

Bulletin of the
American Rock Garden Society

Volume 48 Number 4

Fall 1990

Cover: *Gaultheria humifusa*_____

Painting by Carolyn Crawford, of Louisville, Colorado.
A photograph by William Jennings served as her model.

Bulletin of the American Rock Garden Society

Volume 48 Number 4

Fall 1990

Features

Genistas Perform in the Rock Garden, <i>by Phyllis Gustafson</i>	243
Planning an Expedition, <i>by Don Hackenberry</i>	249
Berries: Not just for the Birds, <i>by James Cross</i>	261
The Pawnee Buttes, <i>by Geoffrey Charlesworth</i>	267
Fall Bulbs for the Rock Garden, <i>by Judy Glattstein</i>	273
Moraine Construction, <i>by Ray Radebaugh</i>	285

Departments

Books	297
Awards	305



Genistas Perform in the Rock Garden

by Phyllis Gustafson

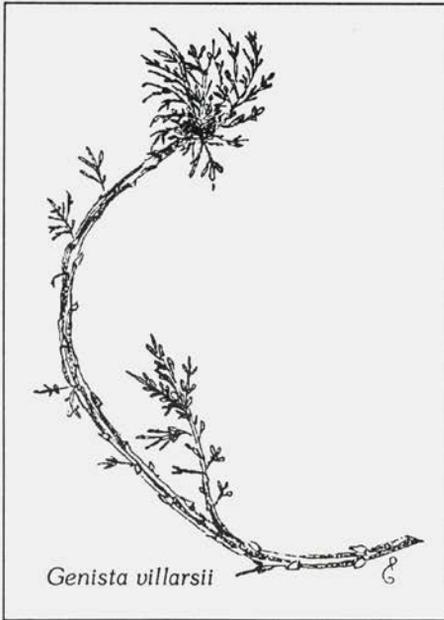
As I sat looking out the window on a cold winter morning, the sun was shining on the garden, playing up the forms and shapes of those stalwart individual plants that are the backbone of the rock garden. These are the small conifers and shrubs that in midwinter are a symphony of profiles and textures that make the garden a graceful dance for the eyes. To create a rock garden, or any pleasing work of art, you must bring into being patterns of motion. This motion is the movement of your eyes as you view the art. In the rock garden, the motion is guided by the points of interest, and these change with the seasons. In midwinter, plants in their winter dress create this motion.

Certainly, some of the small genistas can not be beat for interesting textures and shapes! Each species has its own peculiarities and looks very different from the others. Of those I am now growing, *G. horrida*, *G. lydia* and *G. tinctoria* are appropriate as points of interest on

the larger rock garden. The others are all small enough for troughs, or in very special places in crevices, or tiny rock gardens.

In the vast family of Leguminosae (peas, to us gardeners), there are almost 500 genera. Of these, about 100 are in cultivation. The genus *Genista*, with about 80 species, is considered one of the most important for use in all types of flower gardens. However, I have found that only about 20 species have been listed in seed or plant lists or rock garden books. These few have been through the lumping and splitting of taxonomists and are listed by different authors under diverse species, or even generic names. Being a gardener who would rather grow the plants than learn new names, I will use the names that are best known.

All genistas thrive in well-drained, light, nutrient-poor soil. Because they come from western and Mediterranean Europe where the rainfall is sparse and the long summers are hot and dry, they are the ideal choice for



the water-conscious gardener. If not covered in colder climates or during cold snaps in zones 5, 6, and 7, some of the more tender species will suffer from frost damage. They do recover with remarkable speed once spring arrives.

Genista horrida (*Echinopartium horridum*) is at center stage of the garden from my window. At 20 years of age and only 15" tall and 30" wide, this light olive-green, spiny shrub stays a compact dome that never needs pruning. Told that it came from hot, dry areas of Spain and Portugal, I placed it in full sun in very lean soil. The small heads of bright yellow flowers, which do not bloom until June here, are followed by seed. Seed is perhaps a good way to grow more plants, as cuttings do not always strike, even if you are careful to take green, growing wood. (Spines alone, easy to confuse with the stems, cannot root.)

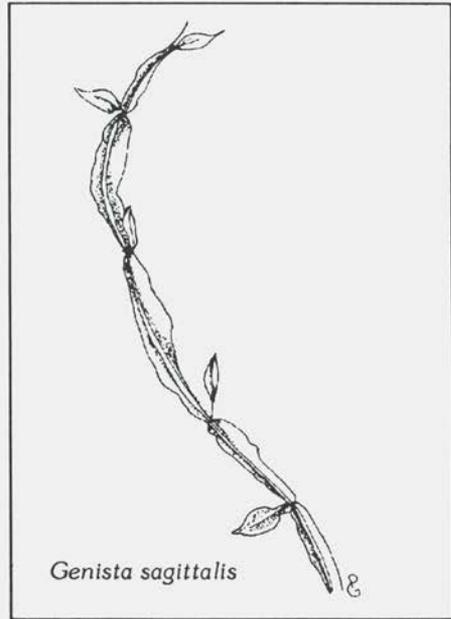
Unfortunately, in the dry summer climate of southwest Oregon, I do have to keep a constant watch for red spider mite, one of our worst garden pests. This little arachnid can cause much damage before the gardener even realizes it. The leaves will turn a blotchy yellow and, in the case of *G. horrida*, this so weakens the leaves and stems that whole branches will die. The mites are specks of red so fine that they are hard to see with the naked eye. You can use a hand lens, or knock the stems against a piece of white paper, or, as I often do, just run your fingers gently over the leaves and stems and see the little fellows on your hand. In our dry climate, they are encouraged by dust settling on the leaves. A good, strong wash of water will slow them down, but I have found that this is not very effective unless done every day. Since constant hosing is not practical, I have found insecticidal soap a big help for late season attacks. If I see the mites turning *G. horrida* a pale, lusterless color early in the summer, I use a systemic, which will last for two months or more. I feel this is less damaging to the environment of the garden than frequent spraying with contact insecticides. When these early attacks occur, I look up. The willow tree nearby is often attacked in late May, and then the red spider mites rain down on all plants below for the rest of the summer. The problem has been almost curtailed since the tree has been injected with systemic insecticides in midspring for the last two years. This not only helps the tree, but also all the plants in the yard and does not hurt birds, insects, nor us.

In the large rocks in front of the

house, *G. lydia*'s mass of arching, almost leafless stems come billowing from her center like a bird's nest fern (p. 304). At 12" in height, she always commands attention. With age, this genista from the Balkans can become 5' or more across. In late April she completely covers herself with flowers. She seems to never be bothered by insects and strikes easily from cuttings; therefore I now see *G. lydia* performing at the local Burger King and at the shopping mall. Even so, I will not become a snob; she shall stay at the front corner of the rock garden to act as a barrier to dogs and small children and to delight the curious along the sidewalk.

On the highest point of the front rock garden, *G. sagittalis* (*Chamaespartium sagittale*) flops over the large granite rocks. The cladophylls are straight when young but they twist and turn as they age. (A cladophyll is a flattened, leaflike stem that has the form and function of a leaf, but arises in the axil of a minute, bractlike, true leaf.) They are a wonderful, rich green color all year but in spring the new growth is a deep citron. The typical yellow pea flowers in tight corymbs at the ends of the stems are the richest color of any in the family. To my eye, this color combination is a feast. The plant is only 6" high but in 14 years has become 4' across (p. 302).

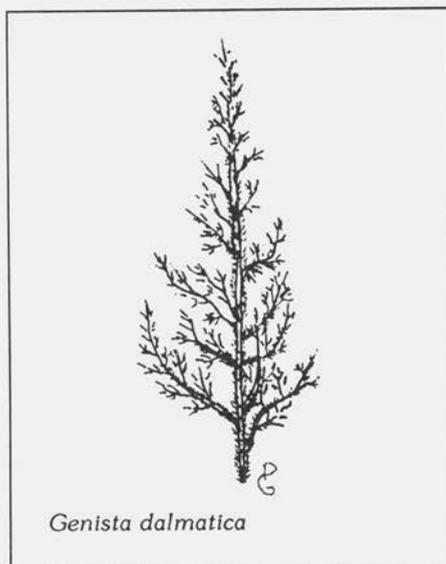
From France, *G. delphinensis* (*Chamaespartium sagittale* ssp. *delphinensis*) is a tiny version of the plant described above, staying under 3". It prefers neutral soil. Too small to be a point of interest in the rock garden, it is just right for a small crevice or a trough. It always causes



comment with its strange flat stems, reminding me of a heap of half-inch ribbon tied on top of a birthday present.

Genista pilosa is widely distributed throughout Europe, and there are many cultivars. *Genista pilosa* 'Procumbens', at 2" in height, is a favorite of landscapers. It can grow to 3' across and is one of the heaviest bloomers. The University of British Columbia Botanic Garden has introduced a superior form named 'Vancouver Gold' (p. 302). While I grow it in the crevice garden where it shapes itself to the rocks, it is considered the perfect ground cover.

In a crevice, at the edge of a walk, sits *G. dalmatica* (*G. sylvestris* v. *pungens*, p. 301). This little-known plant is an ideal subject for the front of the rock garden, or even for a large trough, as it is only 4" high. *Genista dalmatica*, also too small to be a point of interest, is the most deli-



Genista dalmatica

cate looking of the genus, with fine stems, tiny leaves, and sliver-fine spines. The tops of the stems are often damaged during the winter, but in early spring each stem sprouts numerous new buds at ground level, making the clump nice and thick. The stems stand straight up, and in mid-May the very fragrant flowers sit on top of each stem, pointing out at right angles like little birds' beaks.

Genista tinctoria is often grown in larger gardens and is one of the best-known of the genistas. At 30", it is too large for most rock gardens, but there are some small forms. The form 'Plena' (p. 303) will grow into a very thick mat with large, abundant blossoms in long terminal clusters. If you like double flowers, this is a plant you should consider having. Even though most genistas are sun-loving plants, I have found that *G. tinctoria* and its forms will take some shade under the high trees and still bloom well. There are some small forms of

which variety *humifusa*, only 2" high and very prostrate, is another fine choice for troughs (p. 303). With its shiny leaves held flat to the ground, straight stems radiating out from the center of the plant like the spokes of a bicycle wheel, it looks very different from the other small genistas.

My favorite genista, *G. villarsii* (*G. pulchella*, p. 304), is a 2" mat of whipcord stems. The gnarled, warty stems will occasionally root into the ground, affording one method of propagation. It puts on a fine show of heavy bloom with loose racemes in June and is a delightful tangle the rest of the year. *Genista villarsii*, from southeastern France and Albania, is also in my crevice garden where it enjoys the full sun.

With the exception of *G. horrida*, I have never found seed on the genistas here, nor have any of my friends in the area. Why this should be, we are not sure, as the closely-related scotch broom, *Cytisus scoparius*, which is pollinated by bees, seeds all too well and has become a pest up and down the West Coast. Cuttings are the usual method of propagation for genistas, and most strike easily. I get about 75-99% strike most of the time, except with *G. horrida* and *G. delphinensis*. I make the cuttings in midsummer from the young wood, just as it starts to harden. I insert them in a mixture of two parts perlite to one part sand. They are then put on a heated sand bed, under a mist system. While they are slow to root, once the rooting starts they grow rapidly. I soon find the flats of cuttings rooted into the sand—it takes a good tug to remove

them. If left too long they may be set back when potted up. It is better to pot them on just as the roots reach the bottom of the flats. I do this in March or April and have lovely little plants with the pots full of roots one year from the time the cuttings were taken. With *G. delphinensis*, I find that half or more of the cuttings never take. Looking for an answer, I found some suggestions that this species needs leafmold when potted up. This year I am trying some cuttings in the mixture for ericaceous plants, one part peat moss and one part perlite. Perhaps the *G. delphinensis* cuttings need a firmer contact with the medium to root.

Except for red spider mites and occasional mass gastronomical feasting by snails on *G. lydia*, I have had no trouble growing the small genistas. They are trouble-free, never need pruning, fertilizing, or any other coddling.

Genistas should not remain in pots too long, as they put down a tap root and grow fairly fast when young. If they have rooted through the pot, the

tap root is bound to be injured during planting, and so the plants will suffer when set out. If they must be kept in pots, be sure to lift them occasionally and remove any roots that are appearing through the drainage holes. Or knock the plant out of the pot and carefully fold the roots and return to the pot. In either case, do not hold a plant through another growing season, as it will begin to lose vigor.

Of the 80 species in the genus *Genista*, I've only grown these few so far. Recently I've acquired *G. hispanica* and *G. germanica* 'Nana'. *Genista hispanica* can get 18" high, so I'll put it in the background where the round ball shape and heavy bloom on the long terminal clusters in early June should make it a great asset. *Genista germanica* 'Nana' is an upright little shrub with spines along the stems. It may be another candidate for the front barrier against wandering canines and most certainly will add new, interesting texture and shape to that part of the garden.

References

- Bailey, Liberty Hyde and Ethel Zoe Bailey. Rev., The Staff of the Liberty Hyde Bailey Hortorium. 1976. *Hortus Third*. New York: Macmillan Publishing Co., Inc.
- Bartels, Andreas. 1986. *Gardening With Dwarf Trees and Shrubs*. Portland, Oregon: Timber Press.
- Harkness, Bernard. Rev. Mabel B. Harkness. 1986. *The Bernard E. Harkness Seedlist Handbook*. Portland, Oregon: Timber Press.
- Ingwersen, Will. 1986. *Manual of Alpine Plants*. Portland, Oregon: Timber Press.

Phyllis Gustafson is deeply involved in ARGS, having served as a member of the Administrative Committee and also as President of the Siskiyou Chapter. She gardens in Central Point, Oregon, and works at Siskiyou Rare Plant Nursery as a propagator.

Drawings by the author and Al Stavos.

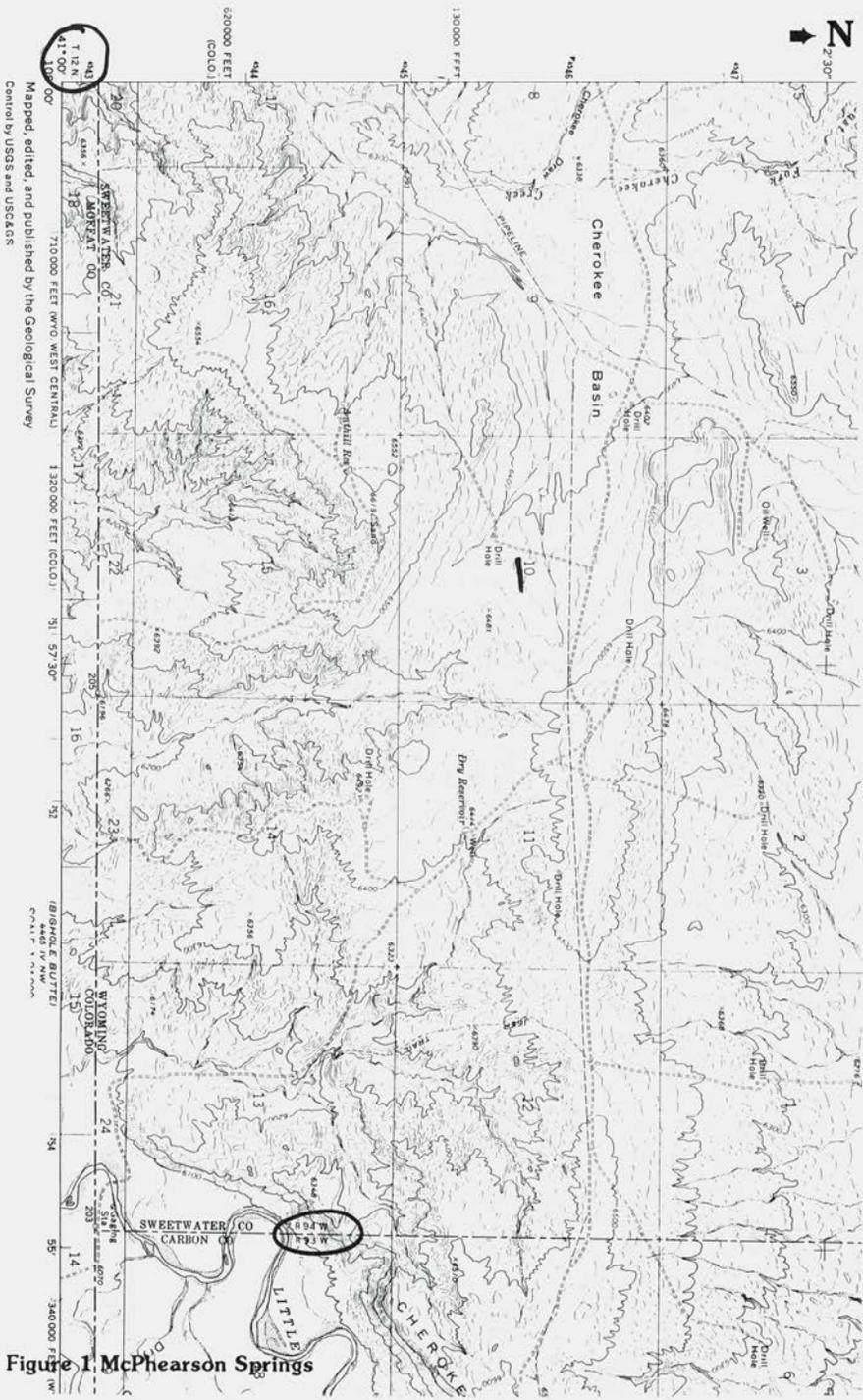


Figure 1. McPhearson Springs

Planning an Expedition

by Don Hackenberry

The destination of all my journeys is home. But the launchpad is the Pennsylvania State University library. Why? That's where the information is that will help me to find the plants I want to bring home with me. The library contains a collection of journals that chronicle the latest adventures of the glorious company of botanists. Some of the journals that focus on North American plants are: *Aliso*, *American Botanist*, *The American Journal of Botany*, *The American Midland Naturalist*, *Annals of the Missouri Botanical Garden*, *Arctic and Alpine Research*, *Bartonia*, *Brittonia*, *Bulletin of the Torrey Botanical Club*, *Canadian Journal of Botany*, *Castanea*, *Claytonia*, *Desert Plants*, *Ecological Monographs*, *Fremontia*, *The Great Basin Naturalist*, *Jeffersonia*, *The Journal of the Arnold Arboretum*, *The Journal of the Elisha Mitchell Scientific Society*, *Leaflets of Western Botany*, *Madroño*, *The Michigan Botanist*, *New Flora and Silva*, *Notulae Natu-*

rae, *Phytologia*, *Rhodora*, *Sida Contributions to Botany*, *Southwestern Naturalist*, *Systematic Botany*, *Torreya*, *The Wasmann Journal of Biology*, *Wrightia*.

And there are others. Most of these are still running; others have finished their course. The ones I most frequently consult are *Brittonia*, *Castanea*, *Great Basin Naturalist*, and *Madroño*. The most enjoyable one to read is *Leaflets of Western Botany*. *The Journal of the Arnold Arboretum* offers botany with a horticultural infrastructure. *Baileya* is a horticultural rather than botanical journal which makes botanical pronouncements; it has a "lump it" viewpoint. (I wonder if "like it or lump it" is an expression that originated in botanical circles? Maybe Cronquist didn't like the phloxes as well as Wherry did, so he lumped them?) The journals whose titles end in "naturalist," and also *Wasmann*, currently have an emphasis on toads and lizards, with only occasional botanical articles.

If published information about a plant exists, it most likely exists in one of these journals. However, most of their contents are devoted to matters you don't really want to know about, and not many botanists want to know about either. One develops an eye to spot valuable information in a journal, just as one learns to spot choice plants in the field.

For the most part, a structured format and colorless writing style are adhered to as part of the botanical discipline. This means that botanists have created a wide open field of opportunity for horticultural writers. A lot of good plants beg to be written about in a comprehensible and interesting manner. Botanists write to each other rather than the public, except in publications such as *Bartonia* which seek to be of interest and benefit to their membership base. One journal that especially has an *Epistolae Obscurorum Virorum* [sic] look about it is *Phytologia*. One gains the impression that authors choose this publication precisely because nobody will ever read it. Nevertheless, this is the journal where Weber describes *Penstemon penlandii*—it sometimes contains useful information.

You expect an author to write as the culmination of years of experience, don't you? When someone undertakes to write about something, he should have a breadth and depth of knowledge of his subject, shouldn't he? That seldom happens. Claude Barr's book is one of the rarities. Normally, one writes as an exercise in the learning process. It's your new discoveries you are excited about. You don't feel as enthused to write of

things you are long familiar with. If an article is written, it is probably written prematurely. Often it is never written at all. Therefore, don't regard an author as an authority, even if he wrote the best piece there is about your favorite plant. If he's really good, driven by persistent enthusiasm (few possess this trait) as well as discipline and duty, he'll follow up and change his mind about some details several times. Dr. Wherry wrote a number of phlox articles, beginning in the 1930s, before he published *The Genus Phlox* in 1955. Then, in *The Genus Phlox, Ten Years After*, he made it clear he did not consider his monograph the last word on the subject.

