as chairman of Siskiyou Chapter more than any other person (5 years) also grows a wide range of native plants including many penstemons and *Phlox adsurgens* in her garden.

## Unusual and Endemic Plants of the Siskiyou Region

*Asarum wagneri*  
*Calochortus greenii*, *Calochortus howellii*  
*Cypripedium californicum*  
*Darlingtonia californica*  
*Dicentra oregana*  
*Fritillaria adamantina*, *F. falcata*, *F. gentneri*, *F. glauca*  
*Draba howellii*  
*Epilobium rigidum*  
*Eriogonum declinum*  
*Erythronium citrinum*, *E. howellii*, *E. hendersonii*, *E. klamathense*  
*Gentiana bisetata*  
*Iris innominata*, *I. bracteata*  
*Kalmiopsis leachiana*, *K. fragrans*  
*Lewisia cotyledon*, *L. leana*, *L. oppositifolia*  
*Lilium bolanderi*, *L. kelloggii*, *L. occidentale*, *L. wigginsii*, *L. vollmeri*  
*Lupinus aridus* ssp. *ashlandensis*  
*Monardella purpurea*  
*Penstemon newberryi* ssp. *berryi*  
*Polistichum lemmonii*  
*Sanicula peckiana*  
*Saxifraga fragarioides*  
*Sedum laxum* ssp. *heckneri*, *Sedum moranii*  
*Sidalcea malvaeflora*  
*Trillium kurabayashii*  
*Triteleia crocea*  
*Silene hookeri* ssp. *bolanderi* and ssp. *pulverulenta*  
*Vancouveria chrysantha*  
*Viola douglasii*, *V. hallii*

# LEWISIA MEGARHIZA

## FORGOTTEN IN MEXICO & GUATEMALA

by Burl L. Mostul and Miguel Chazaro

We had been looking for *Lewisia megarhiza* off and on for four years before we finally found it. It is one of those obscure plants that gets tossed around from genus to genus in the scientific community and yet remains completely unknown to rock gardeners and horticulturists.

*Lewisia megarhiza* (photos, pp. 326-7) is a deciduous species and is most closely related to *L. pygmaea*. The epithet *megarhiza* is appropriate, as the root is large, growing to 2" wide and 18" long in mature plants. The leaves are linear, about 1/8" wide and 4" long, and the rosettes grow to 8" in cultivation. The 1/2"-wide, solitary flowers are nuzzled in the rosette and are white to pink. Flowering time is during late winter and early spring in cultivation, but in the wild occurs during summer rains. In the rock garden, *L. megarhiza* prefers fast drainage and cool areas.

*Lewisia megarhiza* is in the Portulacaceae and was originally described by Hemsley in 1879 from Volcán de Fuego, Guatemala, as *Calandrinia megarhiza*. In 1891 Kuntze transferred it to *Claytonia megarhiza*. A plant found on Pico de Orizaba in the state of Veracruz was named *Calandrinia mexi-*

*cana* in 1932 by Rydberg. Clay moved it to *Lewisia mexicana* in 1937, while Standley and Steyermark called it *Orebroma megarhizum* in 1944. More recently, MacBryde, in 1968, transferred the plant to *Lewisia megarhiza* and in 1985 Kelly and Swanson moved it back to *Calandrinia megarhizum*. It appears that the epithet *Lewisia megarhiza* has "stuck" more than any other name, and here we will refer to it as such.

*Lewisia megarhiza* is native to select volcanoes of central Mexico and to Volcán de Fuego in northern Guatemala. We first looked for it on Nevado Colima (14,230') in the state of Jalisco in western Mexico and returned a year later to look for it again, but to no avail. We also searched for it on Cerro Potosí (elevation about 13,000') in the Sierra Madre Oriental in the state of Nuevo Leon. Cerro Potosí is the highest mountain between the southern Rocky Mountains in the United States and the volcanoes of the Trans-Mexican volcanic belt of central Mexico. It was only when we searched for it on Cofre de Perote (14,044') in eastern Mexico and Nevado de Toluca (15,012') in central Mexico that we



were successful. It is our expectation that Cerro Potosí is too far out of range and of a limestone substrate, rather than volcanic origin, and Nevado Colima is too arid. *Lewisia megarhiza* has been reported from Pico de Orizaba (18,696'), Sierra de las Cruces, La Malinche (14,632'), and Iztaccihuatl (17,883').

