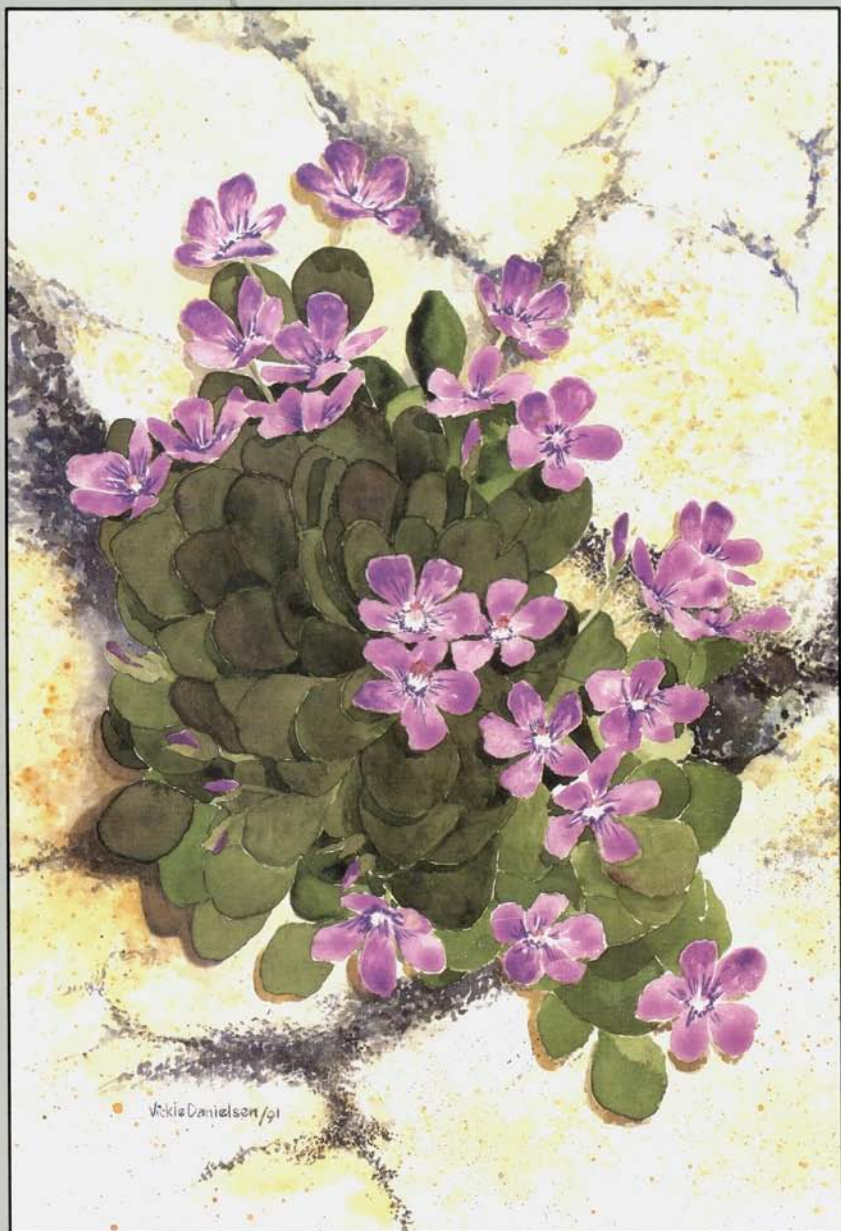


Bulletin of the American Rock Garden Society



Volume 49 Number 3

Summer 1991

Cover: *Claytonia megarhiza* ssp. *nivalis* _____

Watercolor by Vickie Danielsen of Englewood, Colorado

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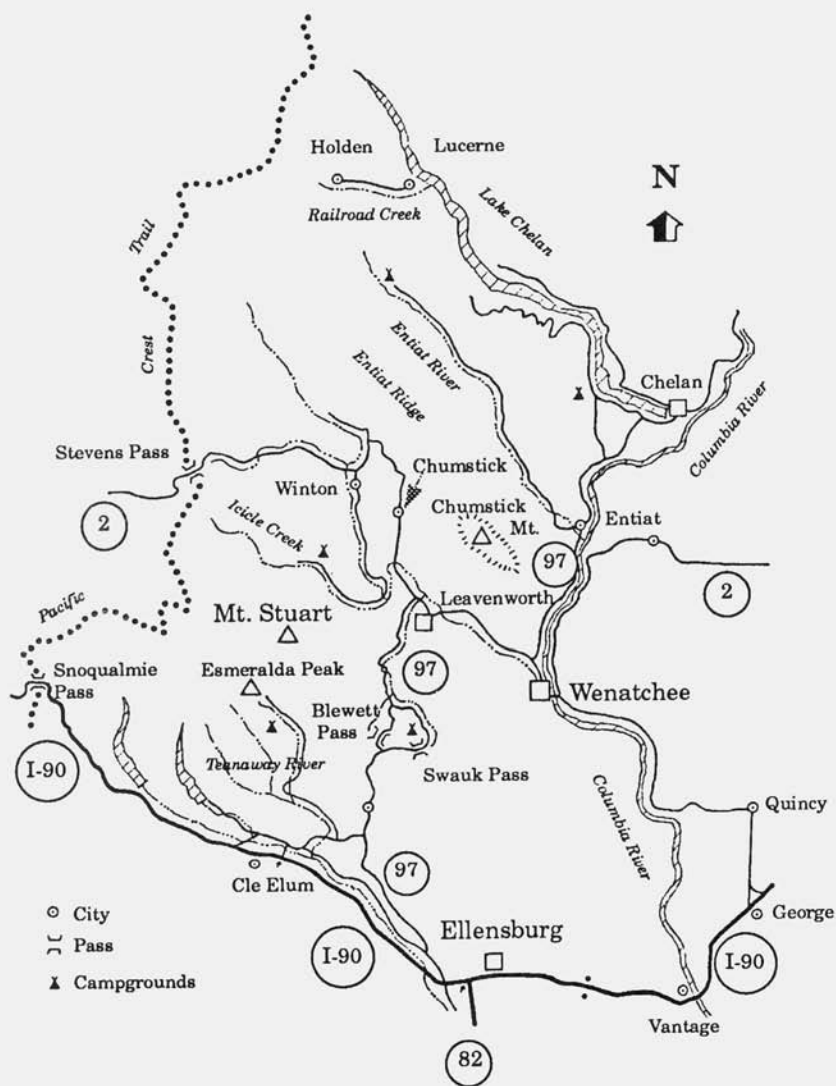
Summer 1991

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The Wenatchee Mountains

The Wenatchee Mountains

by *Arthur Kruckeberg and Coleman Leuthy*

The geological backdrop of the Wenatchees is a turbulent and grand mountainous landscape with a host of lithological types—sandstones, granitics, volcanics, metamorphics (like metadiabase, schist, and gneiss), and a liberal display of ultramafics (serpentine and peridotite). This lithology is arrayed in precipitous, jagged peaks and high volcanic tableland. Discontinuities in the flora are caused by the often sharp boundaries between different rock types. Serpentine outcrops abruptly next to granite or sandstone, provoking night-and-day contacts in the living landscape. The stark “moonscapes” of serpentine barrens often lie chock-ablock with luxuriant vegetation on non-serpentine terrain.

The Wenatchee Mountains run southeasterly from the Cascade Range to the Columbia River as it runs south through the center of Washington. From the southern extreme of the range east along Interstate Highway 90 between Cle Elum, Ellensburg, and Vantage, the largely mountainous terrain extends north of Stevens Pass, and includes the Wenatchee River drainage. In a broader botanical sense,