Phlox is a genus you won't find much written about in recent journals, whereas you will find abundant material on penstemons. Whether a plant is written about depends on whether a botanist is working on it. His reasons for choosing one genus and not another may be the attractiveness of the subject or the apparent need for further study of it, or he may be moved by the imperiled state of known populations, or by grant availability in the field. In this case, the comprehensive background needed to have a grasp of the phloxes may have had something to do with it, but a more likely reason is related to the state of the "art" of botany. Phlox populations often make the concept of "species" seem quite abstract (which it is), while penstemon populations are generally clearly referable to a species. It's a lot easier to make a good presentation of *Penstemon caespitosus*, referring to varieties and close species, than of

Phlox caespitosa. Botany hasn't developed concepts to make an adequate but precise phlox presentation possible. Therefore, if you publish a new species of penstemon, it will probably fly, but describe a new phlox, and it will either be shot down or simply disregarded. Opinions vary of previous work on the genus *Phlox*, and a consensus is not imminent.

Several reference works will help you find articles about a particular plant of interest to you, but much of the content of botanical journals is not readily accessed through any comprehensive index. The references that exist have their uses and limitations. *Index Kewensis* will refer you to the article where a new species is first published. It will also refer you to the first appearance of a name change, provided you already know what the new name is. It will not refer you to material offering additional information about a plant, such as a range extension, which does not involve a name change. In addition to its supplements, issued every five years, there is now a *Kew Index*, issued annually.

The *Index to American Botanical Literature* and its supplement list articles by author. *Biological Abstracts* cites articles about work performed in laboratories rather than in the field or herbarium, and my attempts to use it have not been fruitful. Often a journal is cited by abbreviation in these reference works. It may not immediately occur to you that "Not. Nat." means *Notulae Naturae of the Academy of Natural Sciences of Philadelphia*, where Dr. Wherry wrote several phlox arti-

cles. Standard abbreviations can be found in the *World List of Scientific Periodicals*.

The truth is, I usually find things by browsing. An article you have at hand refers to most of its relevant predecessors, but the only way I know to find out what follows after is to just come across it.

Now, let's use a reference to find something. Let's start with Roy Davidson's article on "Six Idaho Batholith Endemics." That's an exemplary starting point, because Roy mentions the botanists and the dates of their descriptions. Let's look up *Cardamine constancei*, *Synthyris platycarpa*, *Dasynotus daubermirei*, and *Douglasia idahoensis*. Knowing the dates of the descriptions, we can go directly to the appropriate *Supplements of Index Kewensis*, which tell us the species of interest are described in *Madroño*, *The American Journal of Botany*, *The Journal of the Arnold Arboretum*, and *Brittonia*, respectively.

Having found the articles, what shall we do with them? A quick scan suffices to appraise their value for our purposes. I found these useful, interesting, and classic, and made copies of them. What we would like an article to tell us is what the plant looks like (in an abstruse manner), where to find it, and how to grow it (at least some clues about the last). We'll make some use of the first information in our search, but it's the item in the middle that will help plan our itinerary. We'll use the last a lot more when we get back home with our treasure.

The *Cardamine* article only gives one station for the plant. "Humus soil

under *Abies-Thuja* climax, [Canadian Zone], 4 mi. below Lowell, on Three Devils Creek, at Middle Fork of Clearwater River, Selway National Forest, Idaho County, Idaho." Then the collection date of the type specimen is given, "June 2, 1935." It is a reasonable assumption that the plant was collected in flower, so we also have an idea of its flowering period.

The *Synthyris* article offers the same sort of information, plus one additional item: "It grew in a forest of the Douglas Fir-formation. Type, partly shaded places, Coolwater Mountain, Selway National Forest, Idaho County, Idaho, at 6500-7000 feet altitude, collected in flower May 8, 1936...It was also gathered in fruit on July 11, 1936..." Hope that instigates a contribution to the seed exchange.

The article on *Dasynotus* also gives this and adds the obvious about growing conditions, that plants along trails and in clearings grow much better than those in shade, but goes on: "Eight-nine stems were counted on one individual, those making a cluster about 25 cm in diameter at the soil surface. The color of the corollas is pure white." That description greatly enhances my mental picture of its compactness and attractiveness and sets a standard to emulate in cultivation.

The *Douglasta* article gives both the type station and the other known sites, and shows them on a distribution map.

Our labors continue in the map room. But there is something we need to do first: go home! Among other things, that is where our road maps are. In view of the number of

US Geological Survey maps of any one state, it helps to first find the general whereabouts on a road map before trying to pinpoint the site on a large-scale topographic map. Lowell is easy enough to find. Coolwater Mountain isn't on the road map, but Gail and Pennell tell us it is just east of where the Lochsa and the Selway join to form the Middle Fork of the Clearwater. This they do at Lowell.

We have prepared ourselves to find the right map soon. At the top of the first map drawer for each state is a chart for each of the two scales of USGS map, which serves as an index. An outline of the state is overlaid with a grid of rectangles showing the name of the topographic map for the area covered.

Now, there is another way of describing a location with which one should become acquainted. The type station for *Penstemon gibbensii* Dorn is "Wyoming, Sweetwater Co.: T12N R94W S10 NW1/4, about 27 km (17 mi.) W of Baggs, 1950 m (6400 ft.), barren sandy-clay slope, 11 Jun 1981..." It took me a while to figure out on my own that "T12N R94W S10 NW1/4" is a meaningful statement.

Here in civilization, a township is a subset of a county, a unit of government administered by a board of supervisors, its boundaries determined by choices made in the past to encompass the countryside around a village. In living memory, it was also a school district. But west of the Pennsylvania border, a township is a geographic unit of 36 square miles. I vaguely remember something about that back in school in connection with the Louisiana Purchase. Each town-

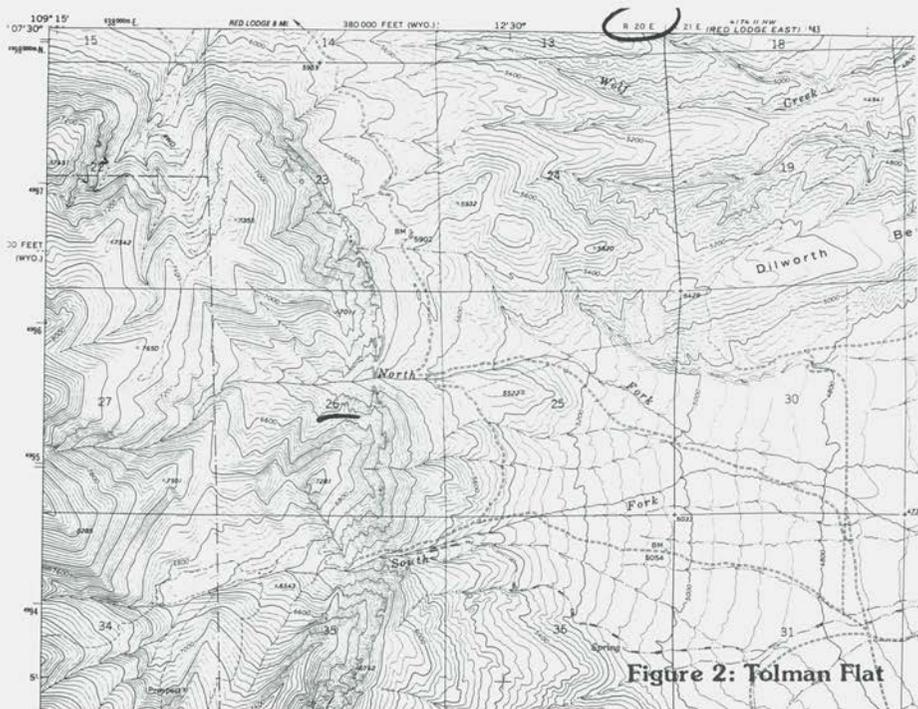


Figure 2: Tolman Flat

ship is identified by numbers, and the numbers are determined by a set of east to west baselines and north to south prime meridians. Because we first looked at a Wyoming road map, and had an idea what part of the state Sweetwater County was in, we looked at the map index for Wyoming and found that the place we are looking for is on the McPherson Springs 7 1/2 min. quadrangle map. A portion of it is illustrated in Figure 1. At the top left of the page, we see T12N, that is, the 12th township north of the base line, and in the lower left, along the county line, R94W, the 94th range west of the prime meridian.

Generally, each township is divided into 36 sections. One of the exceptions is shown just above the state line. That means that if the location

includes the section number, S10 here, you have only a square mile to search for your plant. Better yet, the northwest quarter is also given in this case. From the altitude, we know that *Penstemon gibbensii* grows somewhere along the 6400' line. It is a reasonable surmise that the site where the plant was collected is where the road intersects this elevation line. Another reasonable surmise is that heavy equipment was hauled over the road to drill the drill holes that appear on the map, making the road a washboard. By the way, with this map alone, you can't get here from there. Look at the adjoining map of Baggs to trace the road 17 miles east to town.

In this example, we were able to pinpoint the plant. Now, let's look at a more ambiguous situation. In 1982,

Erwin Evert and Lincoln Constance (for whom the *Cardamine* in Roy's article was named) published the new genus *Shoshonea pulvinata* in *Systematic Botany*. Then, in 1986, a range extension was published in *Madroño's* "Noteworthy Collections: Montana." One of the sites is "Beartooth Mountains, ridgetop n. of the North Fork Grove Creek 10 km se. of Red Lodge, T8S R20E S26, very common in gravelly, limestone-derived soil..." From scanning other maps in the neighborhood, we find that the site is on the Tolman Flat map. The township is indicated below the portion shown in Figure 2. The range is shown top center. Some of the sections are skewed a bit here. To get there, it looks like the first thing you do is park near the elbow of the road and hike about a quarter of a mile up along the creek, then start to climb. Now, by "ridgetop," the collector may mean the area near the 7011' mark near the northern boundary of section 26. Things will probably sort themselves out once you are there; on the other hand, the plant may still elude you.

A caveat: when you get there, the place may not quite correspond to the mental picture the map gave you. Sometimes this is a matter of interpretation. Other times, it is because the map is inaccurate. Maps, like botanical journals, are imperfect tools, but they are the best we have to go on. For instance, the map of where I live shows our mountain as a typical ridge with no distinctive features. It fails to show the "flat" halfway up, and it fails to show that down at Reedsville, at the point of the flat, the mountain Y-forks into

two separate ridges, the front one lower, with a gap between them. That means that our mountain is actually two, sutured at the flat. But matters significant to me failed to impress the surveyor. Also noteworthy are the sanitized place names. Dogtown becomes "Knob," Potlicker Flats is "Mount Pleasant," although Stillhouse Road is shown just beyond it. Other aggregates of houses are given place names never heard of by anybody who lives there. When you make local inquiry, you may well find that this is also the case elsewhere. And older botanical journals sometimes cite place names that can be found on no current map. In fact, you may be hard put to find them in past records. For example, Louis O. Williams cites the occurrence of *Penstemon aridus* on the dry western slopes of the Big Horn Mountains, 10 miles east of Kane, Beaverhead Co., and *P. caryi* on the dry western slopes of the Beaverhead Mountains, 10 miles west of Kane. I asked John Taylor of Bigfork, Montana, where Kane is or was. He wrote back that it isn't there now and does not appear in the directory of former post offices.

There are other articles that will help you plan your expedition besides those that describe target species, especially descriptions of areas and habitats, and vascular plant checklists.

A visit to a species site will usually be brief. These articles describe places where one is not pressed to move on. One can stay a while, lay aside all cares and gain an appreciation of how its plants live in it. The places in these articles would be the highlights of a trip, and they would

give perspective and background to the sites where one is more transient.

If you went to Tahoe last summer, you probably want to go back. Gladys Smith's *Flora of the Tahoe Basin and Neighboring Areas* and its followup will help you plan your further adventures. The articles have been reprinted in book form, available from the author. If your trip takes you through other parts of the Southwest, there is more literature to consult. Stanley Welsh wrote "On the Distribution of Utah's Hanging Gardens" to help you explore canyon country. Emily Hartman and Mary Lou Rottman studied the American, Burns, and Stony Basins in the San Juans, and Mt. Bross in the Mosquito Range of Colorado.

The very best background you can give yourself on the Great Basin is not in a journal, but the first volume of *Intermountain Flora. The Reference Handbook on the Deserts of North America* has a chapter on Steens Mountain, with a list of its many endemic plants. One fine day in The Tattered Cover in Denver, that palace of delights, I saw it among the remaindered books. I had already bought a lot and passed up the opportunity to have it for my very own. I still grieve for my foolishness. In my life, I regret the things left undone far more than things done.

After you've opened the book and read it, there will come a time to close the book. Or more precisely, after going where botanists have gone before, it will be time to note where they have not gone, procure some trail guides, take along your backpack, and plan some trips to those places. But even if the best of

botanists has been to a place, he didn't find everything that was there. Noel Holmgren went to Navajo Mountain, but he didn't see *Phlox cluteana*. One reason is because he wasn't looking for it. The sheep may be another reason. He did find what he was after, *Penstemon navajoa*. As you look over the road maps, you will see many interesting looking spots you wish you could read about somewhere. When you find there is no article, you've found an opportunity.

(Don Hackenberry is an enthusiastic gardener and propagator who lives near Reedsburg, Pennsylvania. He is the proprietor of Appalachian Wildflower Nursery and each year writes a very informative and entertaining catalog for that company.)

References

- Anon. 1969. *Index to American Botanical Literature: 1886-1966*. 4 vols. New York: Torrey Botanical Club.
- Barr, Claude A. 1983. *Jewels of the Plains: Wild Flowers of the Great Plains Grasslands and Hills*. Minneapolis: University of Minnesota Press.
- Bender, Gordon L., ed. 1982. *Reference Handbook on the Deserts of North America*. Westport: Greenwood Press.
- Davidson, Roy. 1985. "Six Idaho Batholith Endemics." *Bulletin of the American Rock Garden Society* 43(4):205-208.
- Detling, LeRoy E. 1935. "A New *Cardamine* from Northern Idaho." *Madroño* 3(3):176-178.
- Dorn, Robert D. 1982. "A New Species of *Penstemon* (Scrophulariaceae) from Wyoming." *Brittonia* 34(3):334-335.
- Evert, Erwin and Lincoln Constance. 1982. "*Shoshonea pulvinata*, a New Genus and Species of Umbelliferae from Wyoming." *Systematic Botany* 7(4):471-475.
- Gail, Floyd W. and Francis W. Pennell. 1937. "A New Species of *Synthyris* from Idaho." *American Journal of Botany* 24(1):39-40.
- Hartman, Emily L. and Mary Lou Rottman. 1985. "The Alpine Vascular Flora of Three Cirque Basins in the San Juan Mountains, Colorado." *Madroño* 32(4):253-272.
- _____. 1985. "The Alpine Vascular Flora of the Mt. Gross Massif, Mosquito Range, Colorado." *Phytologia* 57(2):133-151.
- Henderson, Douglass M. 1981. "A New *Douglasia* (Primulaceae) from Idaho." *Brittonia* 33(1):52-56.
- Holmgren, Noel. 1972. "Plant Geography of the Intermountain Region." In Cronquist, Arthur, et al., *Intermountain Flora: Vascular Plants of the Intermountain West, USA*. Volume 1. New York: Hafner.
- Jackson, B. Daydon and Joseph D. Hooker, eds. 1895. *Index Kewensis: An Enumeration of the Genera & Species of Flowering Plants*. Oxford.
- Johnston, Ivan Murray. 1948. "Studies in the Boraginaceae, XVI." *Journal of the Arnold Arboretum* 29(3):234-237.
- Lesica, Peter, Klaus Lackschewitz, John Pierce, Shari Gregory and Maria O'Brien. 1986. "Noteworthy Collections: Montana." *Madroño* 33(4): 308-312.
- Smith, Gladys L. 1973. "A Flora of the Tahoe Basin and Neighboring Areas." *The Wasmann Journal of Biology* 31(1):1-231.
- _____. 1983. "Supplement to a Flora of the Tahoe Basin and Neighboring Areas." *The Wasmann Journal of Biology* 41 (1,2):1-46.
- Weber, William A. 1986. "*Penstemon penlandii*, spec. nov. (SCR) from Colorado." *Phytologia* 60(6):459-461.
- Welsh, Stanley L. 1989. "On the Distribution of Utah's Hanging Gardens." *Great Basin Naturalist* 49(1):1-30.
- Wherry, Edgar T. 1955. *The Genus Phlox*. Philadelphia: Associates of the Morris Arboretum.
- _____. 1965. "The Genus *Phlox*, Ten Years After." *Bartonia* 35:13-16.
- Williams, Louis O. 1936. "Field and Herbarium Studies, IV." *Annals of the Missouri Botanical Garden* 23(4):449.



Actaea rubra (p. 265)

Dick Redfield

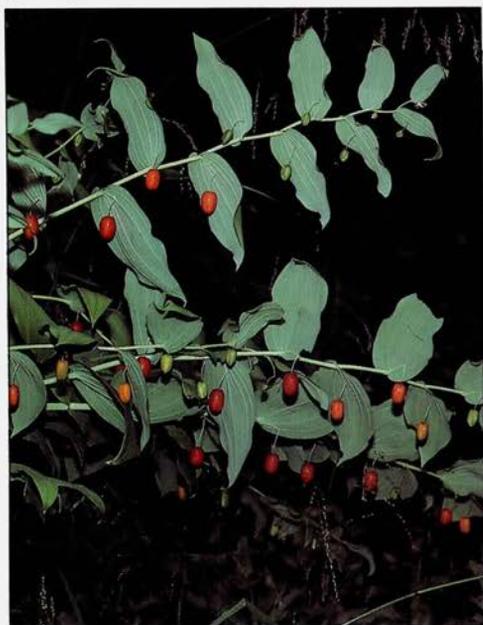


Cornus canadensis (p. 265)

Dick Redfield

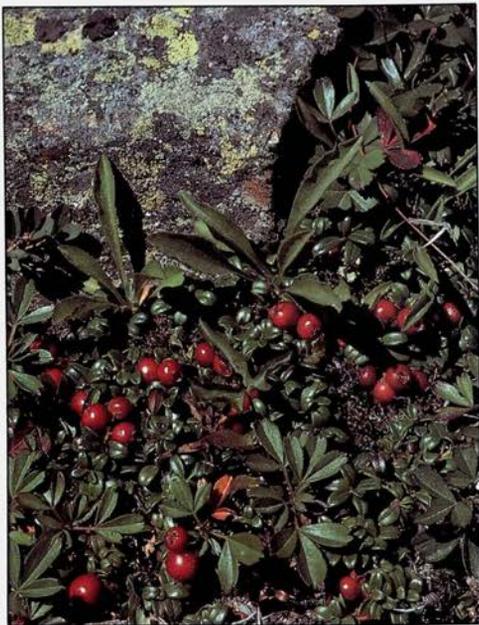
Streptopus amplexifolius
(p. 265)

William Jennings



Vaccinium vitis-idaea 'Minus'
(p. 263)

Dick Redfield





Pernettya tasmanica (p. 264)

Phil Pearson

Ephedra minima (p. 266)

Carolyn Crawford





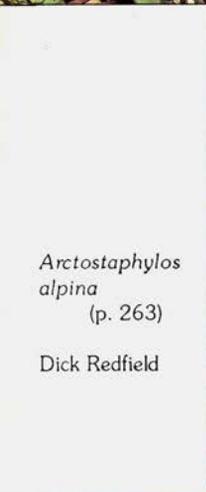
Gaultheria procumbens (p. 264)

Phil Pearson



*Clintonia
umbellata*
(p. 265)

Dick Redfield



*Arctostaphylos
alpina*
(p. 263)

Dick Redfield



*Rubus
calycinoides*
(p. 266)

Phil Pearson



Berries: not just for the Birds

by James Cross

One of the less fortunate characteristics of the alpine rock garden is the general dearth of color as summer matures. This occurs almost by definition with the heavy emphasis on early-blooming, dwarf perennials. There are few plants of small stature that come into their ornamental primes in late summer, fall, and winter before the lasting snows come. The aesthetic need for off-season color is great—our rock gardens need all the help they can get at this time of year. The gardener, too, can use some help. An additional spot of color here and there might help draw attention away from that favorite plant or two hit by summer's muggs.

Berries in the rock garden can add that color. It seemed simple enough at first to write on the topic from my own first-hand experience. But so few useful plants could be cited that the article would have been of limited benefit, even to another gardener in this immediate area. What follows here is the result of a limited survey of active gardeners around the coun-

try and their suggestions. Please send your own experiences with berried plants to the *Bulletin* and add to our list of choices.

Two defining criteria were sought for plants with berries. An attempt was made to confine comments to colorful fruits that would add off-season color. No matter how beautiful unto themselves, cones of conifers and seed heads of a wide assortment of plants were excluded. Plant stature or size was considered a limiting criterion. Species were eliminated if the plant could not be comfortably contained within an *alpine* rock garden for six to eight years or, as the most liberal compromise, could not be considered a practical framing plant for the borders of the alpine rock garden. For general ornamental gardening purposes, there is no shortage of plants with good fall or winter fruiting characteristics; however, the vast majority of these would quickly overrun or too strongly dominate any rock garden containing the slow-growing perennials from above timberline.