We have found it only around 13,000', but it has been reported to grow as low as 11,500'. It grows above timberline in gravel ledges and sandy slopes and is only located in small isolated colonies, never widespread, a very rare plant. At these altitudes during the winter, in January, we estimate the temperature to drop to at least 10°F or below but climbing to over 40°F during the day. Klaus (1975) set up weather stations at various elevations on Pico de Orizaba and recorded temperatures ranging as high as 60°F to lows of 20°F in March at 13,000'. We noted that in January, on Cofre de Perote at 13,000', that soils in the shade remain frozen continuously, while sunny exposures thaw out during the day. We noted in sunny areas that the ground froze to a depth of at least 3". We do not know the depth of frost in

shaded areas. We expect that *Lewisia megarhiza* may be frost hardy in many zones in the United States. In Oregon, it has successfully survived 15°F. Arno and Hammerly (1984) point out that alpine areas in tropical latitudes show an extreme diurnal fluctuation in temperature, and very few plants are adapted to such extremes. Alpine areas in temperate latitudes show considerable fluctuation in annual temperature, but considerably less diurnally. *Lewisia megarhiza* shows both extremes, as Arno et al. point out that alpine tundra of central Mexican volcanoes shows very low nighttime temperatures in the winter as well as extreme daily fluctuations. It is not known how *L. megarhiza* would withstand constant winter freezing temperatures in temperate climates. In cultivation, *L. megarhiza* appears to grow best at temperatures between 25°F and 45°F but grows more slowly at 70-85°F and tends to go dormant at 95°F.

*Lewisia megarhiza* is a good plant for the rock garden that shows promise to be quite hardy. Those who love the unusual or who love *Lewisia* will find it a joy to grow.

Burl Mostul operates a nursery called Rare Plant Research, 13245 SE Harold, Portland, Oregon 97236. Miguel Chazáro is a member of the faculty of geography at the University of Guadalajara, Mexico, and can be reached at Apartado Postal 30, Zapopan, Jal. 45101 Mexico.

#### References

- Arno, S. and Hammerly, R. 1984. *Timberline Mountain and Arctic Forest Frontiers*. The Mountaineers: Seattle.
- Lauer, W., and D. Klaus. 1975. "Geocological Investigations on the Timberline of Pico de Orizaba, Mexico." *Arctic and Alpine Research*, Vol. 7(4) pp. 315-330.

# CANONS OF ROCK USE

## A VIEW FROM VICTORIA

by Atholl Sutherland Brown

Natural rock gardens are common in many parts of the world where rock is exposed and gardeners are abundant. Few rock gardens constructed from free-living or mined rock have a convincing appearance to geologists—or to many gardeners. Yet they are all that can be achieved in many localities. Few locales have the advantages of Victoria, British Columbia, on Canada's west coast. In greater Victoria, not only are there a salubrious climate with a true winter and many skilled gardeners, but also highly varied geology displayed in beautifully shaped, glaciated exposures that provide the bones for extraordinary gardens.

In my view, it is essential for an attractive rock garden that the rocks themselves comprise part of the beauty. They should not be regarded simply as construction materials, imitative relief of mountains, a method of supplying superior drainage, or neutral foils for the display of beautiful alpine plants, but rather they are aesthetic features in their own right. Unique or beautiful rocks well displayed add much to the rock garden's naturalness and wildness, cardinal ingredients in the good rock garden. With a tremendous variety of attractive rocks within a small area and a cadre of skilled gardeners, it is not surprising that Victoria is blessed with so many interesting rock gardens.

### Geological Background

Within the environs of the city of Victoria three completely different geological terranes are exposed, the younger ones having been successively thrust under the older by the mechanics of plate tectonics. The youngest terrane (about 60 million years old) consists principally of pillowed basalt lavas and related intrusive rocks; the next youngest (70 to 65 million years old) consists of slate, gritty black quartzites and metamorphosed volcanic rocks; and the oldest forms the principal rock of Vancouver Island (400 to 190 million years old) and also consists of basaltic and andesitic volcanic rocks, together with related granites and gneisses. Not all the rock types are well displayed in Victoria; only five types are common: basaltic pillow lavas of the youngest terrane in the south and west, slates and mixed volcanic rocks of the next terrane in the southeast, and gneisses and granites of the oldest terrane in the central and northern parts of the city. These are



overlain in the northernmost area by young sandstones that overlap the terranes.