the Wenatchees continue up the Columbia River to Lake Chelan, uplake to Lucerne, and west up Railroad Creek to the Cascade Crest. This larger definition would include the Entiat and Chelan Mountains.

Geologically, these mountains are complex. Major rock types include sandstones, some conglomerates, occasional lime-rich bands, serpentine, basalt flows and the granites of a large batholith—the Mount Stuart Range. The Stuarts extend from Tumwater Canyon on the Wenatchee River to Ingalls Creek, their southern boundary. Early on, these mountains were uplifted from a fault line near the Columbia River. To the east, a major downwarping or *graben* was created in central Washington east of the Wenatchees. Some three million years ago, surface lava flows covered much of the area. Then during the last continental ice age, beginning some 20,000 years ago, an ice sheet extended nearly to the site of the city of Wenatchee. Mountain glaciation in the higher elevations merged with the continental ice. Except for a few ice-free peaks, mostly in the Stuart Range, the terrain was scoured

bare. As the ice receded, there was enormous runoff and erosion, both from the montane glaciers and the continental ice. Floods lasted for many years and some of them were gigantic. East of the city of Wenatchee, geologists estimate that the flood waters coursing down the Columbia were about 1,000' deep. Ripple ridges left by the force of the water are approximately 200' high. The floods here, as evidenced by such geologic features, were the largest ever to occur on earth.