One of the most logical sources for a good, reliable set of colored fruit would be *Cotoneaster*. The low-growing forms are numerous, but most all of these consume large areas quickly and would require frequent and heavy pruning to keep them confined. The deciduous forms provide the most prominent fruit. The species *C. horizontalis*, the rockspray cotoneaster, is a fruiting gem, but much too vigorous. A reasonable alternative, as a much slower-growing plant, is *C. adpressus* 'Compacta'. Unfortunately, at least here in the East, it fruits but lightly. The variegated form, an excellent ornamental, also grows quite slowly, but it too fruits sparsely. There are several forms sufficiently dwarf for most any rock garden, but none of these fruit at all to my knowledge. *Cotoneaster adpressus* 'Little Gem' is, by far, the most reliable selection, but has never set fruit here.

Among the better evergreen forms which might (with fingers crossed and at least one eye closed) be used within a large open space or on the margin of the rock garden, especially if there be a wall or very large rock to hang over, are several candidates. The most prostrate of all cotoneasters is *C. dammeri* (?) 'Strieb's Findling', which will follow closely the contours of any surface. Of darker green foliage and almost as prostrate are two cultivars of *C. microphyllus*, 'Cochleatus' and 'Teulon Porter'. These are quite similar to each other, possibly even identical. Another, with finer foliage, is *C. m.* var. *thymifolius*. All are good fruiters, albeit some berries are hidden by foliage. The one evergreen candidate among the true dwarfs is 'Cooperi', which

many of us have tried in our rock gardens. Some gardeners in zones 6-7 and up have succeeded with this plant, but it has *not* produced any fruit. So this genus, a prime source of colorful fruit, does not offer us a single outstanding candidate, space considered.

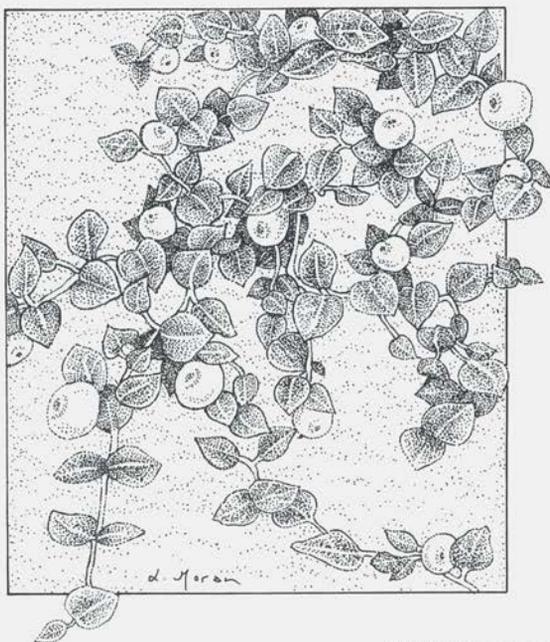
As is seen with cotoneaster, it is not exceptional for the more dwarf forms of woody plants to fail to produce fruit and, in numerous cases, flowers. Do not be misled by the absence of fruit. If the plant seems to have normal flowers, it may only be lacking the proper source of pollen. The diminutive shiny-leaf holly, *Ilex* x 'Rock Garden', fruits well but often is seen with no fruit. I suspect that any male flowers of *I. aquifolium*, *I. opaca*, *I. pernyi*, or the like, will remedy this situation. Besides 'Rock Garden', there are several other very nice and very miniature, evergreen selections of *Ilex*, all chance variations from the breeding efforts of Dr. Elwin Orton of Rutgers University. Hopefully, some will be named one day and thus become available to disseminate among needy rock gardeners. It only takes a few red fruits on one of these tiny gems to make a nice show all fall and winter.

As to deciduous holly, the most dwarf of those with normal-sized fruits seems to be *Ilex verticillata* 'Red Sprite' (also sold as 'Nana' and 'Compacta'). Unfortunately, in ten years this becomes shoulder high and wider than high. There is a very dwarf *Ilex serrata* with many unusually tiny fruits that is self-pollinating and goes by the Japanese name 'Koshobai'. It appears that this must be grafted to be reproduced. In the

absence of dwarf understock, it reverts to the species type, resulting in too much vigor initially. After a few years, the plants appear to settle down to the intended, quite dwarf habit. It may be difficult to locate this plant, but, if you decide to search, try first among local bonsai friends.

Most *Ilex* species bearing black fruit are not eligible for the rock garden, due to the large size of the plants or insufficiently showy fruit. However, where *Ilex crenata* is hardy, the very dwarf forms should be considered, since their open growth habit shows off the fruit quite well. The nicest of these is Dr. Orton's female plant, 'Dwarf Pagoda'. I am told a more recent selection, to be named 'Jersey Jewel', is an even better ornamental for the small rock garden. However, it is a male and so obviously will not bear fruit.

Another example of unnecessary disappointment with fruit not setting is *Gaylussacia brachycera*, the box huckleberry. Don Smith clearly stated many years ago that this needs to be pollinated with a different strain of the same species. It can be a very good fruiter and is well worth having in the garden for the decorative effect of the berries. *Gaylussacia* is one of those plants which cannot take lime. The box huckleberry will not tolerate even the dust or frost-produced debris from tufa.



Mitchella repens

It is much more fussy in this regard than—believe it or not—*Arctostaphylos uva-ursi*. The bearberry will live, though unhappily, for years planted directly into tufa. This *Arctostaphylos*, as well as its cousin, *A. alpinus* (p. 260), is another of our better-fruited plant choices.

Vaccinium is a genus worth exploring. Both forms of *V. vitis-idaea*, the lignonberry or cowberry of Europe, and the hardier and shorter-growing mountain cranberry of North America, are, in acid soil, quite satisfactory producers of attractive fruits. The diminutive form, *V. vitis-idaea* 'Minus', promoted by Sallie Allen as 'Micro Minus', is an especially attractive plant in the alpine rock garden. An early observation would be that 'Micro Minus' is a more dependable producer of stolons or runners than the species itself. *Vaccinium macro-*



Gaultheria ovalifolia

carpum 'Hamilton' is a good fruiting dwarf but only when provided with pollen from some additional variety. I know that it fruits well with ordinary American cranberry (*V. macrocarpum*) nearby. The largest plant here, entirely off on its own, has never set fruit although covered each year with those delightful flowers.

Of the blue-fruiting vacciniums, the variety of *V. angustifolium* known as 'Top Hat' is often billed as a nice combination of ornamental and food producer. If its 1.5-2' size crowds your rock garden, it might do on the margin. Of the numerous other vacciniums there have to be some worthy of trial in your area. As one example of this unknown portion of the genus, I have seen a plant with excellent red fruit said to be *V. uliginosum* 'Alpina' from Mt. Washington. My home sources show this species' fruit as black. The plant's size is uncertain, but from the bloodlines, it could well be of sufficiently diminutive stature.

There are quite a few daphnes small enough in growth habit to qualify for the alpine rock garden. As to fruiting, it is difficult to generalize other than to say that I never see fruit

stay on the plant long enough to be considered ornamental in itself. One reads and hears regularly about fruit on daphnes, especially from England, but of numerous species in the Long Island garden, the only one on which fruit appears regularly, if only briefly, is *D. retusa*. This is also the only species of which we find volunteer seedlings with any frequency.

As a contrast, there are dozens of *Daphne cneorum* in all sorts of locations in the garden and not a single seed or volunteer seedling has been found. It would be interesting to hear the different experiences of other gardeners and their explanations of daphne fruiting habits.

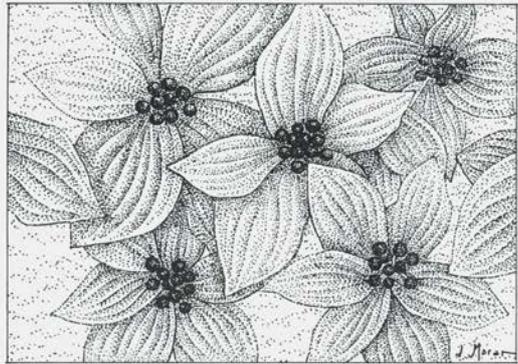
Gaultheria are another logical source of attractive fruit for summer and fall. *Gaultheria procumbens* (p. 259) should be a prime candidate with its colorful fruit and contrasting new and mature foliage in late summer. It has been suggested that *G. humifusa* might be tried in some areas, especially on the West Coast. Although of different foliage character than our native *Gaultheria*, a Japanese species, *G. adenothrix*, is also worthy of trial (p. 257).

For those in mild regions, the low-growing species of *Pernettya*, such as *P. nana*, *P. tasmanica* (p. 258), and *P. pumila* are excellent for fruit and general ornamental purposes. Here in zone 7, they can be kept alive with the cover of a shrub—but what's the use to grow them, when you cannot see them? They do not take on the handsome form here that is seen in open gardens where they

are fully hardy. Perhaps the only real solution for some of us is to visit those milder gardens.

Two quite hardy ground-covers of the northern forest floor, *Mitchella repens*, the partridgeberry, and *Cornus canadensis*, the bunchberry (p. 257), are very useful fruit-producers if we do our best to accommodate them by creating the cultural conditions seen in their native habitats. In cultivation, *Cornus canadensis* is especially sensitive to greater heat around the clock and the attendant dryness. There are, however, great tolerance differences between individual plants. If you are located where summers are hot and dry, try to get your plants from a colony originating as near to home as possible.

There are a number of herbaceous perennials with a need for moist, fertile woodland growing conditions similar to *Mitchella* and *Cornus*. Most are taller but, with a number of hardy species from which to choose, you can select those under 2' in stature and, with some, under 1'. For most of these species, you will have to compromise on texture, for somewhat coarse foliage goes along with the colorful fruit. *Arum italicum*, and *Arum maculatum*, the cuckoopint, are in their ornamental primes in the fall with red, grape-like clusters of fruit, which, incidentally, are listed as poisonous. Their close relatives, the arisaemas, or jack-in-the-pulpits, produce the same type of attractive fruit, but usually on large-leaved, taller plants that need to be carefully placed if aesthetics are to be considered. The



Cornus canadensis

moist and fertile growing conditions apply also to *Actaea*. *Actaea rubra*, the red baneberry (p. 257), produces red fruit, except on the white-fruited form. *Actaea pachypoda*, the white baneberry, produces white fruit, except for the red-fruited form—so there is no need to get these two mixed up! The heights of both species seem to fall between 1' and 2' feet. Growing in these same rich, woody conditions, but closer to one foot in height, is *Clintonia borealis* (p. 260), with attractive blue fruit. A last plant of this type is *Streptopus*, the twisted stalk (p. 257). *Streptopus roseus* grows to 1-2'; *S. streptopoides* is under 1', both with red fruit. If your needs for fruit are great enough to permit compromising even further on stature and fruit color, *Mahonia repens*, the lowest-growing (from under 1' to 2-3') of the more hardy species, might be considered. Give it plenty of soil fertility and bring the pH up a bit from that which makes acid-soil lovers happy.

For those whose gardens are almost frost-free, the New Zealand plant *Coprosma* is said to be a fine candidate. One species can be seen at the Berry Botanic Garden in Port-

land. One should at least start with the low-growing species *C. acerosa* or *C. petriei*, or an intermediate hybrid, *C. x kirkii*. These produce an interesting blue fruit.

An exceedingly attractive ground-cover, *Rubus calycinoides*, has a bonus of salmon fruit (p. 260). In areas where it is truly hardy, it can be all-too-good a competitor for space. It is said to be hardy through New York City, but in this zone 7 garden it has disappeared completely three times, which, as they say, is the charm.

In direct contrast to all of the herbaceous fruiting plants of the moist woodlands, there is one genus of plants mostly from warm and dry areas that in some species provides nice fruit. If it is to be criticized for foliage, it would be because the foliage is too small and slim, or not visible enough! All of the species remind one of a miniature broom or horsetail. This is the genus *Ephedra*. *Ephedra regeliana* provides red fruit in midsummer and stays 1"-2" tall. The favorite species seems to be *E. minima* from Tibet, at 3-5" in height and with a good, low set of long-lasting "berries" (p. 258).

For the borders of the rock garden are several dwarf plants with larger fruit, which might appear out-of-scale to some eyes unless properly placed. Consider the dwarf citrus that can be kept under 2'. Perhaps one of our better informed members will volunteer to bring us up-to-date on small fruit trees. I am told that some very dwarf, fruiting forms of apple trees are in existence. The dwarf pomegranate would be another candidate. The dwarf Japanese quince, *Chaenomeles japonica*

'Chojubai Red' has nice, dark green leaves, 'Chojubai White' more vigor. Both propagate well from cuttings and are in not uncommon use by bonsai enthusiasts. Yet another good fruiting woody plant of which a dwarf form might be found with a serious search is *Ardesia japonica*. Here, too, bonsai people might have a contribution.

Last, but far from least, it was strongly recommended that more people add wild strawberries to their rock gardens and other gardens, too. In some milder parts of our country, they bear fruit the year around. They are especially nice at the far end of the larger garden.

Jim Cross is proprietor of Environmentals Nursery in Cutchogue on Long Island. He received the Marcel Le Piniec Award in 1988 for his outstanding service to rock gardening in introducing new plant materials. In addition to berries, he is very interested in dwarf conifers and hardy evergreen plants of all sorts.

Drawings by Lisa Moran.

[Editor's Note: I have not been able to verify with certainty the identity of the pictured *Ephedra minima*. There exists another plant named *Ephedra minuta*. Both species are apparently from the Far East, *E. minima* from Tibet, *E. minuta* from Szechuan. More research is underway. Watch for a clarification in a future issue.]

The Pawnee Buttes

by Geoffrey Charlesworth

In November of 1989, Norman Singer and I visited Denver, Colorado. Our hosts were Panayoti and Gwen Kelaidis who took us to see the Pawnee Buttes, a natural rock garden, as well as gardens in the vicinity of Denver. Apart from the pleasure of the experience, there has been such a surfeit of input on the subject of rock gardens that a rethinking of attitudes may be in order. What they are or should be, what they needn't be, and what the whole purpose of rock gardening is, if purpose is a useful word.

"You can't get lost in Colorado." So said Panayoti as we drove north from Denver for a visit to the Pawnee Buttes. We set off in two cars, six adults and Eleni, the Kelaidis' much travelled and adored child, midway between baby and little girl. When you think of Colorado you think of the Rockies, but nearly a half of the state is almost flat, and anything east of the north-south line through Denver is prairie or some variant of prairie. The northeast section of the

state is the birdseed capital of the world, producing a particularly fine white millet for canaries and other inmates. At first glance, none of the cultivated areas differed superficially from the virgin prairie, but one soon recognized the undisturbed fields by the buffalo grass, *Buchloe dactyloides*, the prevalent grass of the short grass prairie, which was already brown and softly curly.

But we did get lost. Both going and returning. All the roads are roughly north-south and east-west and you can go from A to B by a multitude of routes. If you think of roads as forming a checkerboard of 8 x 8 one-mile squares there would be 12,790 different routes possible from the southwest corner to the northeast corner. However, two types of obstacle dissuade one from taking a purely arbitrary course zig-zagging across the state. The first type is man-made. Not all roads are continuous, and you can run into a T-junction which forces a right-angled turn. The second type is a natural barrier such as a lake or a

river. We met both. After traveling north on the west side of the lake, we opted to go back south before going east to clear the lake, then north again, though nobody was certain that north then east was wrong. The river was the Platte, an important waterway that goes on to Omaha, Nebraska. This flows roughly but not exactly east-west and throws any road near it into an embarrassed confusion of direction, and of course we had to find a bridge to go north at all. To make traveling even more interesting, the roads are not uniform in quality. Major roads are superhighways with distances to towns on green signs and purposeful exit signs; other roads can be anything down to rough dirt with a disturbingly untraveled look, no signposts, and names like Road U. You would expect the Rockies running north-south to be a visual aid in retaining one's sense of direction, but, tall as they are, they are quickly out of sight. The flatness of the country is an illusion; you see prairie on all sides and without the sun (this was most of the time), you don't always know whether you are going on a north-south or an east-west road, and even if you do, the quirks of nature and man combined raise doubts as to whether you will end up in Wyoming, Nebraska, or New Mexico. I think the moral is to carry a road map even in eastern Colorado.

We got to our destination without catching a glimpse of the Buttes. As we pulled into a small parking lot, we were on a cliff looking down on an astonishing panorama. From the flat plain rose the spectacular Pawnee Buttes (p. 281). The soil is white ash from ancient eruptions from Yellow-

stone. Long ago a river flowed across the ash, but its waters have now been captured by the river Platte to our south. The action of water and wind has left a bit of the river bed sitting high above the plain on two or three dramatic hills. The winds of Wyoming sweep over the plains and there is very little snow accumulation. In fact not much precipitation at all. These stark conditions are more like the steppes of Asia than the tundra high on the nearby Rockies, but here grow the most beautiful, awe-inspiring, aged buns and mats. Their shape, a natural adaptation against wind, is accentuated by the gouging out of the surrounding soil by wind action, so that some plants form nearly perfect spheres. To add to the wonder of their survival, wind has blown sand and grit into the mounds, creating rock hard balls in which organic and inorganic matter are completely intermingled. Some of the football size plants of *Arenaria hookeri* are a century old. These interesting plants congregate in colonies with no obvious explanation. There are large stretches of buffalo grass interspersed by bunneries—not always in protected areas or gullies, though some of them are. Some are established on the most exposed flanks of the Buttes where you could see from half a mile away these Centaurs of the plains—half rock, half plant. *Eriogonum multi-ceps* forms hard, mounded mats two feet across, raised in the center like a hub cap. *Gutierrezia sarothrae* forming a foot-high bush, that covers itself in summer with yellow flowers, was now a twiggy ball with the remnants of seed pods still clinging despite the wild winds.

We managed to collect a little seed, though most of it had already dispersed. Collecting was a cold business and since the party quickly scattered, nothing was identified with any certainty unless you happened to be near an adult *Kelaidis*. People who see beautiful plants in seed vow to return when the plants are in flower; almost equal pleasure could be had by summer visitors if they returned at seed time to see the plants they admired complete their cycle and cope with the winter. Plants here suffer extremes of temperature even in November; later, there is no permanent snow cover as high alpine are claimed to enjoy.

I have never believed this claim myself. Certainly hundreds of *Androsace chamaejasme* are snugly tucked under 15' of snow from November until June, but I doubt that is a necessary condition for survival. One sees too many cushion plants in exposed situations destined to suffer all the rigors of temperature fluctuation and wind exposure long before protective snow is at hand. We tried to go up Mt Evans to check out this notion, but as we started up a notice warned us that the road to the top was closed. We thought we might reach Echo Lake but ran into snow across the road before getting even this high. Plants on the roadside were already winterized—fully exposed but in a dormant state. Are mountain plants equipped to survive winters less than normally snowy and is the "good snow cover to survive" argument a myth? In the garden, survival is possible without snow cover. Whatever the weather each year, some plants live and some plants die,

apparently at random. Nature sometimes takes the blame for our own inadequacies. How do you exorcise a myth except by iconoclasm and exaggeration?

Which brings me to another myth—rock in "rock gardens." The plants near the Pawnee Buttes are battered by rock in the form of sand, grit, and even rock in small chunks, but their roots are in a dense, powdery ash and on the whole they haven't selected rocks to grow on or near. There are some miniature "rockeries" here and there and rocks high on the Buttes—in fact, much of the prairie north of the Platte was dotted with rocky knolls and flattish boulders. But plants are not unanimous in seeking out rockeries to form bunneries. You are probably saying "he is squirming because he is too lazy to build a proper rock garden or too cheap to buy good rock." But I am really squirming under the gentle thought control that requires a rock gardener to make these constructions. We think of a rock garden as a marriage of Nature and Horticulture. I think it is outside both, though its precise locus eludes me still. Postulate an ideal construct which is a combination of "well-laid" rock and "in-scale" plants. The rock provides a boundary to the garden, frames the garden, and displays the plants at a variety of levels and exposures. The plants decorate the rocks and conceal awkward gaps and non-natural formations. If we see this construct in a garden, we say, "How natural." If we see it in nature we say, "It could have been planted." Both remarks are true but absurd. This ideal construct is a rarity in nature, since

most plants don't grow in picturesque "gardens." Also, it is a horticultural platitude, for wherever you turn gardeners have decided that this is the way to grow plants—not only the best way, but the only way. Again I exaggerate. Gardeners are actually very individual and very creative. Their gardens are never slavish imitations of anything. Rock gardeners are opportunists who use whatever natural features a garden has to build their own interpretation of the ideal rock garden. If they introduce rock, it is usually done with discretion and good judgment. They might deviate from the ideal construct, but only consciously and deliberately. A collector of rocks might favor a variety of examples incompatible from a geological standpoint. A rock purist might have a homogeneous collection, but from a quarry so distant that the garden's very existence looks "wrong." Some gardeners use dressed stone or even artificial rock. Some use no rock at all. Where is the unity in this activity? Having become conscious of an "ideal" garden (using the word as meaning "concept" or "type"—not "best"), each gardener takes something from it as the genesis of another garden. For some, the rock will be paramount and the logic of geology imperative. For others, the rock will be a convention, perhaps reduced to stepping stones or even dispensed with entirely.