The Cordilleran Ice sheet melted away from Victoria only 10,000 years ago; hence its effects are still readily apparent. The ice sheet was thousands of feet thick as it flowed across Victoria armed with boulders and sand frozen into its sole. It modelled the rocks into a series of polished and grooved *roches moutonees*. These outcrops ramp up smoothly from the up-ice direction to the north and are truncated and plucked at the down-ice ends, the whole said to resemble reclining sheep in a blizzard—hence the term, which means “sheep-ified” rocks.

#### Victoria's Rock Gardens

The rock gardens of Victoria are developed on this whole variety of rock types, quite a selection within 40 kilometers! Most of the best gardens are on glaciated outcrops (*roches moutonees*), but a few are developed at other sites such as boulder-strewn glacial moraine, or along small, torrential, rock-cut streams.

Typical rock and alpine gardens are designed about *roches moutonees*, which provide enough elevation to simulate mountains and stimulate drainage. The deep grooves and hollows on the sculptured outcrop provide sites for natural or artificial soil accumulation or, in some cases, natural pools. The overall shape of the glaciated exposure can be beautiful, and the better gardens have preserved the lines of the rock, without breaking the surfaces for roads, paths, or house construction. The natural slopes of the outcrops closely match those of the larger hills surrounding Victoria, reflecting the grand on the intimate scale. Joints and fissures in the rocks are abundant, especially in the granites, providing ideal sites for many alpine plants. The bases of large outcrops provide sites for gardens using plants of alpine or subalpine meadows. Screens are readily built against the steeper, truncated slopes of the down-ice end of the outcrop.

Gardens may use the abundant glacial erratic boulders natural in certain parts of Victoria for decorative or imitative interest in woodland or meadow gardens. It is best to use a variety of rock types, as found in the local moraine deposits. The boulders have been naturally embedded in the soil in a way that does not defy gravity and generally have their long dimension parallel to the direction of ancient glacial ice flow. Unfortunately, in my opinion, many gardeners remove the glacier-strewn boulders and use them in construction of walls for raised beds.

Rarely, sites for rock gardens occur along steep stream courses cut into bedrock and or flanked by angular boulders. These can simulate the beds of torrential streams common in the steep hills and mountains of the coast. They require a different pallet of plants, with emphasis on small rhododendrons and maples, ferns, and plants that prefer high humidity.

Reflecting on the best examples of rock gardens of Victoria I have produced a set of canons for the development of natural rock gardens. These are, of course, completely arbitrary, although they reflect a commitment to a natural appearance and honor geology. They must be applied with discretion in different localities.

Whether the gardeners and designers of Victorian rock and alpine gardens consciously thought in terms of these canons or not, I find that their best results confirm them.