It was only in the last 10,000 years, since the cessation of these floods, that the flora we see today in this region developed.

Rare plants in Washington State make only a modest showing in the flora. Since Washington is a gathering place for plants from the south (Oregon and California), from the east (the northern Rockies) and from the north (Canada and Alaska), it is not surprising that endemism is of a lower order than in California or Oregon. Yet of the three or four centers where unique species of plants are found in Washington, the Wenatchees rank high. The Columbia River Plateau is first, the Olympic Mountains rank second, and the Wenatchee Mountains come in third.

At the lowest elevations near the Columbia River, the Wenatchee country can include some cold steppe desert vegetation. Outstanding perennials here include *Viola trinervata* (photo p. 198), *Phlox longifolia* (photo p. 198) and *P. speciosa*, *Townsendia florifer*, *Mertensia longiflora*, *Eriogonum thymoides* (photo p. 199), *Lewisia rediviva*, and *Balsamorhiza hookeri*.

But the Wenatchee Mountain country is mostly within the Yellow Pine-Sagebrush-Bunchgrass life zone. Yellow pine (*Pinus ponderosa*) forms open woodlands. With the characteristic mix of shrubs such as *Artemisia tridenta-*

ta, *Chrysothamnus nauseosus*, and *Purshia tridentata*, and the indicator grass *Agropyron spicatum*, expect to find a generous display of spring-blooming herbs. Of interest to the rock gardener may be *Lesquerella douglasii*, *Phoenicaulis cheiranthoides*, *Valeriana columbiana*, *Paeonia brownii*, and *Gilia aggregata*. Of special interest and of restricted distribution—so restricted that no collecting of plants should be considered—are *Hackelia venusta*, *Delphinium xantholeucum*, *Delphinium viridescens*, *Trifolium thompsonii*, and the famous *Lewisia tweedyi* (photos, pp. 200-201). This lewisia, once thought to be restricted to rocky slopes of the lower forest and talus in Kittitas and Chelan Counties, now is known from the Methow Valley country of Okanogan County and even across the border in Canada in Manning Provincial Park.

At higher elevations this sagebrush and yellow pine vegetation blends into the Grand Fir-Douglas Fir zone, where *Abies grandis* and *Pseudotsuga menziesii* play the leading roles. Where rock outcrops and talus intrude into the conifer forest, some fine plants are to be encountered. Two rock ferns are choice: *Cheilanthes gracillima* and *Cryptogramma crispa*. In the same rocky habitats, look for three penstemons, *Penstemon rupicola* (photo p. 203), *P. davidsonii*, and *P. fruticosus*. All three are in the section *Dasanthera* and are interfertile. Hybrids involving the trio are not uncommon. Other rock inhabitants in this zone include *Arenaria capillaris*, *Anemone occidentalis*, *Aquilegia flavescens*, *A. formosa*, *Lewisia columbiana*, *Erysimum arenicola* ssp. *torulosum*, *Mitella breweri*, *Viola purpurea*, *Monardella odoratissima*, *Galium multicaule*, *Luina hypoleuca*, and others of the daisy clan. In early July in these openings the yellow and white

color forms of *Eriogonum compositum* are everywhere in their glory.

Near timberline, subalpine fir (*Abies lasiocarpa*), whitebark pine (*Pinus albicaulis*), and Lyall's larch (*Larix lyallii*) are dominant. Here openings in the forest become more frequent. Slopes are steeper and mountain meadows and talus flora are supreme, abounding in colorful diversity. Rock outcrops, cliffs, crevices, and talus dominate this species-rich high mountain land. Just a sampling of the rich flora below and above timberline here will suffice as a tempting come-on. Heather meadows with the two phyllodoxes, *Phyllodoce empetrifomis* and *P. glanduliflora*, as well as *Cassiope mertensiana*, have choice associates such as *Luetkea pectinata*, *Anemone occidentalis*, *Castilleja parviflora*, *Pedicularis contorta*, *P. ornithorhyncha*, *Dodecatheon jeffreyi*, and *Lupinus polyphyllus* ssp. *burkei*. On drier slopes and ridge-tops expect to find *Smelowskia calycina*, *Lupinus lepidus* ssp. *lobbii*, *Antennaria rosea*, *Erigeron compositus*, *E. aureus*, *E. peregrinus*, *Solidago multiradiata* ssp. *scopulorum*, *Haplopappus lyallii*, *H. greenei*, *Campanula scabrella*, *C. parryi*, *Arenaria capillaris*, *Sedum lanceolatum* ssp. *rupicolum*, and *Thlaspi fendleri* ssp. *glaucum*.