Before going to Colorado, most of this conflict had been settled in my mind. Working with rocks is not the most appealing part of gardening. Some of my garden bears a faint resemblance to bare mountain tops and other natural forms, parts are

totally contrived, but there are no rocky cliffs. Going to Pawnee Buttes confirmed my feeling that the direction I want to go at least was acceptable. Next day was rather unsettling when Panayoti took us to several Denver gardens.

In and near Denver are some of the finest nurseries you could hope to find. Complementing them you can also find Rock Shops. These enterprising businesses buy enormous rocks from farmers and sell the loot to local gardeners. You can find fantastically beautiful rocks that will transform your flat suburban plot into a rocky outcrop and the path to your front door into a canyon at comparatively little cost. Big rocks give the illusion that the house itself is ingeniously built on rock. Since most of the rocks have lichen already living on the surface, the natural effect is heightened. Plants look great in such an environment. But not natural in a literal sense; a glance at the next door property suggests the rocks are imports. So I am forced to conclude that large local rocks can approximate the ideal, and if you *can* do it, why not? Well, Gwen Kelaidis had one alternative—you make mounds, even in Denver. Even without large rocks, you can get variation in height and exposure, creating a cross between artificial and natural that is pleasing to the eye. Not as artificial as a rectangular raised bed or a dry wall, it suggests a natural habitat and grows the most exquisite buns and mats.

Looking at Gwen's plants, the myth of snow cover again lost ground. Denver winters are very dry—no rain from October through April. It snows, but the snow cover is

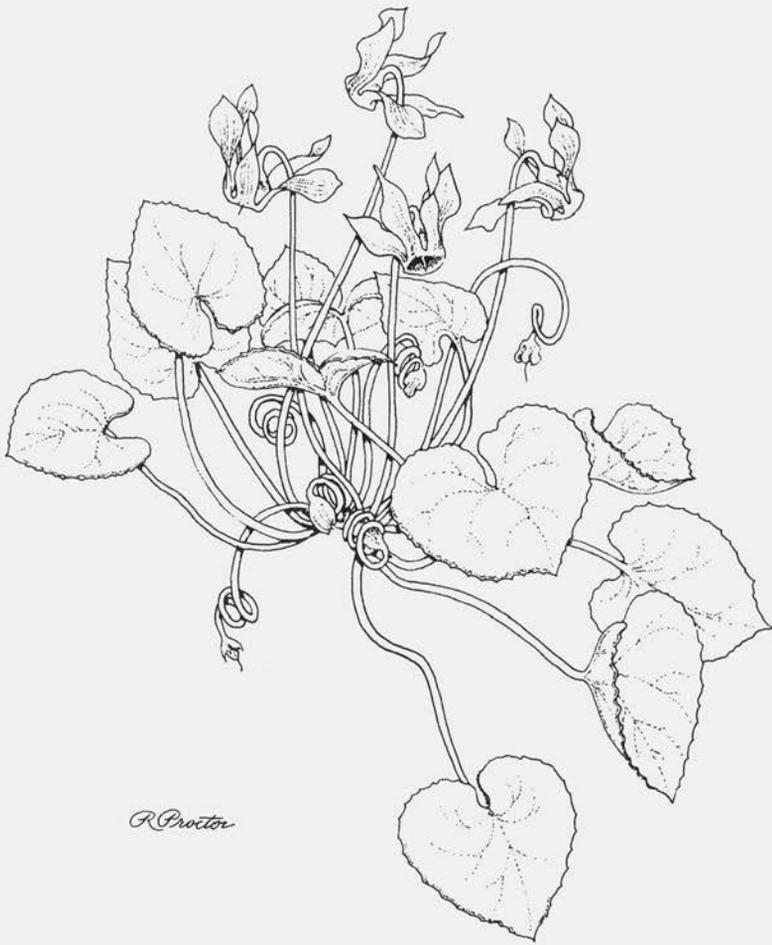
intermittent. Daytime temperatures of 50°F and nighttime freezes are the rule. Pots in the cold frame were already frozen in November.

So let's return to the Pawnee Buttes. You wouldn't go there at the height of the flowering season unless you were on your way to somewhere else. The high mountains would draw you too strongly. But you could spare one day of a three week tour. In winter, the Pawnee National Grasslands provide a safety valve for rabid walkers who can't get into the mountains. The region is reminiscent of the badlands of Alberta, though geologically different. Be prepared for wind; we all returned with red faces. But be prepared for spectacular plants. *Arenaria hookeri*, the spherical, rock-hard sandwort (p. 281), I have grown in the garden as a neat mat of sharp leaves—not quite the prickly, ancient symbol of the Buttes. It would make a good trough plant. A good *Astragalus* of the *Orophaca* section grows here, *A. sericoleucus*, with small leaves and magenta flowers, and you can find *Oxytropis sericea* with nice, silvery leaves (flowers usually white). *Leptodactylon caespitosum* looks like a phlox but isn't (p. 279). *Eurotia lanata* is a woolly, shrubby mat with woolly fruit. The flowers are negligible, but the plant would "furnish" a well-drained scree. Some animal likes to eat the seed, and the plant is called winterfat. Two *Oenotheras*, *O. caespitosa* and *O. lavandulifolia* form woody mounds. *Cryptantha caespitosa* is a quite local plant, a mat-forming miner's candle (p. 280), and there are two penstemons, *P. albidus* (white, of the *Aurator* group) and *P. angustifolius*

(a beautiful blue with glaucous foliage). *Haplopappus acaulis* is here, as it is seemingly on every rocky substrate of the West (p. 279). *Phlox andicola* (p. 279), accompanied by the widespread *Phlox hoodii*, is so nondescript at that time of year as to be scarcely noticed. The dominant plant not restricted to bunneries, but dotted over the entire landscape is *Yucca glauca*. This has slender leaves with white margins and very sharp points. I have grown this graceful plant in Massachusetts for some time, but it hasn't yet flowered. The leaves are between one and two feet long. The dead flower stalks rose about a foot above the ball-like profile.

Eriogonum multiceps had the old, orange-brown bracts still on the plants, so we collected a little seed. Very little else had seed still left, and we felt lucky to come away with a memento of the trip. The return journey, even getting slightly lost, brought us back into civilized Denver in under three hours. What a place to live, with the Rockies equally accessible and perpetually present on the horizon!

(Geoffrey Charlesworth is a regular contributor to rock garden literature and has recently been honored for his contributions with the Carlton Worth Award. See page 305 for more details.)



R. Proctor

Cyclamen fatrense

Fall Bulbs for the Rock Garden

by Judy Glattstein

It is unfortunate that most gardeners associate bulbs with the spring display provided by daffodils and tulips, crocus and snowdrops. There is a broad range of lumpy underground structures, casually referred to as bulbs, that bloom at other times of year. It is especially delightful to see fresh flowering in autumn when most plants are going dormant. Planted in early autumn, as spring-blooming bulbs are, they bring the gratification of bloom in a few weeks, instead months of waiting for the reward of flowers. It is well to be aware that since these bulbs will begin their growth so promptly, planting should occur equally promptly. Fall-blooming bulbs cannot sit around in brown paper bags until Thanksgiving, or even Halloween. The sooner they get into the ground, the better. Many of these late-flowering species bloom "naked," unaccompanied by leaves. Thus it is well to mark their location in some fashion, so that the spring flurry of clean-up and planting will not inadvertently disturb them. Most

successful, I have found, is a mat-forming groundcover of one kind or another. I have used *Thymus serpyllum* cultivars, *Veronica incana* 'Nana', and the like. The use of these groundcovers is several-fold. Firstly, as was just suggested, they act as a marker. Secondly, they prevent autumn rains from splashing dirt onto the flowers and spoiling their appearance. Thirdly, the groundcover, while in active growth in the summer, will make use of moisture which the dormant bulbs do not need. And lastly, there is the matter of aesthetics. I simply much prefer the look of plants in combination. Especially in the instance of the autumn-blooming bulbs, where most flower alone without even the dressing of their own leaves, associating two plants together provides a more pleasing display.

A major difficulty is obtaining the bulbs of these plants as early as the books suggest planting them, in August. The earliest I have seen any of these in local nurseries, or received them by mail-order, is September. By

this time, many are showing their eagerness to get growing in the form of pale elongating shoots, fragile and susceptible to drying.

Having chosen the planting location before I purchased the bulbs, I've cleared the first hurdle to prompt planting. Bulbs have an increased need for phosphorus and potassium, above that of herbaceous plants which do not have storage roots. I use muriate of potash, and superphosphate, mixed into the bottom of the planting hole. Since these are both chemical salts and can harm the basal plate of the bulb, it is important to see that the granules are well mixed with soil, and a thin layer of unfertilized soil may be added to reduce likelihood of contact. The depth of the soil above the bulb is generally three times the height of the bulb, deeper in sandy soil. In heavy, clay-like soils shallower planting would be required. However, such soils are generally too wet for healthy bulb growth, and it would be better to select a different site. After planting, water thoroughly. Replace any disturbed mulch, and wait. Growth, in the form of flowering, should commence shortly.

The foliage of these bulbs appears the following spring, and they must be encouraged to grow for as long as possible, in order to replenish the nutrients stored in the bulb and thus produce a good flowering display in autumn. If you suspect that the fertility of your soil is low, I recommend the use of a liquid fertilizer to supply immediately available nutrients to the bulbs during their relatively short period of above-ground growth. My favorite is Peter's Blossom Booster

which has an analysis of 10-30-20 (N-K-P). This is applied when the leaves first appear, and twice more at three-week intervals, as a half-strength solution. Fertilization is probably more important in the lean, gritty soils of a rock garden than in the humus-rich soils of the woodland garden.

Among the most popular of the autumn-flowering bulbs are the different species of *Colchicum*. The goblet-like flowers appear in September and October. Once pollinated they swoon, and loll seductively on the ground. Fresh flowers appear, extending the flowering period. They may readily be distinguished from crocus, as they have six stamens, whereas crocus have only three. The flower color is generally a soft mauve-lilac, either self-colored or checkered, depending on the species. White forms are sometimes found (p. 278), and *Colchicum autumnale* 'Plenum' (p. 278) and *C. speciosum* 'Waterlily' are double-flowered forms. Colchicums are, technically speaking, corms. That is, they consist of modified stem tissue, have a vertical orientation, and entirely regenerate and produce a new corm each season. Coarse, broad, bright green, strap-like foliage appears in the spring and persists until mid-June, when it turns yellow and collapses all over its neighbors. Because of this untidy habit, colchicums are best grown with shrubs or comparably vigorous associates. While pollination occurs in the autumn, seed does not appear until late May. This habit gave rise to an old vernacular name of "son-before-the-father." Some delightful selections include: *Colchicum autumnale* (p.

278), daintier than the other species and thus suitable for combination with ferns or some of the smaller hosta at the edge of the woodland; *C. bourmuelleri*, with large flowers of good substance, the color deepening as the flowers mature; *C. speciosum*, which has large, raspberry-pink flowers with a white throat. The best available tessellated variety is *C. agrippinum*, whose strongly checkered petals make up for the rather weak perianth tube (the flowers fall over). One off-beat colchicum is *C. luteum*, which has yellow flowers and blooms in the spring. Colchicums are the source of the drug colchicine and generally are not eaten by pests. Slugs will go after the rotting foliage in late spring, and once deer ate *C. luteum*. I sincerely hope they at least had a tummy-ache.

It is with the fall crocus that the rock garden truly receives a rejuvenation. For it is only in summer that crocus are absent from the garden. With careful selection, crocus may be had in bloom not only spring and fall, but in the winter also.

Non-gardeners, especially those with culinary interests, may be aware of the saffron crocus, *Crocus sativus*. It is the red stigmas of this crocus which are the source of the costly spice. While you can harvest enough to season an occasional paela, I hesitate to suggest that your fortune is made, as it takes approximately 4,000 flowers to produce one ounce of saffron. This is one crocus which does not seem to like my garden. Plump corms do well the first season and then dwindle and decline rapidly. With its rich purple flowers, it is an attractive addition to the rock

garden, if only it would persist.

Far more successful is *C. speciosus*. This has been in cultivation long enough that several selections are available—'Aitchsonii', 'Cassiope', 'Oxonian' are but a few. One of the earliest of the fall crocus, its lavender-blue flowers with yellow throats appear in September. It is a prolific species, increasing by both seed and offset. The thin, grass-like leaves are not a problem, even where it grows in profusion. They grow and fade without harming nearby plants as colchicums might. I especially enjoy this species when grown with *Sedum sieboldii*, whose mauve-pink flowers overlap in blooming sequence with the crocus. At the edge of woodland, I like *C. speciosus* interplanted with *Ophiopogon planiscapus* 'Nigrescens', whose deep black leaves are an elegant foil for the lavender chalices of the crocus.

One crocus which does flower accompanied by foliage is *C. longiflorus* (p. 278). The yellow-throated, purple flower has good substance, and a faint fragrance of violets. Faint, that is, if you expect a 4" tall flower to waft its perfume to your nose. Crawl around on your hands and knees, and the scent will be much stronger. It is fortunate that this species is also a free increaser as, like all other crocus, it is a favorite with the deer. I console myself with the thought that in Greece it is the goats who dine on these plants I treasure. Small comfort, and it would be best to find a place where the crocus might be protected.

A white-flowered, fall-blooming crocus is *C. ochroleucus*. This flowered for me in late October, early

November. The flowers seemed too frail, too thin in texture for the season. It was attractive as it blossomed through the hoary mat of *Thymus lanuginosus*. With good drainage during the period of summer dormancy, this has been reasonably persistent. Descriptions I have read of *C. niveus* suggest that this white-flowered species might be more to my liking.

Staying in the "C's," we come to *Cyclamen hederifolium*, which used to be known as *C. neapolitanum*. An exquisite flower, this is one bulb worth cultivating for its foliage as well. The flowers appear first, in late August and early September, dancing on naked stems like badminton shuttles or some flock of dainty pink butterflies. The leaves appear later in September, beautifully marked with silver. It seems that, like snowflakes, each tuber produces a different pattern of leaf markings. The leaves remain through the winter and only fade into summer dormancy in late May or early June. This cyclamen has attractive foliage for nearly ten months of the year, certainly a good return for the space it occupies. Cyclamen require a soil rich in humus, moist but well-drained, in dappled shade. Plant them shallowly, only an inch or two deep, and mulch with leaf litter. The tuber neither splits, nor makes offsets, only growing larger in diameter and producing more flowers year by year. Generally seed is freely produced. I suggest you gather it and sow it in protected conditions, for mice, voles, and chipmunks find the first-year tubers like toothsome pink caviar and will reduce the numbers which survive to bloom-

ing size. Growing from seed is an easy means of propagation and a sure source of plants which have not been collected in the wild.

There are other bulbs to explore—*Sternbergia lutea* with its yellow flowers, all too often offered from wild-collected stock and, sadly, not persistent in my garden; *Allium thunbergii*, with its dainty umbels of lilac flowers above grass-like foliage in October; Queen Olga's snowdrop, *Galanthus nivalis* ssp. *reginae-olgae*, offered at regal prices, flowering without its leaves, and departing this world (at least my garden) before spring; the autumn snowflake, *Leucojum autumnale*, so dainty in appearance, in contrast to its more robust spring- and summer-flowering cousins, that it is better appreciated in a pot.

When you are ordering bulbs, most assuredly look ahead to spring. But reward yourself with some more immediate pleasure and discover the delights of the autumn-blooming bulbs.

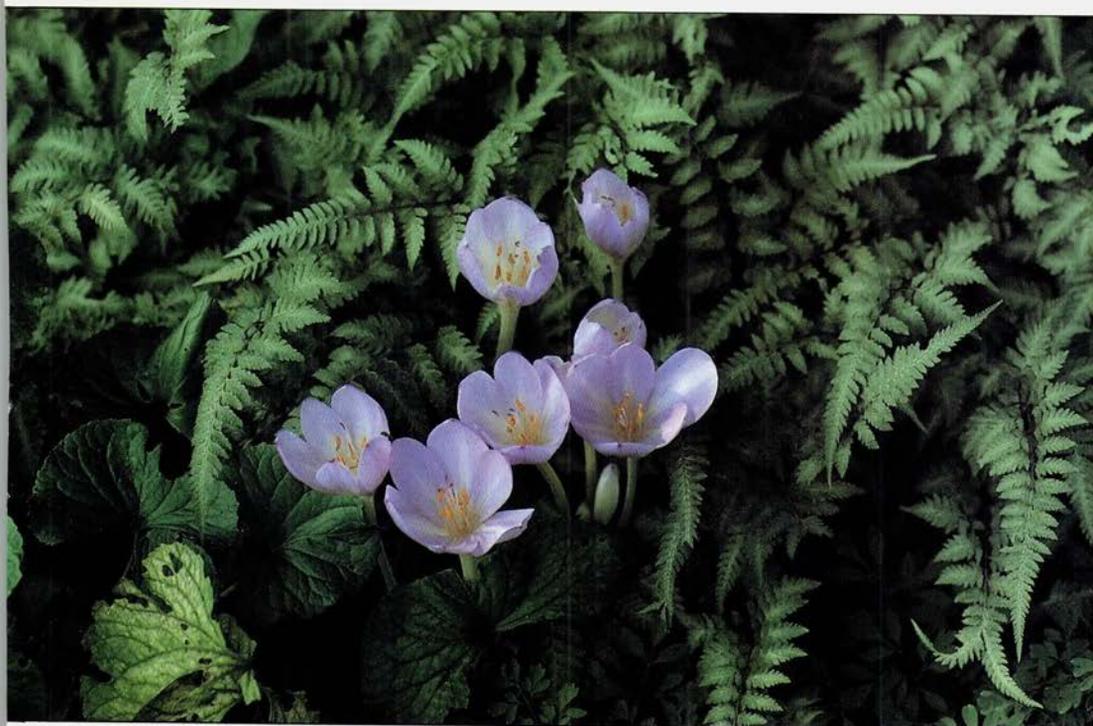
(Judy Glattstein is editor for the handbook on bulbs for the Brooklyn Botanic Gardens, to appear in August of 1991. She is a professional garden writer and an enthusiastic gardener and member of ARGS.)