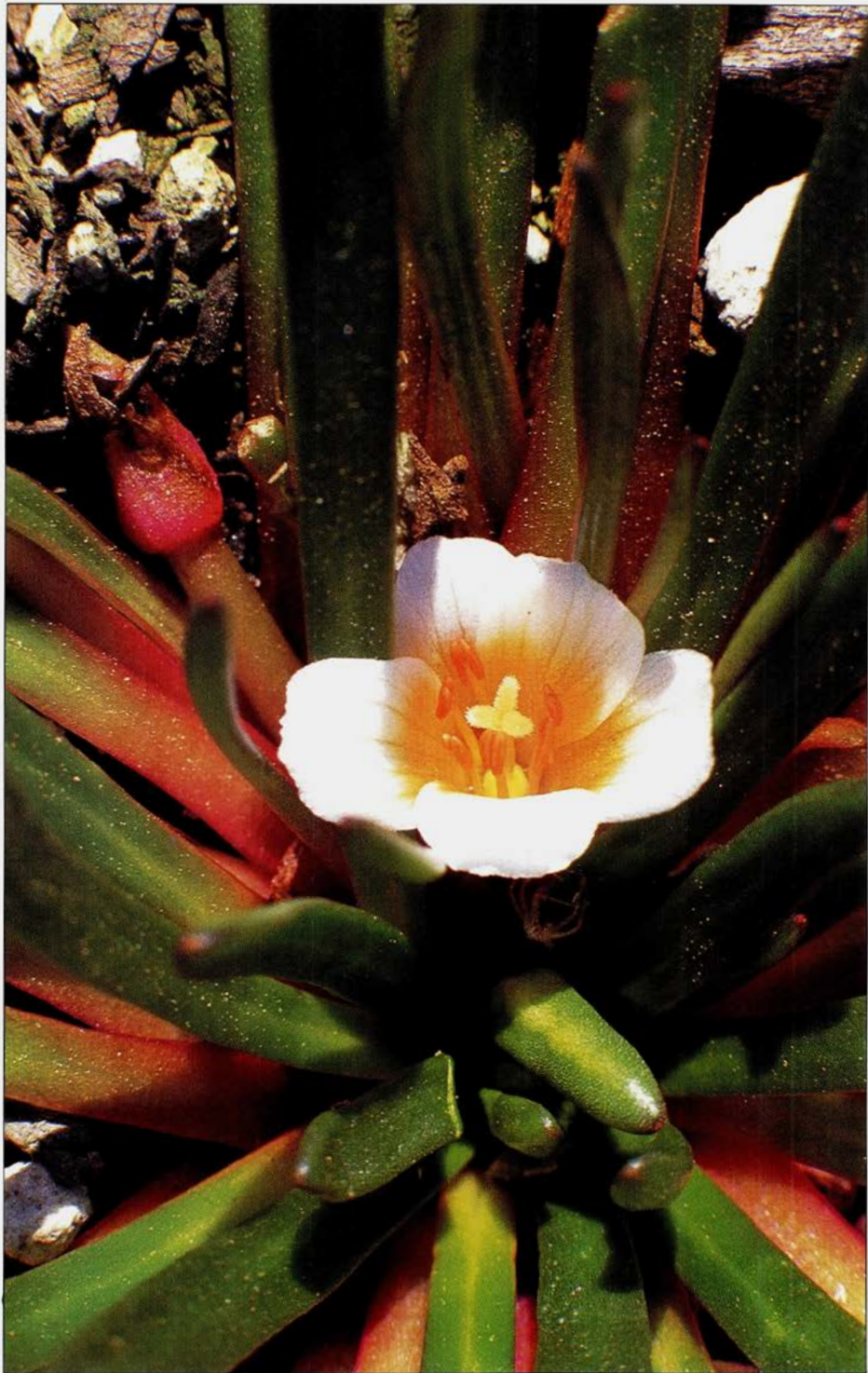


*Daphne arbuscula*, in bud and bloom (pp. 293-301)