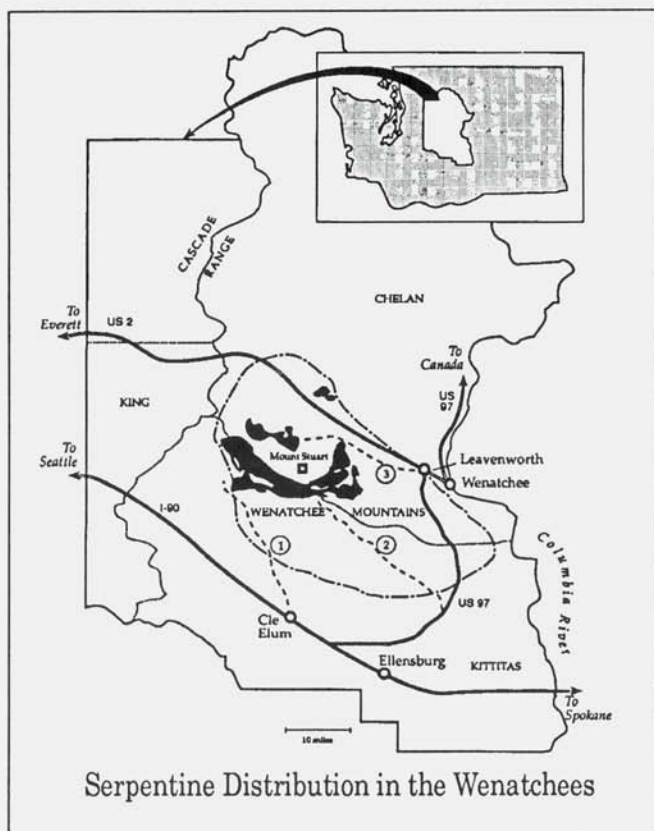
In this subalpine zone where crevices and scree slopes abound, a cohort of rock-loving herbs meets the eye: *Elmera racemosa*, *Penstemon procerus* ssp. *tolmiei*, *Heuchera cylindrica* ssp. *alpina*, *Collomia debilis*, *Ivesia tweedyi*, *Spraguea umbellata*, *Draba paysonii*, *Phlox diffusa*, and that Wenatchee rarity, *Pellaea breweri*.

Finally, beyond the *krummholz* of dwarfed trees are islands of true alpine tundra, especially in the Enchantment Lakes country of the Stuart Range. All

of the forested and alpine zones are included within the Wenatchee National Forest.

The most striking of the endemic Wenatchee Mountain flora are the serpentine species. Often these have an absolute fidelity to this ferromagnesian soil type. There are those that are restricted to serpentine, such as *Polystichum lemmonii*, *Adiantum pedatum* ssp. *calderi*, *Chaenactis thompsonii*, *Douglasia nivalis* var. *dentata* (photo p. 202), *Lomatium cuspidatum*, *Poa curtifolia*, *Cryptantha thompsonii*, and *Claytonia megarhiza* var. *nivalis* (photo p. 204). Others, such as *Aspidotis densa*, *Eriogonum pyrolaeifolium* var. *coryphaeum*, *Ivesia tweedyi*, *Anemone drummondii*, *Arenaria obtusiloba*, *Chaenactis ramosa*, *Castilleja elmeri*, *Polygonum newberryi*, and *Salix brachycarpa*, are good indicators of serpentine. The pyrola-leaved buckwheat (*Eriogonum pyrolaeifolium*) epitomizes the latter group—common and characteristic on serpentine, yet also found on other rock types. This elegant low herb is largely restricted to serpentine in the Wenatchees but in the volcanic Cascades to the south it is common on sterile and unstable pumice and pyroclastics. It is everywhere on the subalpine scree and talus slopes of the grand volcano, Mt. Adams, and even survives on Mt. St. Helens after the 1980 eruption.