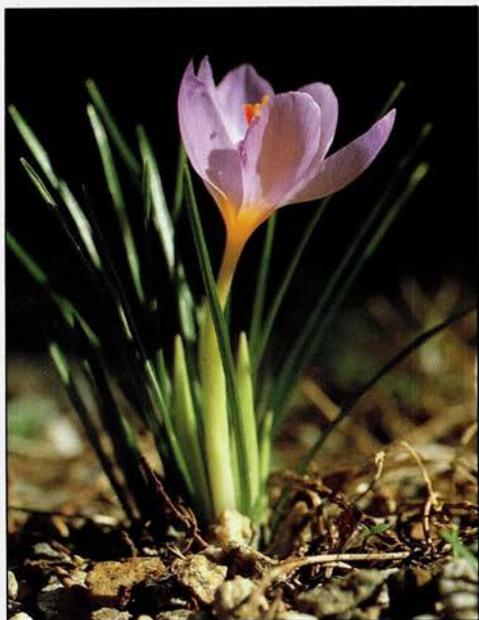


Crocus speciosus (p. 275)

photos by Judy Glattstein

Colchicum speciosum with *Athyrium goeringianum* 'Pictum' (p. 274)





Crocus longiflorus (p. 275)

Judy Glattstein



Colchicum autumnale (p. 275)

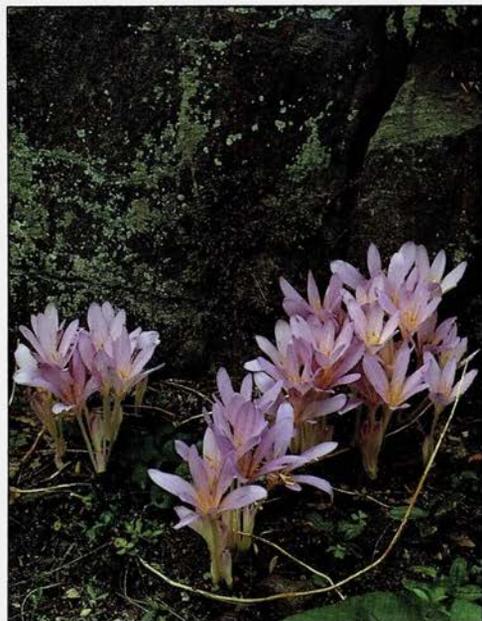
Rob Proctor

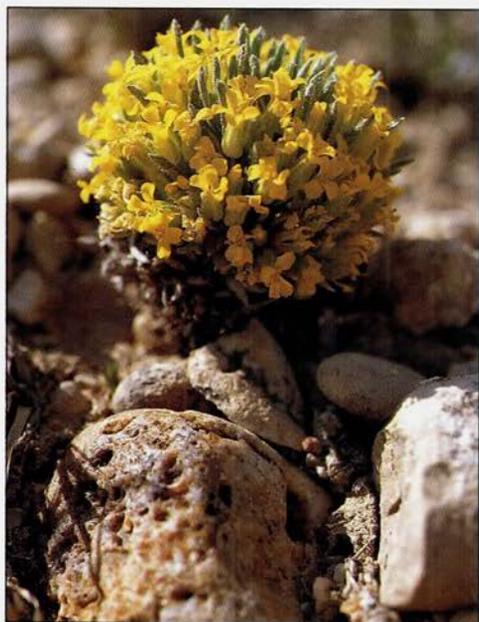
Colchicum autumnale
(p. 274)

Judy Glattstein

Colchicum speciosum 'Album'
(p. 274)

Judy Glattstein





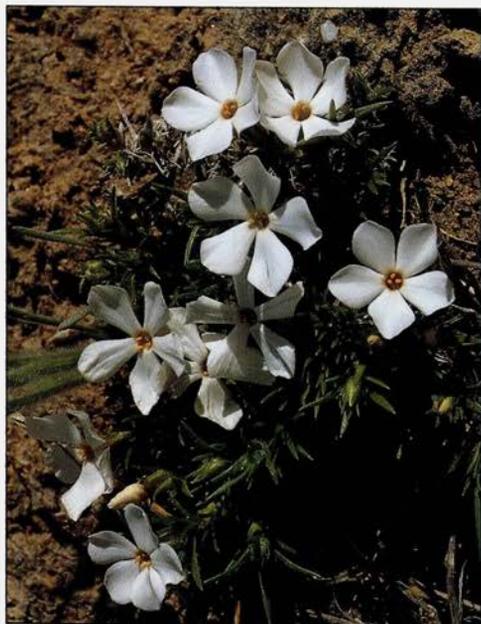
Lesquerella alpina, at Pawnee Buttes



Hymenoxys acaulis (p. 271)

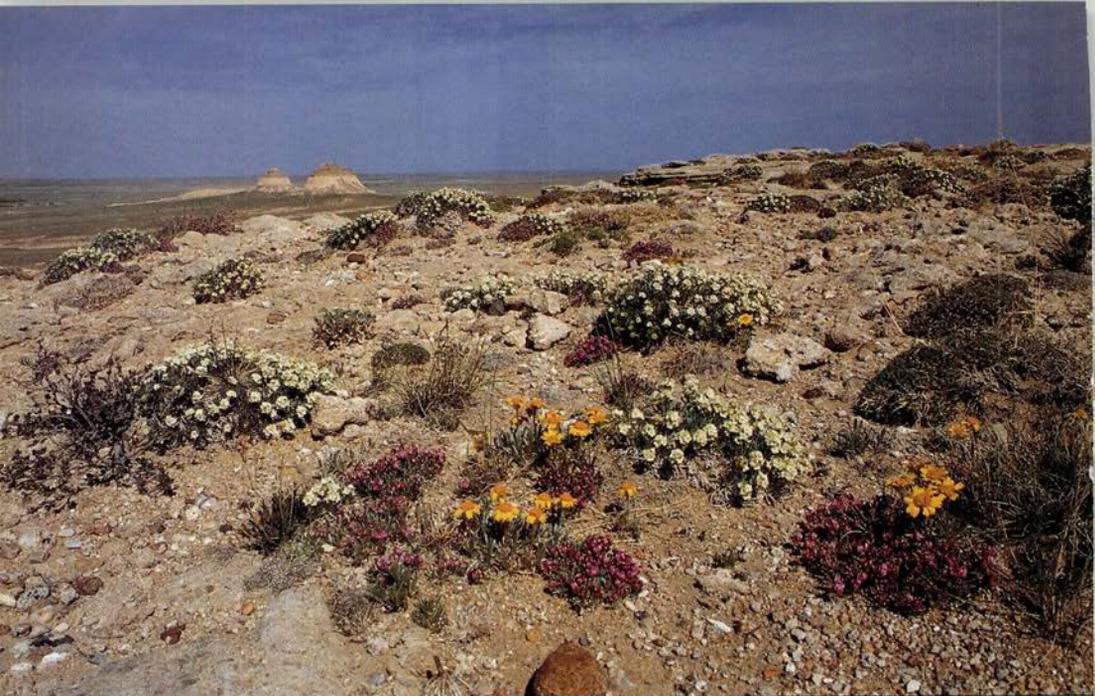
photos by Dick Bartlett

Phlox andicola (p. 271)



Leptodactylon caespitosum (p. 271)





View of the Pawnee Buttes in spring. (pp. 267-271)

Dick Bartlett

Astragalus spatulatus

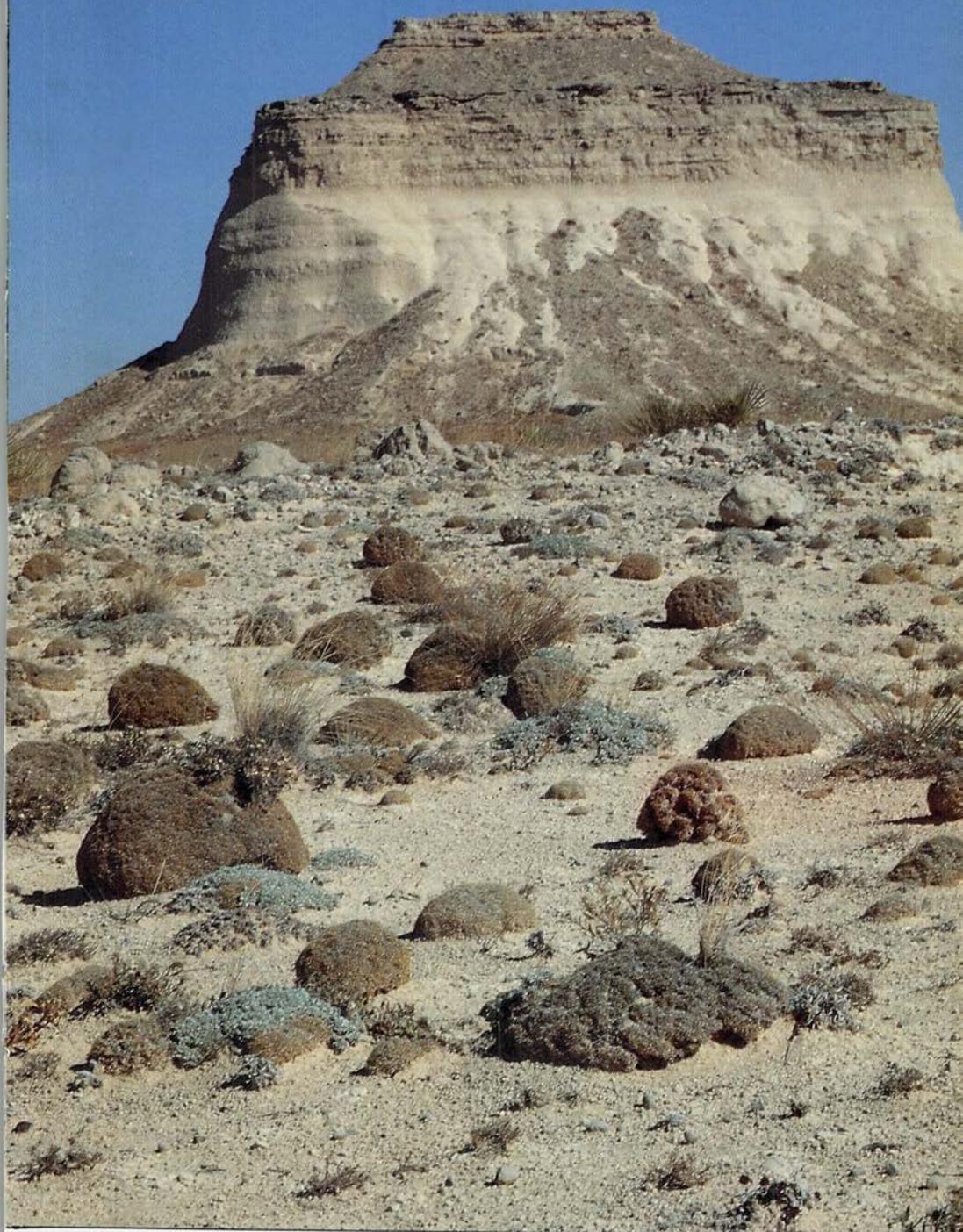
Ann Bartlett



Cryptantha caespitosa (p. 271)

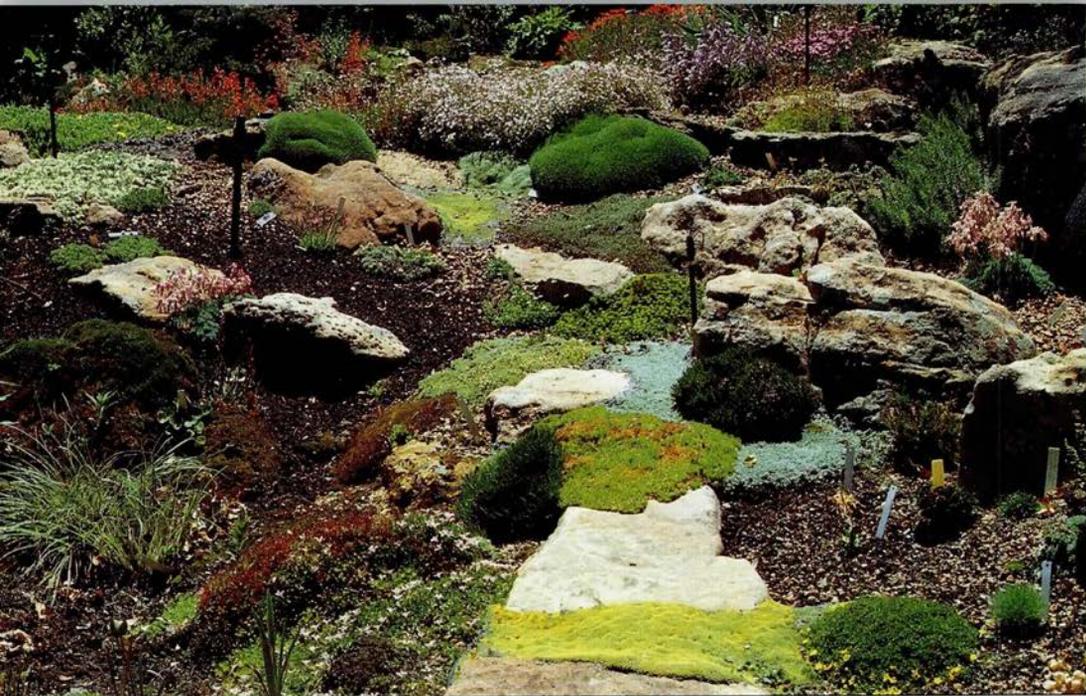
Dick Bartlett





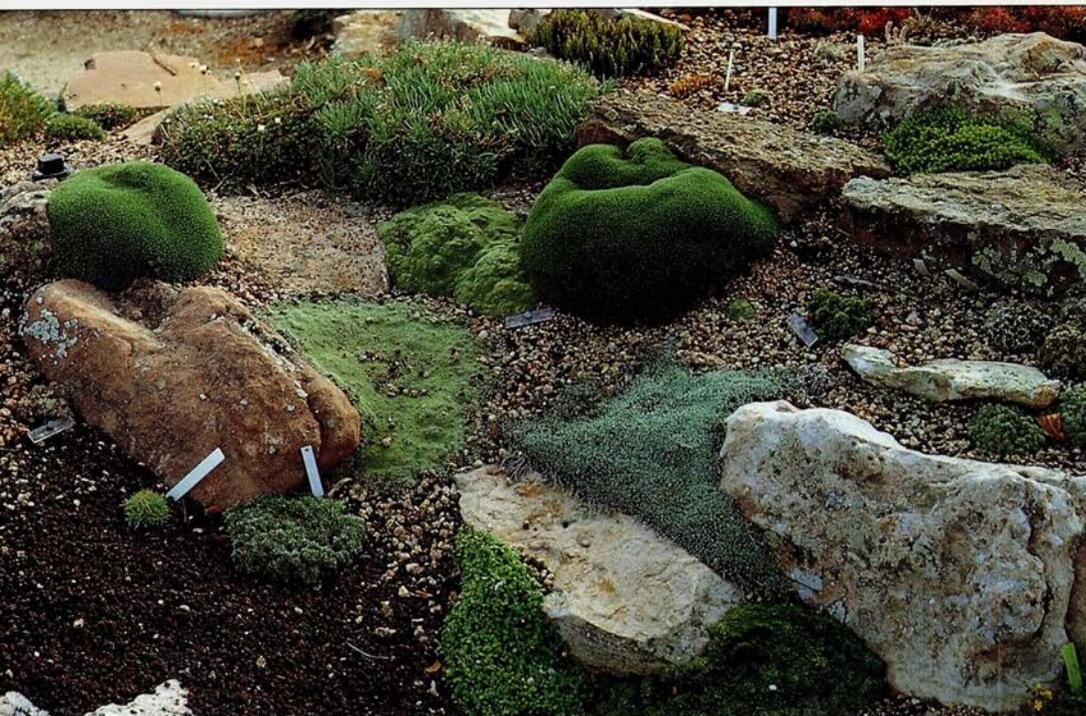
The Pawnee Buttes, Colorado, in November. Cushions of *Arenaria hookeri*, *Astragalus tridactylus*. (p. 267-271)

Panayoti Kelaidis



The moraine in the Radebaugh garden (pp. 285-296)

Ray Radebaugh





A naturally subirrigated meadow near Tioga Pass, California

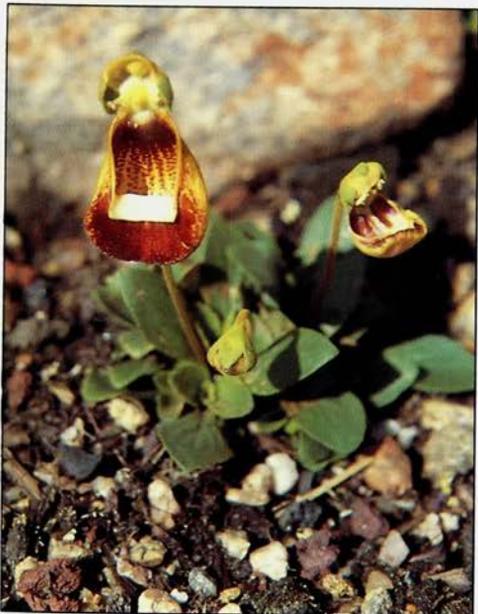
Ted Kipping



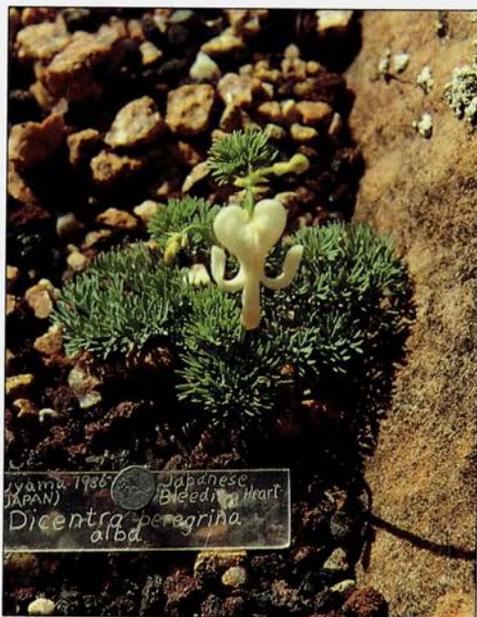
Dicentra peregrina (p. 294)

photos by Ray Radebaugh

Calceolaria darwinii (C. uniflora, p. 294)



Dicentra peregrina, white form (p. 294)



Yama 1986
 (JAPAN) Japanese
 Bleeding Heart
Dicentra peregrina
 alba

Moraine Construction

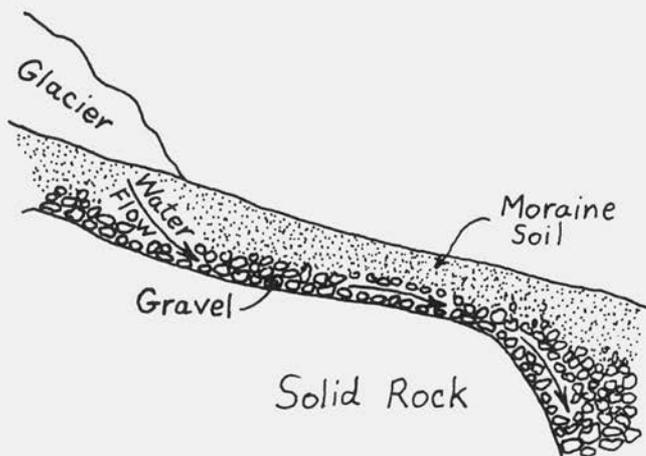
by *Ray Radebaugh*

A moraine is one of those areas of unique microclimate that can be seen while hiking in the mountains above timberline. Sometimes it comes as a surprise as we walk across tundra areas, inspecting the plants as we go. Suddenly we find ourselves on a slope where the plants are not only different but seem to grow with little sign of struggle in the harsh environment of that altitude. The greens are brighter, and there is a lushness of growth that almost seems to mock the environment. But protection from the fierce, drying winds and intense sunlight is concealed nearby. It can't be seen because it is more than a foot underground: water flowing through gravel deposits on top of an impervious rock layer. The icy cold water comes from a melting glacier or snow field somewhere up the slope. That same glacier moved through the area thousands of years ago, grinding the rock in its path into gravelly debris and depositing it on the retreating edges at the front and sides. It is the flow of underground water through

this gravel that constitutes the moraine and distinguishes it from the scree.

In the latter part of the summer, when rainfall above timberline is not reliable, plants growing on the moraine have a steady supply of water wicking into the soil from below. Most often these areas are on north- or east-facing slopes, the sort of slope where glaciers or snowfields are found. The cold underground water, flowing all during the summer growing season, keeps plant roots only a few degrees above freezing even in the middle of summer. This cool, moist environment is ideal for many plants. The gravelly scree soil provides good aeration and drainage, yet remains constantly moist. Some very choice plants grow only in these conditions, and many others that also grow in unwatered areas grow in the moraine with much more vigor.

After seeing the beautiful plants that grow in a naturally subirrigated scree, I have found myself going back down the slopes with dreams of a moraine in my own garden. If I had a



A NATURAL MORAINE

moraine I might be able to please some of those very difficult alpinists I haven't been able to grow. Also, the garden moraine can be an area that really brings the feel of the alpine tundra into the garden.

In principle, the duplication of a natural moraine in the garden is relatively simple. Water is piped to the area from the house. An impervious base is provided by laying down a sheet of 6 mil polyethylene. On top of that layer is placed the gravel through which the water is to flow. The plastic sheet and the gravel layer are on a gentle grade, so that as water drips into the gravel at the top of the slope it flows through the gravel and runs into a drain line at the base of the slope. The planting soil on top of the gravel picks up the water by a capillary, or wicking, process. The seven points to consider in moraine construction are: 1) location, 2) drainage, 3) water supply, 4)

water distribution, 5) impervious base, 6) water flow medium, and 7) moraine soil. Proper construction, described here, will lead to a reliable operation with low flow rates of water.

Unfortunately, what starts as a dream ends as still just a dream for many rock gardeners. Sometimes the project never gets started because of not enough detailed information, or because the construction sounds too difficult. To be honest, I will say that more effort is required to construct a moraine than any other rock garden area, except a pool or waterfall. I hope that with the detailed instructions given here, the "I-don't-know-how" obstacle can be eliminated.

Location

The first step in constructing a moraine is to choose a site and decide on the size. A moraine could be as small as a few square feet. For

most home gardens, 100 square feet would be a large one. Mine is about 80 square feet. You can give the impression of a larger moraine by making the length greater than the width and incorporating a gentle meandering.

Often the moraine is bordered by scree areas to the sides and above. The planting soil will be similar in these areas and the general character of plants in the scree and the moraine kept the same. A bog area at the base of the moraine is also easy to incorporate from a practical standpoint. All these things help provide a natural-looking combination. The moraine should be in a position where it will have a north- or east-facing slope to keep the area cool and to hold snow cover for a longer time. However, it should be in full, or nearly full, sun to provide the high light intensity required by plants that grow above timberline.

The moraine should be in a relatively open area where there are constant air currents to help cool it. In lowland gardens, we can never achieve the low summertime temperatures present on the natural moraine, but if the garden moraine is located where there are natural air currents, this will enhance the evaporation of water seeping up through the soil and reduce the soil temperature as well as the air temperature just above the surface. Those of us in the Rocky Mountain region are well aware of the enormous cooling effect of evaporating water in an area of low humidity. Our bodies rapidly chill when coming out from a swim. We can maintain our houses at 75°F inside when it is 95° outside by rely-

ing solely on an evaporative cooler, without paying the high electric bills associated with normal air conditioning. In other regions of the country where the humidity is higher, the cooling effect of evaporating water is less, but plants still benefit from the moving air.