Anne Spiegel



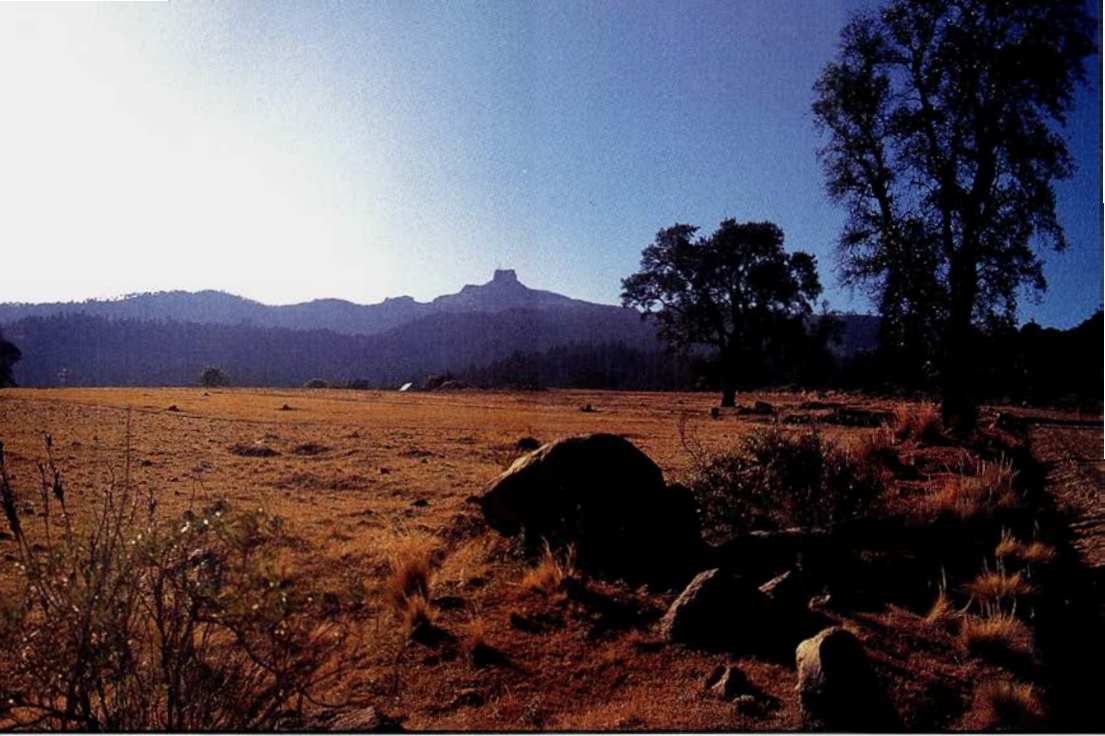




*Lewisia megarhiza* (pp. 317-18)

Burl Mostul





Habitat of *Lewisia megarhiza* on Cofre de Perote (pp. 317-18) photos, Burl Mostul

Rosette of *Lewisia megarhiza*

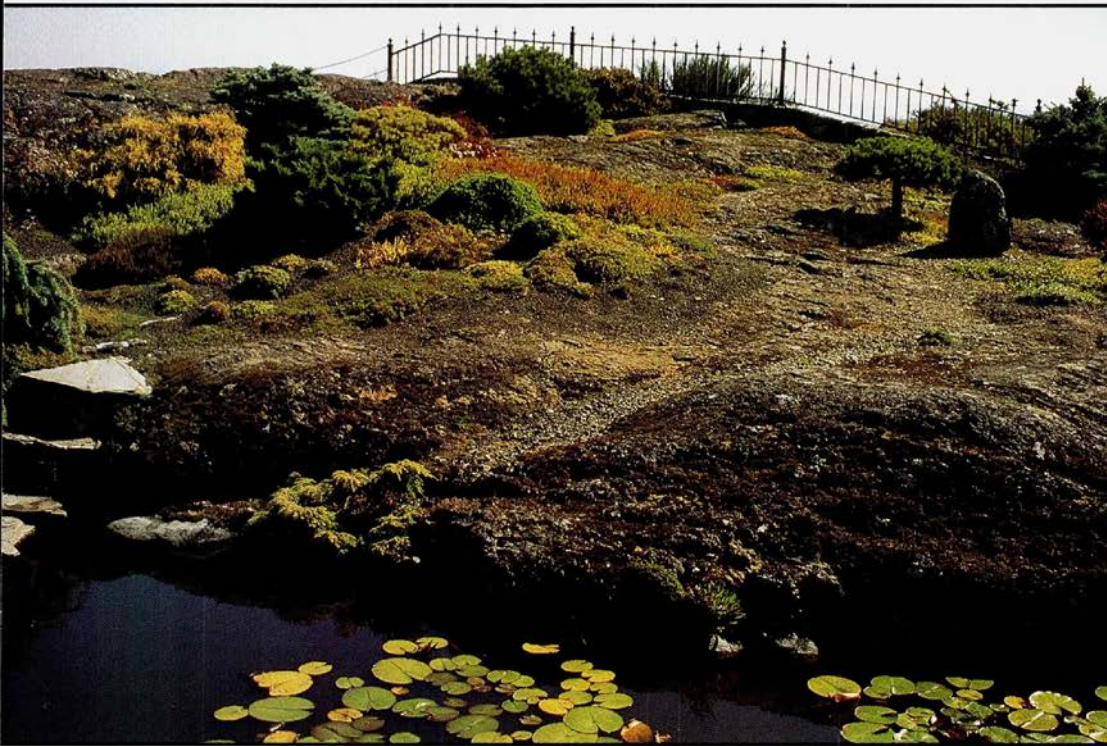






Garden of Atholl Sutherland Brown, Victoria, British Columbia (pp. 319-325)

photos, Atholl Sutherland Brown



## Canons for Development of Natural Rock Gardens

Use local stone—the more local, the better—except where imitating a moraine, which is naturally constructed of rocks brought in by the ice from outlying areas.