Serpentine soil, derived from the ultramafic rock, serpentinite (or its igneous relatives) has a chemical make-up all its own and utterly unlike "normal" soils. It is exceptionally high in magnesium and iron but abnormally low in calcium. It may also have unusually high amounts of the heavy metals nickel, chromium, and cobalt. All three are toxic to most plants but are tolerated or even avidly absorbed by serpentine species. Because of their adverse,



unbalanced elemental composition, serpentines are nutritionally infertile. Recycling of organic matter into nutrients is also inhibited.

Low plant cover and steep, barren slopes add to the misery for plants—exposures are hot and dry, devoid of shade at the surface of the soil. Yet where there's a will there's a way. The evolutionary opportunism of plant life meets the serpentine challenge in at least three ways: 1. Plants may undergo adaptive speciation to become singular, unique endemics to serpentine, e.g., *Douglasia nivalis* ssp. *dentata*. 2. Some species, found both on serpentine and elsewhere, develop distinct races on serpentine, often with differences at the varietal level. *Achillea millefolium* has been shown to have genetically distinct

races that tolerate serpentine, although these are not recognized as a named variety. 3. Species with wide distribution may extend onto serpentine, well beyond their normal geographic range, for example, *Eriogonum pyrolaeifolium*. Of course there are many plants that simply do not take up the challenge and are never found on serpentine.

Despite their tolerance to serpentine, plants from serpentine outcrops seem not to require this demanding substrate when cultivated. However, the use of serpentine gravel in the garden as a rock mulch is not only good for root crown protection but

also is aesthetically pleasing.

Serpentine landscapes in the Wenatchees vary from the extreme of the serpentine barren—a moonscape devoid of plant life, or with only widely spaced individuals of the most tenacious of endemic perennials—to forested sites, where the trees typical of the elevation are present but of lower stature than on other soils. A frequently encountered habitat is the lush seep, an island of wetland surrounded by sere serpentine terrain. Characteristic plants of these wet, boggy places include *Adiantum pedatum* ssp. *calderi*, *Dodecatheon jeffreyi*, *Cirsium edule*, *Angelica canbyi*, *Gentiana calycosa*, *Habenaria dilatata*, and *Ledum glandulosum* var. *columbianum*.

The climate of the Wenatchees is warm to hot in summer and mostly dry. Temperatures near the Columbia River range from 75°-80°F on summer nights to midafternoon highs of 80°-100°F—or even 110°F. In forested valleys at elevations of about 2,000', the low temperatures may be 50°-60°, the highs 70°-90°. In the higher mountains at 5,000-9,000', there may be frost at night and yet daytime temperatures may still reach 80°. But if the wind is blowing, the visitor will want a winter coat. In the midst of winter, temperatures drop to freezing nearly every night and the days are often only slightly warmer.

Precipitation is light and comes mostly as snow. Autumn rains may come early, but in many seasons the ground is so dry in autumn, right up to the time the ground freezes, that no mushrooms appear. Rain may fall after the ground freezes, and some winter rains are mixed with snow. At the Columbia River (650'), snow may accumulate to 1'. Average annual rainfall at Wenatchee (about 800') is 9.7". At 2,000' near Leavenworth, snow covers the ground starting about Thanksgiving and averages 2-4', up to even 6'. At high elevations 10-12' of snow can accumulate. Average annual rainfall at Blewett Pass (elevation 4,071') is 24.9"; at Cle Elum Lake (elevation 2,223'), 35.5". Of course, there are no records available for the highest peaks. Spring rains are scattered, but the ground stays wet as the snow begins to melt in early March. In shady places snow may linger through early April. Summer rains, if any, come as downpours, often without warning.

The early flowers are blooming by mid-March, especially *Ranunculus glaberrimus* (photo, p. 199), the first flower of spring in this region, followed by *Fritillaria pudica* (photo, p. 199), *Claytonia lanceolata*, and *Mertensia*

longiflora. The higher elevations are not easy to reach until May, June, or even July. While Snoqualmie Pass (Interstate 90), Stevens Pass (US 2), and Swauk Pass (US 97) are kept open in winter, the Forest Service roads are blocked by snow until late June or early July. The best flower viewing is in April or May at low elevations, and in June or early July, as soon as the roads open, higher in the mountains.