The moraine's location must be where the water can be drained away naturally or via drain pipes. It should not be so far from the house that the piping to provide water becomes too expensive. A natural water supply on the site could, of course, change these considerations.

Once the location of the moraine is chosen, the first step in construction is to roughly contour the area until the right visual effect is created. The entire area for the moraine is then dug out to a depth of about 12"-18". For my moraine I dug out 20" at the top of the slope and about 10" at the bottom of the slope to give a varying depth to the final moraine. The exposed clay area sloped about 18" in a distance of about 8'. I decided to divide the moraine into two parts and place a bog at the base of one of the parts. That half has a surface area of about 20 square feet. The water level in the bog is held at any desired level by a simple gadget I'll not describe here. The overflow from the bog then goes to a buried drain line. The other part of the moraine is about 60 square feet and is long and meandering. It drains directly into the buried drain line.

Drainage

Drainage of the moraine is for the excess water that is not wicked up to the surface and evaporated or taken

up by the plants. A slight excess will always be necessary to ensure the flow of water even under the hottest of conditions. The moraine should be watered from above whenever the rest of the rock garden is watered. When it rains in the mountains, it rains just as much on the moraines as on the rest of the tundra. The downward flow of water through the soil and into the flowing water washes out any salts that were deposited during evaporation. The drainage system must be able to handle the extra water flow during watering periods or heavy rain storms.

To drain the moraine dig a trench along the base of the slope and below the clay surface which has now been exposed. A 3" or 4" diameter corrugated and perforated plastic drain pipe is laid in the trench. Drain pipe is readily available from most lumber yards. The important question is where the trench and drain pipes lead. In my garden, the 4" line runs underground from the base of the moraine gradually downhill (about 1" in 10') through other parts of the garden until it reaches a dry well next to the street 160' away. If the moraine is the only thing to be drained, then the dry well can be placed right at the base of the moraine or just a few feet away. A dry well is simply a hole in the ground that has been filled with uniformly sized stones (typically 1/2" or 3/4"). The top 10" is covered by using steadily decreasing rock sizes until a coarse sand is put on the top few inches. It is then covered with soil and turf or any other plants. The size of the dry well need not be large provided it is not completely

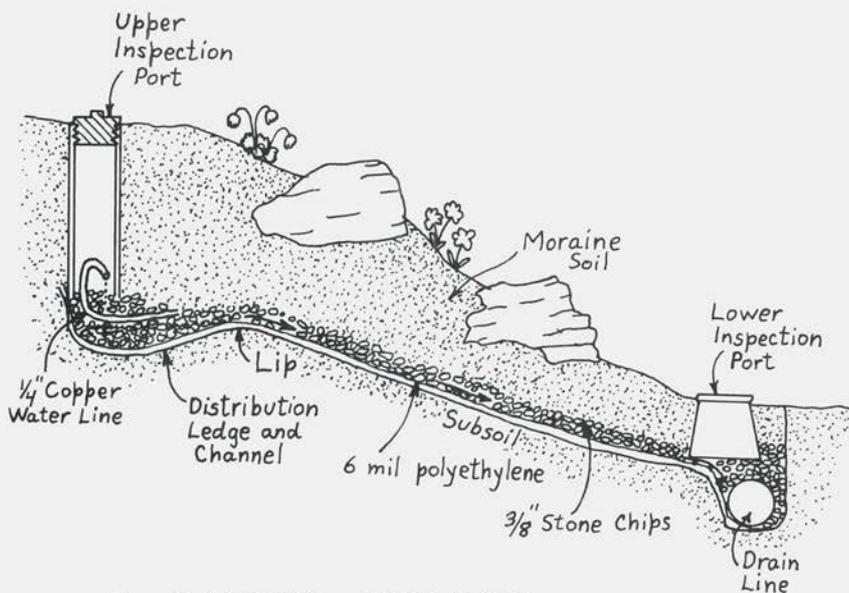
surrounded by heavy clay. A good size for a 100 square foot moraine would be 3' in diameter and 3' deep.

An alternative to a dry well would be drain line branched out into several underground lines, and traveling for several feet like the leach lines from a septic tank. During heavy rains, the dry well or drain lines could fill up and cause an overflow onto the surface of the ground. Thus they need to be located where the overflow flooding does not create any problem. All drain lines would lie in trenches covered with 3/8" stone chips to a depth of at least 6", followed by a layer of coarse sand. A soil of any desired depth can be placed on top of the sand layer.

Water Supply

A concern for water conservation may keep some from building a moraine. Certainly the moraine takes more water than, say, a plains garden of the same size. But many plants can be grown in the moraine that can't grow in a plains garden. The water usage may be negligible compared with our normal household water use anyway. For a moraine of 50 square feet, the water requirement for continuous flow is 5-10 gallons per day. Four times that amount is used for taking a bath and the same amount is required to flush the toilet twice. If you thought the flowing underground water for a moraine had to be like a river, I hope this puts the water requirement into perspective. The plants in a moraine only need a fresh supply of water near the roots; they don't care how fast it flows beneath them through the gravel.

The most usual water source would



A GARDEN MORAINE

be domestic water piped from the house to the head end of the moraine. Because of the small flow rates, the size of the pipe need not be large. I use 1/4" diameter, soft copper refrigeration tubing that is easily bent. Alternatively, the new polybutylene tubing can be used. It has the advantage that it can expand somewhat during freezing of water inside. The manufacturer claims there is less chance of freeze cracking than for copper, but does not claim it to be freeze proof. Consequently, provision for draining the supply line in the winter must be made. The growing season is from April 15 to October 15 in most areas, so this line must operate and provide water flow for the moraine during this time. The nighttime temperatures could drop to about 20°F near the beginning and end of those periods. If the line is buried 12" deep, these temporary freezing spells will not freeze the

water line. In my case, the line is exposed only for a few feet where it comes out of the house above the concrete foundation and bends to go underground. The above-ground portion of the line needs to be insulated. The slow flow of the water through the line should prevent freezing even though temperatures may drop to 20°F at night.

A shutoff and drain valve are located in the basement, where they are at a lower elevation than any other portion of the line. The flow control valve is located underground by the house and covered with a sprinkler valve control box. To drain the system in winter, the shutoff valve is closed and the flow control valve is opened wide. The drain valve is then opened and the water collected in a pail. The water flowing out the drain valve syphons out the entire 1/4" line. If the line were 1/2" or larger, the water might not be syphoned out

of low-lying portions of the line where water would have to flow uphill for a short distance.

While we are on the subject of valves, let me discuss more about the flow control valve. It has been the only component of the entire moraine project that has given me trouble. At first I used a typical brass shutoff valve for 1/4" copper line. I found that after about two months of operation the flow rate had increased considerably and so I closed the valve further to decrease the flow. One or two months later the flow had increased again and, to my surprise, I found that even with the valve fully closed the flow rate was too great. I disassembled the valve and found that the brass valve seat had grooves eroded into it by the action of the flowing water. I then tried a different brand with a somewhat different construction. Again, after about three or four months this valve was destroyed by erosion. Next I decided to use a brass needle valve which is specifically designed for controlling low flows. I felt that the eroding action could be from fine sand particles in the water, so I added a 15 micron filter before the valve. That arrangement operated satisfactorily for five months, although I had to make one small adjustment of the valve after three months. Unfortunately, the filter began to clog, so I removed it.

I was then at the point where I needed some expert help. First, I called one of the large local valve distributors and told them about the eroding valves. They had never encountered the problem and could not offer any help. I then talked directly with the engineers of the

Nupro Company, a major valve manufacturer. They told me that the eroding was probably due to the combination of an oxidation of the brass in water and the eroding away of the protective oxide layer by the high velocity water in the valve. They recommended I use a stainless steel needle valve and said that a filter would not be necessary. I have used the stainless steel needle with a 0.050" orifice for over a year now with no indications of valve erosion. Some type of plastic valve could possibly be used since there is no chemical reaction with the water. However, plastics are much softer than stainless steel and may still experience some erosion.

Water Distribution

The water flowing from the open end of the 1/4" copper tube can be introduced to the top of the excavated slope by at least two different methods. Books on rock gardening recommend the use of a perforated pipe across the top of the slope. It is never clear to me whether the perforated pipe is the type with very fine pores that weeps when the inside is pressurized with water or whether it is the type with larger holes that would not be pressurized. The problem with the first is that there is no easy way to control the flow and if it plugs, it has to be dug up. The second type is not normally available except in 3" or 4" diameter drain line, which is too big. A piece of this perforated tube would have to be placed all the way across the upper end of the slope. As the tube fills with water at one end, the water will flow out the lowest hole. Unless all holes

are at exactly the same level, all the water will flow out the lowest hole. Only if large flow rates were used could all the water not escape out just one hole, so water would flow out some of the other holes as well. These perforated pipe techniques make it difficult to distribute the water uniformly across the upper part of the slope or to lower the flow rates.

The water distribution technique I found to work best uses a combination of syphon and wicking actions. At the upper end of the exposed clay slope a 4"-6" wide flat ledge or shelf was made that was very nearly level from one side to the other. A channel was dug out along the center to a depth of about 2" and was filled with water for its entire length. With water in the channel, the lip of the ledge was gradually lowered at the high spots until the water wet the lip edge uniformly along the entire length. As shown in the drawing, the lip edge has a very gradual curvature to keep it from being easily damaged.

Impervious Base

The next step is to simulate the solid rock base below a natural moraine. After removing all protruding stones, a sheet of 6 mil polythene is laid on top of the clay slope. The plastic covers the ledge and the channel dug into it and extends to the bottom of the trench dug for the drain line. Stone chips of 3/8" size are placed over the lip and as the water level in the channel rises, water is pulled over the lip by a combination of the wicking and siphoning actions of the stone chips. The water then trickles down across the plastic sheet and if some area does not show

water flow, the lip of the ledge at that location can be lowered slightly. When water trickles out all along the ledge, we can proceed.

Water Flow Medium

In general terms, a coarse gravel layer on top of the plastic sheet is the medium through which the water will flow from the top ledge to the drain pipe at the bottom. Most books that discuss moraines talk about using stones of 1" or larger diameter for a depth of several inches at the base of the moraine in order to provide excellent drainage. In nature the medium through which the water flows may have stones that large, but the flow rates are large enough to keep the water level near the top of the stones. In the garden, where we have a slow trickle of water passing through the stones, the water depth is only about 1/8". The top surface of a deep layer of such large stones would remain as dry as a bone. A planting soil placed on top would never be able to absorb the moisture in the gravel below and we would be left with an area of excellent drainage, but nothing more.

The stones on top of the plastic must be large enough to permit a flow of water through them, but they must also be small enough to allow for a wicking action of the water up to their top surface. I find that 3/8" stone chips, available from sand and gravel companies, are about ideal. These chips are placed on top of the plastic sheet to a depth of 1.5"-2". That depth is found to be about right for wicking water to the top, but the exact depth is best found by some experimentation at this point. With water trickling through the stones,

the top surface becomes wet and darkens. As the stone depth is increased, wicking eventually no longer functions and the top surface no longer becomes wet. At that point the last 1/2" of chips should be removed. Now is a good time to observe whether the entire stone base is wet. If there are any dry areas, some adjustment may have to be made to the lip on the ledge or to the slope itself.

To prevent soil from being washed into the stone chips and blocking the flow channels, a 1" layer of 1/4" chips, followed by a 1" layer of coarse sand (concrete grade) are placed on top of the 3/8" chips. Again with water trickling through, make sure that the top surface of the sand is wet everywhere.

Before the area is covered with planting soil, provisions should be made to inspect the water flow rate at the upper and lower ends of the slope. The 1/4" copper tubing for the water supply is bent near the end, as shown in Figure 2, so water will drip from the end without running back down the outside of the tube. A 2" diameter PVC or ABS plastic pipe (available from lumber yards) is placed over the 1/4" copper tube and extends up to the moraine surface. A 2" female pipe fitting is glued to the top end of the plastic pipe into which a 2" black ABS plastic pipe plug is screwed to cover the viewing port. A similar arrangement can be used for the lower inspection port if you wish to keep it unobtrusive. I chose to use a larger inspection port there, made from a 6" diameter sprinkler valve cover. Removing the lid to that port allows one to view the water trickling

into the drain line. The stone chips are removed from the plastic sheet under this inspection port to make it easier to see the water flow. The water flow from the 1/4" copper line can be adjusted to just keep the area by the drain line wet, without excessive water flow. I find that the proper flow occurs just before the individual drops from the 1/4" line turn into a continuous stream.

Moraine Soil

The planting soil for the moraine is placed on top of the sand layer. I chose to make it 8" deep near the lower end and 18" deep near the top of the slope. In most cases this moraine soil is to be the same as a scree soil, although some areas may be enriched with more peat moss for certain plants. It is in the composition of this scree soil mix that I disagree with many published recipes. All scree soils have a mixture of sand, humus, and stone chips. I have seen many recipes where the proportion of stone chips is too small. A common recipe is 1 part sand, 1 part humus, and 3 parts stone chips of 3/8" or larger.

The purpose of the stone chips is to provide air pockets and large flow channels for rapid drainage of water and easy access of oxygen for the plant roots. By themselves, the stone chips hold very little water and wicking of water for the moraine soil is good for only a few inches. A mixture of sand and humus is added to the stone chips to hold more water. As the sand-humus mixture is added, it begins to fill up the void space between the stone chips. At the point where all the voids are just filled with

the sand-humus mixture, the larger air pockets are removed and no large flow channels exist. At that point the stone chips are a hindrance to drainage compared with a bed of just sand and humus.

A proper scree mixture must have a small enough sand-humus content so as to leave part of the void space between the stone chips unfilled. Only then are there some large flow channels left to provide excellent drainage and aeration. For most stone chips graded to one size, like 3/8", the void space is about 50%. If half of the void space is filled with sand-humus mix, the volume of that mix should be 1/4 the volume of the stone chips. A mixture of 1 part sand, 2 parts humus, and 12 parts stone chips provides the proper ratio. That mixture could be too lean for a dry climate and not provide much wicking action as a moraine soil. If we allow for three-quarters of the void space to be filled, we get a sand-humus volume of 3/8 the volume of the stone chips. The recipe becomes 1 part sand, 2 parts humus, 8 parts stone chips. To increase the water holding capacity further, some of the stone chips can be volcanic or scoria rock. To provide slightly better wicking action some of the 3/8" chips can be replaced with 1/4" chips. With those considerations in mind, I have used the following mix for a scree and moraine soil: 1 part coarse sand, 2 parts peat moss, 3 parts 3/8" stone chips, 3 parts 3/8" volcanic rock, 2 parts 1/4" stone chips. To that mixture is added a sprinkling of superphosphate and of general purpose fertilizer. The peat moss I use is 1 part Canadian peat and 1

part Colorado mountain peat.

In one experimental area of the moraine I used a planting medium that consisted of 100% volcanic or scoria rock of 3/8" size. That rock was even screened to remove the fine particles less than 1/16" in diameter. I have found that many plants do well in that medium, although their growth rate appears to be less than the same species in more normal soil.

As the moraine soil is added, larger garden rocks are placed in it in accordance with normal rock garden construction. In addition, I have added some large chunks of peat (about one cubic foot) to the soil near the base and by the bog area. These peat chunks soak up water and since they are constantly moist, they are soon covered with a bright green moss that adds to the naturalistic appearance of the moraine.

Plants

Plants for the moraine should be those that require these conditions, or do much better here than anywhere else. Some plants that require a lot of moisture can simply be watered overhead more often to supply their needs. But there are other plants that would begin to rot at the crown with that much overhead moisture. That problem is not so serious in the Rocky Mountain region where the humidity is low, but is very serious in many other parts of the world. Particularly susceptible to rotting are the ground-hugging alpine plants with very fine hairs on the leaves. Those fine hairs slow the evaporation of water from the leaves.

Some of the plants I have grown in the moraine have done quite well. My

favorite is the very dwarf Japanese bleeding heart, *Dicentra peregrina* (p. 284). It was only a few years ago that the Japanese figured out the cultural requirements of this gem. It must have superb drainage, a long root run, and a good supply of water for the roots—a perfect match for the moraine. I've had three *Dicentra peregrina* in the moraine since it was constructed in 1985. The one which does the best is in the normal moraine soil. In May, it is smothered with pink blossoms on 2" stems above the very finely cut silver-blue foliage. The blooming period lasts over a month, and even when not in bloom, this is one of the most attractive plants in the garden. The foliage in April is made even more exquisite by a slight hint of plum color on the very tips of the pointed, minute leaves. This year the plant has grown to a clump 4-5" in diameter and an inch and a half high. Two of the Japanese bleeding hearts grow in part of the moraine where the planting soil is pure 3/8" volcanic rock. Those plants also do well and bloom vigorously but not quite as well as the one in the regular moraine soil. Nor does a plant growing nearby in a regular scree misted twice a day. This shows the advantage of the underground water of the moraine. Also growing in the moraine is the white form, *Dicentra peregrina* 'Alba' (p. 284), which was a gift from Atsushi Kuyama at Alpines '86. A red form exists but I have not been able to find a source.

Some of the dwarf calceolarias from South America can be grown in regular garden soil. They all have small, pouched flowers which are

usually yellow with some specklings of a darker color. The most beautiful, and unfortunately the most difficult, is *Calceolaria darwinii* (*C. uniflora*) with 1" wide pouches on 3" stems (p. 284). The coloring is a deep yellow with extensive orange specklings on the front of the pouch and a striking white band across the lip. The best hope of success with this plant is in a moraine. I received some seed of it in 1985 from the ARGS seed exchange. After one seedling finally appeared, it was placed on the moraine. It did nothing in 1986, and I forgot about it until 1987, when it sent up two of its distinctive pouch flowers. Unfortunately, it did not reappear in 1988.

Attendees at Alpines '86 were given a small plant of *Aster coloradoensis*, grown by Homer Hill from seed collected in the Mosquito Range of Colorado. When I got mine, I was totally unimpressed. The two or three spiny leaves on it didn't seem all that attractive and I never thought it would amount to very much. Nevertheless, I put it in the moraine since most alpine asters do best in such conditions. Last summer the plant had grown to a compact clump of evergreen leaves about 4" in diameter by 1" high. In June the leaves were nearly obscured by the pink flowers, almost an inch across, large for such a compact plant. Other alpine asters that should be grown in a moraine include *Aster likiangensis* and *A. purdomii* from the Himalayas.

An obscure ground cover I had never heard of until reading a description in a catalog is *Hypsela reniformis*. It calls for constant moisture, so into the moraine it went, just

above the bog at the base of the moraine. It forms a solid mass of glossy, half-inch-long leaves, somewhat folded along the center. From the middle of the summer until frost the small, crimson-pink flowers, like orchids in appearance, rest on top of the foliage. It spreads by underground runners so I have constrained it to an area of about two square feet by circling it with lawn edging and rocks.

Some of the miniature horticultural forms of heathers can be a good source of summer bloom in the moraine. They require a lot of light and constant moisture to bloom well. I have *Calluna vulgaris* 'Sister Anne' in the moraine on the north side of a steep slope formed by a chunk of peat. This shades the plant from the winter sun. The new growth has an abundance of tiny, tubular, pink flowers along the stem. The flowers fade to white seedpods that have all the effect of flowers and stay on the plant all winter. The foliage is extremely dense, like a blue-green moss. After three years in the moraine, it has grown to a clump about 6" high and wide. Other dwarf heathers also doing well in the moraine are *Calluna vulgaris* 'Foxii Nana', *C. minima*, and *C. pygmaea*.

Many other dwarf Ericaceae will do especially well in a moraine with added peat moss and some shade from the winter sun. *Phyllodoce empetriformis*, resembling a dwarf conifer about 6" high, forms buds at the tips of the branches. These open to purplish-pink, urn-shaped blossoms. The cassiopes have a similar flower, but the leaves are more scale-like. *Cassiope lycopodioides* has been in the moraine since 1986 and

has bloomed well the last two years.

One genus I'm particularly fond of for the moraine is *Raoulia*, or New Zealand scab plants. These plants are grown mostly for their foliage—the flowers are inconspicuous except for one or two species. They make a mere film on the ground of various colors and textures and it is these various color forms that can be used to provide subtle colors in the garden throughout the year. The plants are evergreen, but the colors fade to gray in the winter. Several square feet can be covered by the raoulias after a few years, and trimming will eventually become necessary unless they are constrained. The real jewel of the genus is *Raoulia lutescens*, which has extremely dense foliage of the most beautiful blue-green color. Each leaf is less than 1/16" in diameter and the total height of the plant never exceeds 1/4". The flowers, too, are miniscule, but when they appear in the summer, the blue-green film takes on an added gold color for a few weeks. *Raoulia australis* has intensely silver leaves just slightly larger than those of *R. lutescens*. *Raoulia glabra* has light green leaves with rather showy white flowers about 1/4" in diameter that sit on top of the foliage. *Raoulia monroi* is slightly taller, about 1", with blue-green leaves that are curled and twisted to give a unique texture to this ground cover. An inter-generic hybrid, *Raoulia hectori* x *Leucogenes grandiceps*, provides a stunning, light green color with a height of about 1/2". The hybrid *R. x 'Greenstone'* can be used to provide an olive-green color in a plant 1/4" high that is covered with rather showy white daisies in the

height of summer. I have not grown this last plant.