Reflect the structural features of adjacent outcrops: the dip of beds, foliation in metamorphic rocks, and jointing in granites and gneisses.

Reflect the local topography. For example, in Victoria, use gentle slopes, not the abrupt lines of the Coast Mountains or the karst topography of the Guilin region of southern China. If imitating a local seascape, use the gently sloped rocks of the local coast.

Do not defy gravity. Slopes more than  $30^\circ$  are rare in nature and are short-lived features (at least in geological time frames). Rocks in the garden should be at rest, not perpendicularly poised like those of the classic rock gardens of China which generally imitate the karst topography of the River Li.

Do not break the natural exposure of smoothly modelled glacial outcrops with buildings, roads, or garden construction.

Situate flower plantings in grooves and depressions. Conceal terraces on glaciated outcrops by trailing plants over the edges.

Place scree below a prominence, as in nature.

Compose boulder fields of natural arrangements of glacial boulders.

Avoid bizarre-shaped stones, such as fretted limestones, which are not natural to the area.

Atholl Sutherland Brown gardens in Victoria, British Columbia, on a natural rock formation. His original gardening interest was in rhododendrons, and he became increasingly interested in alpine plants because of the natural setting of his land. Photos of his garden are on page 328.



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# AWARDS

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## Award of Merit

### Helga Andrews

Our first recipient certainly reflects all that we value in our members. Helga Andrews is a fine gardener who is not just an avid rock gardener but is also active in many other plant societies. After retiring from her first career as a teacher she became a propagator for Arrowhead Nursery, and many rare treasures appeared to delight their nursery clientele. Certainly this was being a teacher all over again.

Not only has Helga chaired New England Chapter activities, including entries into the New England Flower Show, but she stepped forward to take over the reins at one of our most cherished activities, the Eastern Study Weekend. She has chaired not one but two Study Weekends, in 1988 and 1996. She did not rest between these events but kept up this intense pace of service by working diligently to make the Seed Exchange a success when the New England Chapter took on this momentous task.

Above all what comes across in the letters about Helga is her enthusiasm for growing plants, her excitement at trying new species, and her ready exchange of information and ideas on their culture.

—Judith Jones

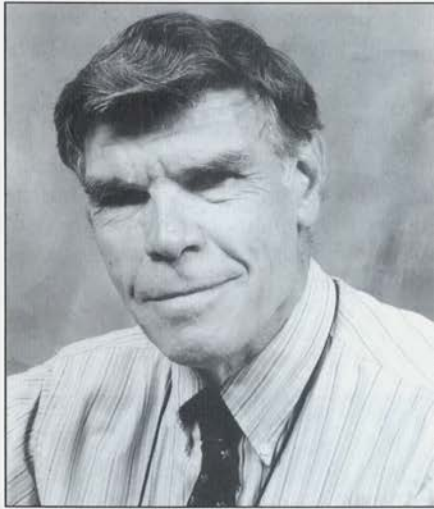


### Donald Humphrey

The next recipient epitomizes the tremendous draw that NARGS has for its members. It is because of the many disciplines and interests our members bring to the organization that we find it such a necessary part of our lives.

We should be very proud to count Donald Humphrey among our members. Don used his career in wildlife biology to make a difference on this planet in protecting several important areas for our enjoyment and education as well as that of future generations, not only in this country but abroad as well.

Don wrote reports that led to the establishment of the Indiana Dunes National Lakeshore and the Pictured Rocks National Lakeshore. He twice led planning



teams to Saudi Arabia, resulting in two major national parks in that country.