A moraine certainly would not be complete without several species of *Kabschia saxifrages* and some of the high alpine androsaces. The two are quite similar in size and growth characteristics. They form dense cushions 1-2" high by 4-5" wide after several years. Most *Kabschia saxifrages* have narrow leaves edged in silver. The short-stemmed flowers cover the plants usually in March or April. The foliage of the high alpine androsaces varies from green to gray-green, and consists of very small leaves, but without the silver edging. The blooming period is late April to May with flower color usually pink or white. I find the high alpine androsaces much more difficult to get established than the *Kabschia saxifrages*. I have succeeded with *Androsace* x 'Millstream Hybrid' and *A. carnea* but have failed so far with *A. pyrenaica*. I haven't given up yet.

There are many other plants which are best grown in the moraine. Space does not permit a description of all of these, but they include *Androsace chamaejasme*, *A. villosa*, *A. alpina*, *A. helvetica*, *A. charpentieri*, *A. ciliata*, *A. cylindrica*, *A. hirtella*, *A. imbricata*, *A. mathildae*, and many *Androsace* hybrids; *Arctericia nana*; *Arnica lessingii*, *Arn. unalascensis*; *Asperula suberosa*; *Betula nana*; *Campanula allionii*, *C. pilosa*, *C. piperi*; *Daboecia*; *Diapensia lapponica*; *Douglasia laevigata*, *D. nivalis*; the difficult drabas, *Eritrichium nanum*, *Gentiana angulosa*, *G. bavarica*, *G. farreri*, *G. hexaphylla*, *G. lawrencei*, *G. ornata*, *G. sino-ornata*, *G.*

veitchiorum, *G. verna*; *Parnassia glauca*; *Primula*, *Auricula* group; *Pyxidantha barbulate*, *P. brevifolia*; *Ranunculus adoneus*, *R. alpestris*, *R. crenatus*; *Saxifraga oppositifolia*; *Shortia*; *Silene*; *Soldanella*; *Synthyris canbyi*, *S. cymopteroides*, *S. dissecta*, *S. lanuginosa*, and *S. pinnatifida*. There are many on this list that I have not grown. The list is a compilation based partly on my experience and partly on the recommendations of Linc Foster in his book, *Rock Gardening*.

(Ray Radebaugh is an ambitious and very skilled rock gardener, who gardens in Louisville, Colorado. He has served as President of the Rocky Mountain Chapter and is still serving as an inspiration to use bigger rocks and more complicated construction, and to grow difficult plants more beautifully.)

Drawings by the author.

"[The garden moraine], though it bears the name, has no relation to the barren moraines of the glaciers, but rather to the upmost shingle-slopes in the highest folds of the mountains, where the loveliest and choicest of all their flowers are gathered in the fine loose slides of stone, moistened beneath by the rivers of melting snow. And in cultivation, the "Moraine" has often proved the answer to problems long unsolved in the management of the more difficult alpine, hitherto sadly indocile and intractable in ordinary cultivation."

Reginald Farrer, *The English Rock Garden*, 1919.

Books

The Rhododendron Species, Volume II—Elepidotes, Part I Arboreum-Lacteam. H.H. Davidian. 1989. Timber Press: Portland, Oregon. Hardbound; 344 pp. (159 color), 46 line drawings, 5 maps. Price, \$54.95.

by Richard V. Piacentini

The long-awaited second in a series of rhododendron works by H.H. Davidian, this particular volume covers the series *Arboreum*, *Argyrophyllum*, *Auriculatum*, *Barbatum*, *Campanulatum*, *Falconeri*, *Fortunei*, *Fulgens*, *Fulvum*, *Grande*, *Griersonianum*, *Irroratum*, and *Lacteam*. None of the species in these series would be considered candidates for a rock garden. However, this is a monumental work that should be in the library of any serious gardener interested in rhododendrons. Gardeners interested in the dwarf species would find Volume I on the *Lepidotes* of greater use. The depth and breadth of this work is commendable.

The book starts out with some maps of the Himalayas and China, the area believed to be where rhododendrons first originated. Included is a list of name changes for Chinese provinces. This is of particular use to anyone referring back to some of the old classic works on rhododendron. A glossary follows, covering many of the botanical terms used throughout the book. Novices would have appreciated a bit more thorough listing in this section. The next section is a series of line drawings on leaf and flower shapes, then scales, seeds, and 26 pages of hair types. Hardiness ratings follow the British system. It should be noted that no one has ever really devised a useful guide to hardiness that encompasses all regions.

Keys are straightforward, requiring some knowledge of botanical terms. The botanical descriptions are very complete and cover descriptions on habit, leaf and flower shape, colors, etc. Most people should be able to determine which species they have, using these together with the keys. Synonyms and bloom dates are also included. Perhaps the most valuable feature of this book is Davidian's comments on each of the species drawn from his long experience studying the genus and his association of over 40 years with the Royal Botanic Garden in Edinburgh, Scotland. After an interesting account on the discovery and collection of the species, Davidian provides a subjective review covering the most admirable traits of the species and whether or not he considers the plant of garden value. This is the section of the book that I find to be the most enjoyable and interesting to read.

In summary, this is an excellent book, and a perfect companion to Volume I which deals with the Lepidotes. One can only hope that Part II of this series will not be too far behind.

America's Cottage Gardens. Patricia Thorpe and Eve Sonneman. 1989. Random House, Inc. and Random House of Canada, Ltd.: New York, Toronto. 192pp., hardcover. Price, \$29.95.

by Lauren Springer

At first glance, I almost dismissed this large, glossy tome spilling with artistic, moody photographs as just another well-packaged, well-produced piece of gardening fluff. A closer look at the photos and a few paragraphs later, I realized how wrong I was. There are, believe it or not, some uncharted waters in the overcrowded sea of gardening books, and these two innovative women have found them.

On an enviable trek across country, following "the road less traveled," Thorpe and Sonneman hunted down the true essence of American gardening, the small, unselfconscious, effusive gardens you'd never see in *House and Garden*. Here, across the country, dealing with the most varied climates, plant tastes and choices, gardeners young and old, male and female, black and white, have created an expressive form of folk art which Patricia Thorpe calls "cottage gardens," for lack of a better word.

But you'll find no quaint English cottage gardens à la Gertrude Jekyll here. Instead, meet Mississippian Janie Porter, who at seventy-five, and alone at the end of a dirt road amid miles of scrub oak and pine, grows a huge assortment of immaculately tended plants, from peonies to *Penstemon pinifolius*. She could care less about the Latin names; she just orders what catches her fancy in the catalogs, plops them into the ground with no highfalutin design tenets to guide her, and grows them to perfection.

Each region is treated separately, with insightful text accompanying the spirited photography. Only an experienced gardener like Thorpe could understand the energy and love that made these gardens, and her sensitivity to each region's and each garden's unique beauty is a good lesson for those of us who, subconsciously or consciously, are becoming too rigid and snobbish in our quest for the "perfect garden."

Although no true rock garden is represented in this book (a case could be made that one elderly woman's collection of painted rocks might be the truest rock garden ever created), the quirky, original spirit that inspired this author and photographer to make such a quirky, original book is one I think most rock gardeners can relate to. This book is a celebration of gardening not for style or status, but for love. It's one of the most joyful garden books I've ever read.

Pflanzen für das Alpenhaus. Fritz Kummert. 1989. Eugen Ulmer GmbH. & Co.: Stuttgart. 448 pp., hardcover. 119 color photos. Price, \$99.50.

by Panayoti Kelaidis

Much has been written on growing alpinists in pots since Gwendolyn Anley's *Alpine House Culture* published in 1938. Virtually everything on the subject has been produced by and for Britons, who excel in this facet of alpinism. This has led to the impression that alpinists are rarely grown in alpine houses elsewhere in the world, or at least that they are not grown as well as they are in England. A quick glimpse through Fritz Kummert's tome will change this impression precipitously. A tremendous range of plants that perform well in Central European alpine houses are illustrated with 119 color photographs of rare artistic and technical excellence. Most of these have never been pictured in books or journals before, or if they have, not with such an artistic eye. The text treats 380 genera and 1800 species with accuracy and thoroughness not often encountered in English language horticultural texts: All Latin names are quoted with authors, synonyms, country of origin, bloom time, and dimensions in cultivation, and precise cultural directions for anyone lucky enough to read German. Lest anyone think that this is yet another "*Arabis, Aubrieta, Dianthus, Gentiana, Primula, Saxifraga*" compilation, let me underscore the fact that plants unusual in cultivation are given priority: Numerous novel genera in books on alpinists, such as *Abrotanella, Alopecurus, Anarthrophyllum, Ancylostemon*, to pick a few from the start of the alphabet, are justifiably included. There seems to be a refreshing emphasis on plants from Continental regions, particularly the mountains of the Mediterranean Basin, Western and Central Asia and the Southern Hemisphere. Indispensable for the enthusiast.

Meconopsis. James L.S. Cobb. 1989. Christopher Helm and Timber Press: London, Portland. 125 pp., hardcover.

by Panayoti Kelaidis

Meconopsis occupy a sort of no-plants-land within Rock Gardening: The best known species generally grow a yard or two in height—admittedly large for most home landscapes—not to mention the sad fact that they present something of a challenge to grow even in favored parts of North America. A sort of mythological aura hovers over the genus, which James Cobb has managed to penetrate for the reader, without dispelling any of the allure these remarkable poppies will always hold. The last book-length treatment on the genus was published 56 years ago by Sir George Taylor (who Mr. Cobb assures us is still alive and gardening.) There have been considerable advances in botanical studies on the group. A great number of cultivars and hybrids have been developed

in the genus, and much experience and knowledge have accrued in the last half-century with regard to growing these bewitching Himalayans. James Cobb's style is lucid and entertaining: I was particularly intrigued by his detailed account of how elaborate misting systems are installed in Scotland and England to ensure optimal performance during droughty summers. I suspect that like so many alpines, *Meconopsis* will prove particularly appropriate for high altitude gardens throughout North America. Gardeners in Asheville, North Carolina, Aspen, Colorado, the Adirondacks, and Alaska, take note!

A Guide to Rock Gardening. Richard Bird. 1990. Christopher Helm: London, North Pomfret, Vermont. 142 pp., hardcover.

by Panayoti Kelaidis

The time-honored format of rock garden manuals begins with a series of short essays on construction, Latin names, questions of organization and procedure, and then a long or short list of plants—usually presented alphabetically by genus. This newest *Guide* fits neatly into this pattern. Mr. Bird's style is distinctly pedagogical, perhaps appropriate for a book directed at beginners.

The alphabetical list is marred with a few too many typos (*Bellum* for *Bellium*, *Dimorphoteca* for *Dimorphothecca*, etc.). Fifty-word summaries for genera as diverse as *Astragalus*, *Campanula*, or *Saxifraga* can hardly help very much, but then again, that's why one must have more than one book in one's library. Duncan Lowe's crisp drawings are an utter delight throughout and do much to complement the sense of the text.

This will make a fine Christmas present for someone you would like to infect with the rock garden bug.

Errata

#@!☆@#☆@!!!

Bulletin of the American Rock Garden Society 48(3), Summer 1990.

The correct address for Kevin McIntosh, registrar for the upcoming Eastern Study Weekend is 4225 Blue Barrow Rd., Ellicott City, MD 21403, not as printed in the Summer 1990 issue and accompanying brochure. Postal authorities have been notified and assure us that there is little cause for alarm if you have mailed your registration to the previously given wrong address. The mail has been getting through.

The top photo on page 222 shows *Phlox divaricata* 'Eco Regal', left, and *P. divaricata* ssp. *laphamii* 'Chattahoochee', right.



Genista dalmatica (p. 245, 246)

photos by Baldassare Mineo





Genista pilosa 'Vancouver Gold' (p. 245)

Baldassare Mineo

Genista sagittalis (*Chamaespartium sagittale*, p. 245)

Ramona Osborn





Genista tinctoria 'Plena' (p. 246)

Phyllis Gustafson

Genista tinctoria var. *humifusa* (p. 246)

Baldassare Mineo





Genista lydia (p. 245)

Baldassare Mineo

Genista villarsii (p. 246)

Baldassare Mineo

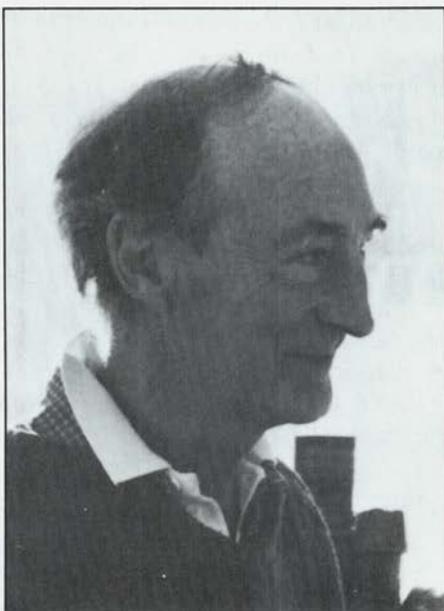


Awards

The Carlton R. Worth Award

Geoffrey B. Charlesworth

It is significant that the Carlton R. Worth Award, established six years ago, has only been presented four times. Instituted and funded by the Adirondack Chapter of the American Rock Garden Society, the award honors an outstanding plantsman and former editor of the ARGS Bulletin and is given to an author of distinguished writings about rock gardening and rock plants. Although the recipient need not be a member of the ARGS, special preference—for suitable and obvious reasons—is given to material published in the ARGS Bulletin.



Under the terms of the award, it would be hard to find a more suitable and obvious recipient than Geoffrey B. Charlesworth. With the 1988 publication of his first book, *The Opinionated Gardener—Random Offshoots from an Alpine Garden*, literature about rock gardening and rock garden plants reached an apex of elegance and erudition. And many of the essays collected here began as contributions to the newsletter of the Connecticut Chapter of the ARGS. A past chairman of the Connecticut Chapter, co-founder of the relatively new Berkshire Chapter, and an active member of both, he has produced a steady stream of lucid, witty articles for their newsletters. In addition, he has contributed to the quarterly bulletins of the national organization and to *Skalnicky*, the Prague Rock Garden Society bulletin.

While the Carlton R. Worth Award is bestowed on writers who specialize in alpine subjects, Charlesworth's book, *The Opinionated Gardener*, has the virtue of appealing to gardeners of every stamp. His eloquent prose has undoubtedly won converts to the stringent discipline of rock gardening. But even an armchair gardener could not fail to enjoy

his musings over the unique qualities of different gardens and relish his insights into the philosophy of gardening.

A passionate, committed, and, of course, opinionated gardener himself, Geoffrey Charlesworth has grown plants in locations as varied as New York City, suburban Long Island, and, most happily, rural Massachusetts. In addition to writing extensively about alpiners, he has successfully raised from seed—and given away—an incredible number of genera and species. For his generosity alone, this British-born mathematician and Professor Emeritus of Hofstra University should be celebrated! In a single year, he sows as many as 1900 packets of seed and disburses the lion's share of the crop among other gardeners. He donates plants and seedlings to individuals and to ARGS sales with a lavish hand. And when the seedlings are gone, his description of the sowing impulse endures in his writing:

"There is no thrill so great as seeing a new species emerge from seed, produce its first leaves, and ultimately flower. By the time you have grown 2,000 species, you could believe you have exhausted Nature's imaginative variability; by the time you have grown 5,000 you realize you never will. There is always something new. This is what my kind of gardening is all about."

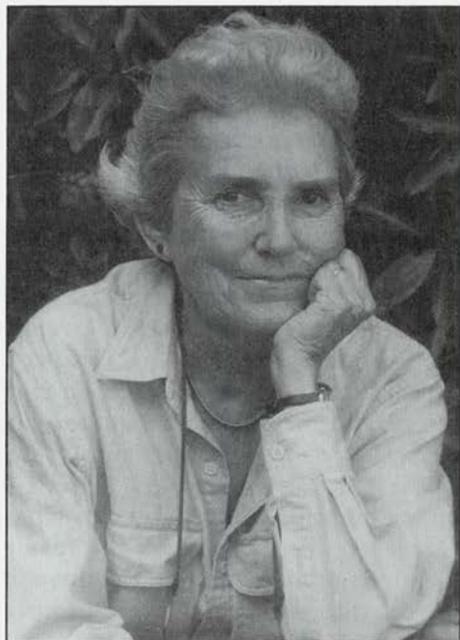
And this is what the Carlton R. Worth Award is all about—rock garden writing at its best.

Sydney Eddison

The Award of Merit

Catherine Hull

The woman we honor with this year's Award of Merit is more than just a gardener: she is a volunteer in every sense of the word, giving freely of her horticultural experience, serving ARGS outside the limelight, and never seeming to run out of energy or enthusiasm. She epitomizes the traveller in Robert Frost's poem who pauses only briefly to admire the view, then shoulders his responsibilities and continues on:



“...But I have promises to keep,
And miles to go before I sleep.”

Since joining the Society in 1969, Katrink has been active on both local and national levels. Locally, she is a faithful member of the New England and Berkshire Chapters. She helped organize the 1980 Annual Meeting in Peabody, Massachusetts, and contributes on a regular basis by giving talks, opening her gardens whenever asked, digging up offshoots for admiring guests, donating plants for fund-raisers, writing articles, and even potting up special treasures to enhance plant show tables.

On the national level, she served on the ARGS Awards Committee in 1978 and chaired this committee in 1987 and 1988. Despite her busy schedule, she has attended most ARGS national meetings and every International Rock Garden Conference, where her infectious enthusiasm and good will earned many converts for ARGS.

An inveterate traveller, Katrink has botanized her way through Switzerland, Italy, Czechoslovakia, Japan, Korea, Taiwan, Nepal, India, Kashmir, South Africa, and, naturally enough, England and Scotland. Her explorations in North America have included Alaska, the Wallawas in Oregon, the Northwest Olympic Range, and most recently, two trips to the Bighorns of Wyoming.

She shares all these experiences with ARGS members across the country by presenting slide talks, the most memorable being the lecture she dedicated to Linc Foster at the 1985 Winter Study Weekend in Long Island, when she discussed western European alpenines that adapt well to New England conditions, showing them in their natural habitats and flourishing in local gardens.

Outside of ARGS, Katrink is well-known for her rock gardening knowledge. She has been active in The Garden Club of America for over 20 years, winning the GCA Medal of Merit in 1984 and the Natalie Peters Webster Medal in 1985 “for finding unusual plant material, encouraging its creative use and assuring its availability.” She is on the GCA list of nationwide speakers and has lectured extensively on rock gardens. As an accredited GCA judge, she has worked the alpine classes at the Philadelphia and Boston flower shows. The Massachusetts Horticultural Society recognized her superb garden with a Gold Medal in 1977 and then in 1987 awarded in horticulture in the growing of alpine plants.”

Her other commitments include volunteer work at the Arnold Arboretum and memberships in the Massachusetts Horticultural Society, New England Wildflower Society, and many others. She has served as President of the Friends of the Manchester Library and of the Friends of Manchester Trees.

Recently she served on Harvard's Visiting Committee for the Arnold Arboretum. She is currently on the Sedgwick Garden Committee of the

Trustees of Reservations, headquartered at Long Hill in Beverly, Massachusetts, working alongside Margot Parrot to preserve the gardens of this 100-acre estate.

When time, energy, and promises permit, Katrink works in her own garden in Manchester, Massachusetts, on top of a steep hill with a view of the ocean and islands that stretch towards Boston Harbor. The original landscaping executed in the 1930's by Fletcher Steele featured a long, granite retaining wall and goldfish pool, which incorporated a natural granite ledge and a life-sized statue of Neptune. Over the years, Katrink has replaced the rose and clematis border along the wall with a raised tufa bed and has built a granite wall and scree to display her alpiners. But she has managed to incorporate some of Mr. Steele's original plantings of *Pieris*, *Kalmia*, *Rhododendron*, and *Petasites* into her woodland garden.

At long last, ARGS has recognized that here is a knowledgeable plantswoman and devoted advocate of rock gardening. We take great pride in presenting this 1990 Award of Merit to Catherine Hull for her years of quiet dedication to the Society and for the generous spirit with which she has shared her passion for alpine plants.

Buffy Parker

Dr. Edgar T. Wherry Award

Gladys L. Smith

The Dr. Edgar T. Wherry Award for 1990 is presented to Gladys L. Smith, one of our most outstanding members. Given for dissemination of knowledgeable information, botanical and horticultural, about native American plants, it is evident to all who know her that this is indeed a fitting and appropriate award to honor her accomplishments. After a successful career in music education, she established a whole new endeavor in an entirely different field, now sharing her enthusiasm for plants and her skill as a teacher with yet another following of students and admirers.



Many of our members first met Gladys on one of her field trips, where her energetic leadership and love of the California flora fired our enthusiasm. Colleagues and novices alike are impressed by her extensive and impeccable knowledge of the flora of Western North America. For many years she taught plant identification and wildflower classes for the University of California extension service and courses in plant identification for Strybing Arboretum Society. She taught several summer seminars on native flora in the field at Churchill in Manitoba, Canada, on the west shore of Hudson Bay. These were also under the auspices of the University of California at Berkeley. Roger Raiche of the University of California Berkeley Botanical Garden, who attended her last seminar there writes, "Her knowledge of the subarctic flora is as impressive as her knowledge of the California flora." Any trip in the field with her is a rewarding and memorable experience.

Gladys has also been generous with her informative and entertaining lectures, where her beautiful slides and lively commentary captivate her audience, and her meticulously accurate information commands our admiration and respect. She speaks with authority on plants of diverse areas, including the Arctic and the Sierra Nevada, as well as many other parts of California.

As a noted author, she has published a superb *Flora of the Tahoe Basin*, the first to be published on this famous area, although many eminent botanists have written about it. She has just finished writing a flora of Mendocino County, California, a monumental 12-year work. It will be published by San Francisco University in this year of their centennial. She gave our Western Chapter a delightful and enlightening slide talk describing some of her experiences during the field work for the Mendocino flora. Very few of us appreciate the effort involved in such a work when we refer to its pages.

Other honors bestowed upon her include the Eloise Lecheur Award of the Garden Club of America and the Owen Pearce Award, presented to her by Strybing Arboretum Society. It is interesting to note that she and Dr. Wherry corresponded at one time about plants growing in serpentine areas.

One of the most endearing facets of this remarkable lady's life is her generosity in sharing her immense knowledge and boundless enthusiasm with those who come within her presence. In teaching, as in research, she has been an inspiration to us all.

Margery Edgren

ARGS Coming Events

1991 Eastern Winter Study Weekend

The Plants of China

January 25 to 27, 1991

Featuring a scenic bus trip to the US National Arboretum to tour the new Asian and China Valleys and view the expanded Bonsai collection and the famed Gotelli Dwarf Conifer collection.



Speakers: Lawrence Lee, Theodore R. Dudley, Robert McCartney, Kurt Bluemel, Alexej Borkovec, George W. Ring, and Phillip Normandy.

Place: The Radisson Mark Plaza Hotel, Alexandria, Virginia.

Registration Fee: \$60 before December 1, 1990, \$70 thereafter.

Questions?

Registration: Kevin McIntosh, 4225 Blue Barrow Ride, Ellicott City, MD 21043
301-465-0479

Other questions: George Phair, 14700 River Road, Potomac, MD 20854, 301-926-8944

1991 Annual Meeting

A Kaleidoscope of Gardens

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

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

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



Calochortus Fritillaria

Other Western Native Bulbs

C.H. Baccus *3/10*
900 Boynton Ave.
San Jose, CA 95117
(408)244-2923

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

Wildflowers of the Southern Appalachians

Choice, hardy, reliable, showy.

FROM OUR NURSERY TO YOUR GARDEN
be it woodland, rock, moist or dry.

Send \$2 for 40 pp. descriptive catalog or SASE for list of wildflowers, hardy ferns and perennials

Sunlight Gardens

Rt. 1 Box 600-R2
Andersonville, Tenn. 37705

Adonis vernalis

Very early blooming
Large, golden flowers.

Extremely choice—a must for every rock garden.

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

\$12.50 each, 3 for \$30, 6 for \$54

Discounts on larger quantities.

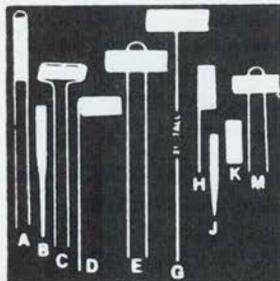


Kurt Bluemel, Inc.

Rare Plant Division

2740 Greene Lane, Baldwin, Maryland 21013

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



PAW PAW EVERLAST LABEL COMPANY

- A- Hairpin Style Markers.....30 for \$9.30
- B- Plant or Shrub Labels.....100 for \$6.75
- C- Cap Style Markers.....30 for \$9.70
- D- Swinging Style Markers.....30 for \$7.95
- E- Rose Markers.....30 for \$8.85
- F- Tall Display Markers.....30 for \$12.15
- G- Tall Single Staff Markers.....30 for \$9.30
- H- Flag Style Markers.....30 for \$7.20
- J- Small Plant Labels.....100 for \$6.55
- K- Tie-on Labels.....100 for \$9.65
- M- Miniature Markers.....30 for \$7.45

P.O. Box 93 - E Paw Paw, Michigan 49079-0093
Quantity Prices Available Postage Pre-paid

CHADWELL WILD FLOWER SEED (Est. 1984)

The proprietor offers a selection of wild collected seeds suitable for rock garden alpine house, woodland or peat garden. Items for beginner and connoisseur.

HIMALAYAN PLANT SEED CATALOGUE

Incl. Primula, Saxifraga, Androsace, Arisaema, Campanula, Iris, Tulipa, Aquilegia, Meconopsis, Gaultheria, Cassiope, Waldheimia, Paraquilegia.

JAPANESE LIST

Incl. Primula, Campanula, Pulsatilla, Adenophora, Gentiana, Lagotis, Pyrola, Shortia, Leontopodium, Lilium, Phyllodoce, Geranium, Adonis, Dianthus.

SEED COLLECTING EXPEDITION TO THE EASTERN HIMALAYA, 1990

Detailed prospectus available. Area rich in: Primula, Saxifraga, Rhododendron, Gentiana, Cremanthodium. £55 or £30 shares. Send \$2 bills (not a check) for any or all of above to:

C. Chadwell (ARGS)

81, Parlant Road, SLOUGH.
Berks. SL3 8BE. England

ALBIFLORA

BOOKS: Our list contains books and magazines on alpine plants, Japanese flowers and gardening, full of color pictures with Latin or English names as well as some books on Flora of China and Flora of Taiwan, etc.

SEEDS: We offer a comprehensive range of seeds of Japanese native plants collected from all over Japan. The new list will be ready in December.

JAPANESE PRIMULAS: The list features a good many named varieties of *P. sieboldii* and all the wild species of Japanese primulas.

Enclose 2 Int'l Reply Coupons per enquiry; ALBIFLORA, Inc., PO Box 24, Gyotoku, Ichikawa, Chiba, 272-01 JAPAN



RICE CREEK GARDENS, INC.

Rare & Unusual Perennials
Rock Garden Plants
Dwarf Conifers
Hardy Rhododendrons
Shrub Roses
Wild Flowers
Herbs & Water Plants



Catalog \$2

Nursery Sales
11506 Hwy. 65
Blaine, MN 55434

Mailing Address
1315 66th Ave. NE
Fridley, MN 55432

We Build Authentic
Rock Gardens
and
Complete, Distinctive
Landscapes



Rocknoll

OUR 61ST YEAR

Unusual Rock Plants, Shade Plants, Hosta,
Perennials, Hemerocallis, Sempervivums,
Wild Flowers, Shrubs, Dwarf Evergreens,
Dwarf, Siberian & Japanese Iris
40 Varieties - Phlox Subulata & Species
20 Varieties - Hardy Geraniums
14 Varieties - Dianthus
Special - 10 Mixed Tetraploid Hemerocallis
\$22.00 Postage Paid

36 PAGE CATALOG

Please send 50¢ in Stamps
We Ship

Attention: Eleanor Saur or Dorothy Parker
Rocknoll Nursery
Dept. 28
9210 US 50, Hillsboro, Ohio 45133-8546
1-513-393-1278

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

Catalog: \$2.00 refundable on first order



PORTERHOWSE FARMS

41370 S.E. Thomas Rd.
Sandy, Oregon 97055

Telephone/FAX (503) 668-5834





SISKIYOU RARE PLANT NURSERY

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

Dept 1, 2825 Cummings Road, Medford, Oregon 97501

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

SHIPPING TO U.S. and CANADA ONLY

A Distinguished Collection

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

ROSLYN NURSERY

211 BURRS LANE, DEPT. R

DIX HILLS, N.Y. 11746

124 page Mail Order Catalog \$2.00



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

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

Homestead Division

9448 Mayfield Road, Chesterland, OH 44026

Catalog \$1.00 deductible from order.

MEDICINAL PLANT SEEDS

Dramatic varieties of indigenous plants used in Chinese medicine. Echinacea. Organic garlic. Dried herbs. Books. Catalogue, \$1.00 refundable with order

Elixir Farm Botanicals

General Delivery
Brixey, MO 65618

PERENNIALS

Extensive list of top-quality nursery-propagated perennials for the fine and unique gardener.

Featuring exclusively McEwen Siberian Iris.



Catalog of over 1,000 varieties of perennials, \$1.50.

Fieldstone Gardens, Inc.

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

MINNESOTA AUTHOR offers her two excellent books about Woodland Wildflowers. Both encompass material never written about elsewhere. THE ROOT BOOK, How to Plant Wildflowers, Spiral, 114 pp., \$9.50. ADVENTURES OF A 'WILD' PLANTS WOMAN, In Pursuit of Native Plant Preservation, Paper, 240 pp., \$12.95. Add \$1.75 for mailing, per shipment; (Foreign, \$3. and Bank or Postal Money Order in U.S. funds). Minn. residents add Sales Tax. Add'l information sent for a SASE or Postal Coupon. NORMA PHILLIPS, 6700 Splithand Road, Grand Rapids, MN 55744 U. S. A.

ROCK PLANTS

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



Free 120-page catalog when you visit us.

To send for catalog, include \$3.00

Oliver

NURSERIES, INC.

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

Unusual Alpines & Hardy Plants

Nursery established 1927

From our extensive plant collection we can offer an interesting range of Alpines, Primulas, Saxifrages, Hardy Perennials, Shrubs, and Dwarf Conifers. All are fully described in our current catalogue. (Please send \$2.00 in notes, not cheques.) Seed List also available (2 reply coupons please). Orders dispatched worldwide by AIR MAIL, carefully packed.

Holden Clough Nursery

Dept. ARGS, Holden, Bolton-by-Bowland
Clitheroe, Lancashire, BB7 4PF England
Telephone: 2007 615

Chehalis Rare Plant Nursery

2568 Jackson Highway, Chehalis, Washington 98532

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

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

Exhibition - Alpine

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

Primula Florindae & Mixed Candelabra

Generous packet \$1 each.

Hand Pollinated Show Auricula

Red Self Green Edge
Yellow Self Gray & White Edge
\$2.00 per packet of 25 seeds.

Hand Pollinated Double Auricula Mix

\$3.00 per packet of 15 seeds.

MINIMUM ORDER \$5.00

Post free in U.S. and Canada

Overseas orders please add 50¢.

Homeplace Garden

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



Write for Catalog, \$2

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

CAMELLIA FOREST NURSERY

Camellias—Dwarf Conifers

A Wide Selection of Rare Trees and Shrubs
Newly Imported from China and Japan

Send 65¢ in Stamps for List

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

Foxborough Nursery, Inc.



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

LANDSCAPE DESIGN & INSTALLATION CONIFER & ROCK GARDENS
W. David Thompson By Appointment Only
Street, Maryland 21154 (301) 836-7023

Retail & Wholesale

COLLECTORS DWARF BULBS

Our 1990 catalogue contains many old favorites for garden and Alpine House.

In addition, we offer numerous rare and new introductions.

Full and Descriptive Catalogue \$2.00

POTTERTON & MARTIN
Nettleton, Nr. Caistor, North Lincs.
LN7 6HX, ENGLAND
tel 0472-851792

American Penstemon Society



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



*we ship almost
anywhere!*

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

Heaths & Heathers
Box 850, Elmira, N.Y. 98591
(206) 482-3258



AMERICAN CONIFER SOCIETY

Interested in dwarf conifers and their companion plants? Join the American Conifer Society. For information write: ACS, c/o Maxine Schwarz, Secretary, PO Box 242, Severna Park, MD 21146.

WILD FLOWERS

Forest Floors of Mountain Meadows
* * *

WOODLAND ROCKERY

6210 Klam Road
Otter Lake, MI 48464

MAIL ORDER CATALOG \$1.00

ALL WILDINGS NURSERY PROPAGATED



Marty and Sandy Jones

Colorado Alpines, Inc

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

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

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

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

P.O.Box 2708
AVON CO 81620



Coenosium Gardens

6642 S. Lone Elder Rd.
Aurora, OR 97002
503-266-5471

OVER 700 DWARF AND
UNUSUAL CONIFERS
NEW CATALOG AVAILABLE
\$3.00 (REFUNDABLE)

DWARF AND PYGMY CONIFERS

(Mail or Pick-up)

CHOICE ROCK PLANTS

(Pick-up only)

Send self-addressed, stamped envelope for List

Visits by Appointment Only.

Ellie & Joel Spingarn

PO Box 782

Georgetown, CT 06829

Phone 203-544-8194

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

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

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

WOODLANDERS

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

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

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

Mt. Tahoma Nursery

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

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

THE PRIMROSE PATH

R.D. 2 Box 110 Scottdale, PA 15683

Primula veris



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

THE CUMMINS GARDEN

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

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

THE ALPINE GARDEN SOCIETY

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

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

Rocky Mountain
Rare Plants



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



KURT BLUEMEL, INC.
Rare Plant Division

Choice Plants
of the Northern and Southern Hemispheres

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

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

Pacific Horticulture

a magazine about
plants and gardens of the west

illustrated color quarterly

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

Circulation Department
PO Box 680, Berkeley, CA 94701

DILATUSH NURSERY

Rare Dwarf Conifers
by appointment only

780 Route 130
Robbinsville, N.J. 08691
(609) 585-5387



A • R • G • S BOOKSTORE

<i>Cuttings from a Rock Garden*</i> , by H. Lincoln Foster & L. L. Foster..	\$23.00
<i>Alpine Wildflowers of the Rocky Mountains*</i> , by J. Duft & R. Moseley ..	7.00
<i>Auriculas*</i> , by Brenda Hoyatt.....	14.00
<i>The Genus Lewisia*</i> , by Brian Mathew	23.00
<i>The Iris*</i> , by Brian Mathew.....	23.00
<i>Iris*</i> , by Kohlein	27.00
<i>The Genus Cyclamen*</i> , by Christopher Grey-Wilson	22.00
<i>Vascular Plants of Wyoming</i> , by Robert Dorn.....	15.00
<i>Vascular Plants of Montana</i> , by Robert Dorn	9.00
✕ <i>Utah Flora*</i> , ed. Stanley Welsh et al.	36.00
<i>Orchids of the Western Great Lakes Region*</i> , by Fred Case	26.00
<i>The Opinionated Gardener*</i> , by Geoffrey Charlesworth	14.00
<i>Rocky Mountain Alpines*</i> , publ. Alpines '86 Int'l. Conference.....	30.00
<i>Rock Gardening</i> , by H. Lincoln Foster.....	18.00
<i>Manual of Alpine Plants</i> , by Will Ingwersen, reprint edition	15.00
✕ <i>The Bernard Harkness Seedlist Handbook</i> , by Harkness et al.	23.00
<i>Successful Southern Gardening*</i> , by Sandra Ladendorf.....	18.00
<i>A Manual of Saxifrages*</i> , by Webb & Gornall	40.00
<i>A Manual of Alpine and Rock Garden Plants*</i> by C. Grey-Wilson	22.00
<i>The Rock Garden and its Plants *</i> , by Graham Stuart Thomas	26.00
<i>Modern Miniature Daffodil Species and Hybrids*</i> , by James Wells	26.00
<i>Campanulas*</i> , by Peter Lewis and Margaret Lynch.....	22.00
<i>Rare Plants of Colorado</i> , by Colorado Native Plant Society	6.00
<i>Alpine Wildflowers of the Rocky Mountains</i> , by Willard, Smithson	3.50

* denotes a hard cover

Please mail inquiries and orders to:

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

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

First Book, US	\$3.00
Outside US.....	\$4.00
Each Additional Book.....	\$1.50

Your zip code or postal code must be included.

Chapter Chairpersons

Adirondack	William Dress, 716 Elm Street Ext., Ithaca, NY 14850
Allegheny	Walter C. Betzold, 131 Rochester Road, Pittsburgh, PA 15229
Arizona	Sonia Lowzow Collins, RR 3, Box M365, Lakeside, AZ 85929
Berkshire	Anne Spiegel, 73 Maloney Road, Wappingers Falls, NY 12590
Columbia-Willamette	Diana Reeck, 1602 NE 162 Avenue, Vancouver, WA 98684
Connecticut	Joan Lee Faust, 11 Field Road, Riverside, CT 06878 Esther LeGeyt Bailey, 157 Douglas Street, Hartford, CT 06114
Delaware Valley	Joyce Fingerut, 2106 Pennsylvania Ave., Ft. Washington, PA 19034
Emerald	Ernest O'Byrne, 86813 Central Road, Eugene, OR 97402
Great Lakes	Jim Briggs, 3270 E. Lansing Road, Bancroft, MI 48414
Hudson Valley	Edith Young, Box 332, RFD 3, McDougal Ln., Peekskill, NY 10566
Long Island	Shelley Herlich, 43 Greenfield Lane, Commack, NY 11725 Lillabeth Wies, Box 233, Cold Spring Harbor, NY 11724
Manhattan	Lawrence Thomas, 340 E. 74th, #11G, New York, NY 10021
Minnesota	Florence Keller, 6412 Indian Hills Rd., Minneapolis, MN 55435
Mt. Tahoma	Doreen Pohlman, 10623 125th Street East, Puyallup, WA 98374
New England	James L. Jones, 45 Middle St., Lexington, MA 02173
Newfoundland	Bodil Larsen, Site 78, Box 36, St. John's, Newfoundland A1C 5H4
Northwestern	Art Dome, 4832 54th Avenue South, Seattle, WA 98118
Ohio Valley	Harry Butler, Rt. 1, 2521 Penemit Rd., Spring Valley, OH 45370
Ontario	Cyril Baker, 258 West St., #506, Brantford, Ontario, N3R 6N1
Piedmont	Bobby Wilder, 1213 Dixie Trail, Raleigh, NC 27607
Pikes Peak	Gary Mueller, 2103 Essex Lane, Colorado Springs, CO 80909
Potomac Valley	Don Humphrey, 6540 Oakwood Drive, Falls Church, VA 22041
Rocky Mountain	Joan Schwarz, 26290 Clear View Drive, Golden, CO 80401
Siskiyou	Joseph Shelton, PO Box 8311, Medford, OR 97504
Southern Appalachian	Ruth Samotis, 2618 Hebron Road, Hendersonville, NC 28739
Watnong	Barry Yinger, PO Box 565, Far Hills, NJ 07931
Western	Margery Edgren, 50 Oakhaven Way, Woodside, CA 94062
Wisconsin-Illinois	Douglas Macdonald, 1214 Grant Street, Evanston, IL 60201

Bulletin Staff

Editor	Gwen Kelaidis (303) 322-1410 1410 Eudora Street, Denver, Colorado 80220
Advertising Manager	Al Deurbrouck (412) 653-0281 6915 Hilldale Drive, Pittsburgh, Pennsylvania 15236
Guest Artists	Carolyn Crawford Lisa Moran Rob Proctor Al Stavos Phil Pearson Ann Bartlett William Jennings Phyllis Gustafson Baldassare Mineo Judy Glattstein Dick Bartlett Ray Radebaugh Dick Redfield Panayoti Kelaidis Ramona Osburn Ted Kipping

Officers

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

Directors of the Board

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

Managers

Executive Secretary	Jacques Mommens
	PO Box 67, Millwood, NY 10546
Seed Exchange	James L. Jones
	45 Middle St., Lexington, MA 02173
Bookstore	Jean Stevens
	Route 6, Woodland Drive, Eau Claire, WI 54701
Archivist	Marnie Flook
	RD 3, Box 278A, Chestertown, MD 21620
Slide Collection	William Plumner
	10 Fox Lane East, Painted Post, NY 14870
Library	Janet Evans, c/o Pennsylvania Horticultural Society,
	325 Walnut Street, Philadelphia, PA 19106

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

Address editorial matters pertaining to the *Bulletin* to Gwen Kelaidis, Editor, 1410 Eudora Street, Denver, Colorado, 80220. Advertising matters should be addressed to Al Deurbrouck, Advertising Manager, 6915 Hilldale Drive, Pittsburgh, Pennsylvania 15236. The *Bulletin* is published quarterly by the American Rock Garden Society, a tax-exempt, non-profit organization incorporated under the laws of the State of New Jersey. Second Class postage is paid in Darien, Connecticut and additional offices. Postmaster: Send address changes to *Bulletin of the American Rock Garden Society*, (ISSN 0003 0864), 15 Fairmead Road, Darien, Connecticut, 06820.