Retirement led him to become a volunteer at Green Springs Garden Park in Virginia where in 1986-87, as a part-time employee, he created the first public rock garden in the area. In 1991 he became manager of Green Springs Park and what had been a declining-estate-turned-park took a turn upward when he spearheaded the development of an overall master plan, helped create a support group to raise funds and provide volunteers, thus turning the park into a vital community horticultural center. Writer Allen Lacy praised the park as "one of the most exciting ventures in American Gardening today."

It seems that this alone is not enough to fully occupy Don's time, and he has designed several other gardens in the area, including another rock garden. Then there are the 1500 lots of seed per year to be grown, shared, and donated to various sales. In the course of growing he is also testing various plants from the southwestern US, the mountains of Mexico, temperate South America, and South Africa for garden worthiness in the Mid-Atlantic Region.

But the comment I found most apropos of the spirit of NARGS came from Bob Faden, who wrote, "Don seems to have endless patience with people asking him questions about how to grow plants, and he never seems to tire of talking about plants with just about anyone."

—Judith Jones

### David Vesall

It is truly tragic that our next recipient is to receive an Award of Merit posthumously. Although his contributions to NARGS were cut short by an untimely accident, his vigorous promotion of rock gardening as a hobby and NARGS as a most essential adjunct to an interest in alpine plants for gardener, grower, or photographer benefited us all. David went beyond his own chapter to reach out to other chapters and plant organizations to extol the benefits of NARGS membership.

His love of alpinism took him and his wife, Jeannie, on many trips to search out and study alpinism. Beyond sharing his travel experiences, he also freely shared





plants and seeds of his own special selections or forms with others. He was an avid propagator of plants from seed, developing advanced indoor starting techniques. Working as a team, David and Jeannie developed gardening techniques for their area for difficult plants. All this knowledge was freely shared through lectures, articles, or on a one-to-one basis.

Jeannie, we wish this were being presented to David in person. Still, he must know what a difference he made in his time, and we wish him many exquisite and challenging alpiners wherever he is. We cherish his memory, and we are with you in spirit to help you heal as you continue on without his earthly presence.

—Judith Jones

## Carole Wilder

With our next recipient we truly need to re-examine that chuckled phrase so often heard from volunteers, "I don't know how to say no." It is not that such volunteers do not know how to say no, but that they value this society so much that no is not in their vocabulary. This membership is most fortunate to have such unselfish dedication from Carole Wilder.

Carole has served the national organization on so many levels that a lifetime membership was voted her as a reward for services. Her national contributions have included the patience and forbearance to serve on the Board of Directors twice and upcoming into a third stint. She also served as Recording Secretary in 1990.

Annual meetings do not just happen serendipitously but are carefully planned and executed under the guidance of a chairperson. Carole chaired an annual meeting for the host Minnesota Chapter in 1985 and will be doing so again in 1997. In the interval between the annual meetings she kept limber by running the Seed Exchange from 1988 to 1990. She will be overseeing the new Seed Exchange split system for 1997-1998.

All this activity on a national level has not kept Carole from being active in her own chapter serving at various tasks such as president., board member, or heading numerous committees. She was and is the key mover in establishing and maintaining the rock garden at the University of Minnesota Landscape Arboretum. And, of course, she is a knowledgeable plantsperson ready to share advice and encouragement with fellow rock gardeners.

—Judith Jones



## Marvin E. Black Award

### Andrew Osyany

I would like to thank Norman Singer, who presented this award to Andrew Osyany in an inimitable impossible-to-capture-in-print manner. For those of you who were not able to be present, and, alas, Andrew was one, you will have to settle for my recital of Andrew's eminent qualifications to following in the Pied Piper footsteps of Marvin Black, as glowingly elucidated in his nomination letters.

Some ten years ago Andrew ignited about 40 Ontario rock gardeners into meeting and becoming a chapter of the North American Rock Garden Society. He has served as membership chairman and secretary for that duration, as well as being editor for six years of their outstanding *Journal*, which appears ten times yearly. Andrew's personal notes on various mailings of the *Journal* have helped swell their membership to around 500, making the Ontario Chapter one of NARGS' largest.

Not content with just one chapter to serve rock gardeners in Ontario, he encouraged ORGS members in the Ottawa area to form their own Ottawa Valley Chapter. At Andrew's insistence an ORGS seed exchange was established with descriptive information on each entry. He produced an annual handbook for five years and started the garden guide to feature members' gardens to visit. But Andrew has that special talent, beyond being an accomplished doer; he not only gets projects up and going, he is also able to successfully draw other people into action to carry the projects forward.

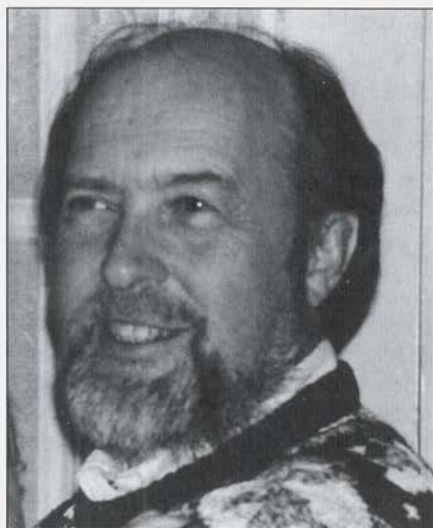
Andrew has organized and taken several trips to various parts of the world, with others or on his own, to collect seed for the Seed Exchange. He has organized a collective seed exchange to help Czech seed collectors distribute their rare and desirable seed to eager recipients worldwide.

He has served in various capacities on a national level and just served as Chair of the Nominations Committee.

Anna Leggatt, of the Ottawa Valley Chapter, attests that without Andrew's encouragement she and many other Canadian members would not have attended national meetings. As a result of Andrew's unfailing enthusiasm, Ontario members were persuaded to host the annual meeting in 1992. As committee chair once again Andrew has been hard at work spurring the planning for hosting the 1998 Eastern Winter Study Weekend.

In the words of Pat Bender, Northwestern Chapter member, "I can think of no finer candidate for the Marvin Black Award."

—Judith Jones





## Marcel Le Piniec Award

### Sally Walker

In the words of Panayoti Kelaidis, Curator of the Rock Alpine Garden at Denver Botanic Garden, "Sally Walker is a pioneer in the Renaissance of seed collection that has taken place over the last two decades." Panayoti dramatically presented Sally with the Marcel Le Piniec Award ranking her among legendary women plant explorers and seed collectors such as Lester Rowntree. He very eloquently outlined her achievements in his nomination letter:

"Sally has indefatigably collected practically every year throughout Mexico and the western United States, often up to Alaska as well. Her collections are meticulously documented, cleaned to perfection, and distributed in the most expeditious fashion. Few people are aware that she is conducting systematic botanical research on these trips, collecting herbarium specimens, and depositing them at Kew, among other institutions.

"More importantly, she has sought out every year outstanding introductions, including some of the most exciting plants to reach our gardens: dozens of penstemons, salvias, trees, shrubs, alpines, perennials of all sorts. Their collection locations, elevations, and a concise description are encapsulated in her catalog.

"A few examples of her introductions which are firmly established in cultivation thanks to her efforts are *Penstemon kunthii*, *Lilium parryi*, *Salvia henryi*, and particular favorites of mine, the dramatic new Southwestern species of *Agastache barberi*, *A. aurantiaca*, and *A. rupestris* have indeed become instant successes and favorites." Don Humphrey, Park Manager for Green Springs in Fairfax, Virginia, cites a long list of successfully introduced plants to Mid-Atlantic horticulture thanks to Southwestern Native Seed.

"Sally has attended national meetings of the North American Rock Garden Society on many occasions, offering her seeds for sale at these meetings. She has contributed on several occasions to our quarterly bulletin. Her husband Tim's stunning photography has appeared in many magazines, drawing attention to the rich flora of the American West and generating great enthusiasm."

And in the true spirit of this award "Sally's excellence, value, and consistency are legendary among her friends and customers."

—Judith Jones





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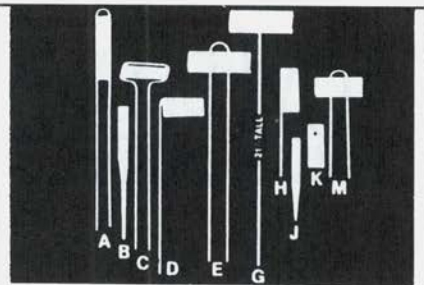


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