For years the Wenatchee high country has lured rock gardeners to pay homage to its floral riches. Most plant lovers enter the mountains via three or four principal routes. Our favorite is the country of the upper North Fork of the Teanaway River. A good dirt road takes one all the way to the base of Esmeralda and Teanaway Peaks. A fine trail system beyond the road's end explores Esmeralda Basin, Longs Pass, and Ingalls Lake. Serpentine, sandstone, and metadiabase outcrop grandly in the Teanaway country. Other routes also merit exploration. The upper Cle Elum River Valley has many trails all up to ridge tops. The Icicle Creek drainage out of Leavenworth opens up a vast high country, including the spectacular subalpine Enchantment Lakes terrain of the Stuart Range (photos, pp. 202, 203). For a taste of the eastern end of the Wenatchees, there's a great explorers' road across the high Table Mountain Plateau—it takes off from US Highway 97 at Swauk Pass. Two notable elysian fields *en route* to the city of Wenatchee via this dirt road are Mt. Lilian and Mission Peak. A number of roads from Leavenworth, Chumstick, and Lake Wenatchee put you into headwater basins or up onto Entiat Ridge, which may also be reached from the Columbia River via Entiat. Another eastern portal is Swakane Canyon, running west from the Columbia River just north of Wenatchee. This was a favorite haunt of "Hitchy," C. Leo

Hitchcock, co-author of our flora, *Vascular Plants of the Pacific Northwest*. *Lewisia tweedyi* and *Trifolium thompsonii* are Swakane Canyon plants of note.

And a final word about the Wenatchee Mountains, this floristically rich diverticulum of the Cascade Range. Its prime botanical explorer was J.W. Thompson. This perceptive early collector found a gaggle of rarities, including *Cryptantha thompsonii*, *Chaenactis thompsonii*, *Trifolium thompsonii*, and *Silene seeleyi*. His

ashes have fertilized his favorite stamping ground, the high country above the Teanaway River.

J.W.'s early discoveries are "rediscovered" every year by new generations of naturalists. The Northwest Chapter of ARGS, the Washington Native Plant Society, and the North Cascades Institute schedule regular field trips to these most enchanting mountains. Day hikers or backpackers, all are bewitched by the colorful displays of this rich flora in the grand mountainous setting.

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Map on page 162 by Dick Bartlett

Arthur Kruckeberg's love affair with the Wenatchee Mountains began in 1950 with research on the serpentine flora. It has led over the years to his growing many Wenatchee gems in his four-acre garden in Seattle. Art is well-known as a teacher and lecturer in ecology, evolutionary botany, and native plants.

Coleman Leuthy's interest in plants, especially in field mycology, led to a career as a biology teacher. He gardens at his cabin near Chumstick Mountain, at about 2,000'.

The Lazy Way: Broadcast Sowing

by C. J. Patterson

I have always been a lazy gardener—well, maybe lazy is too strong a word for it. I have always believed that hard work never hurt anyone, yet I confess that I find the most pleasurable time in the garden is the early morning tour of the garden with one's morning cup of tea, before heaving a great sigh and getting out the shovel. The second most pleasurable time is the evening tour, when it's too late to get started on anything else, so you can wander at will, checking the beds and mentally building great Wisley-esque escarpments along the back of the lot. This tendency to enjoy the fruits instead of the labors has always caused me a good deal of guilt, especially when confronted with others' industry. I once visited Norm Singer's and Geoffrey Charlesworth's lovely gardens and was amazed by the vast array of seed pots filling every nook and cranny. Coldframe after coldframe, hundreds and hundreds of seed pots, showing an energy and work ethic that would make bees look like slackers. Incredible! Unthinkable! I was depressed for weeks.

The truth is, growing alpinines from seed is hard work. I bow to no one in

my reverence for that miracle package called a seed; I tingle with the best of them when *Douglasia montana* pops up above the grit with its little brown snood of a seed coat still pinching its cotyledons together. I know that a shipped plant will never match in health and vigor a seedling that I have properly raised myself. But it is still hard work. Add to this the fact that I never seem to have enough time when I come home from work to deal with very many seedlings before it is too dark to see the little dears. April and May, prime time for seedling work, is also peak season at the nursery where I work—there are no long, lazy weekends to devote to seed pans at my house.

Necessity is the mother of invention. It soon became plain that it would be necessary to invent some way out of this problem, or I would have to live to be as old as Methuselah to be able to try as many alpinines as I wanted at the rate of a couple of dozen seed pots a year. A Fortuitous Accident and Sheer Curiosity have led me to a method that has at least partially eased my problem and given me many labor-free hours of pleasure.

When I first started rock gardening, I chose as many of the "easy" plants as I could, as I wanted something relatively tolerant while I learned the ropes. Growing rhododendrons had forced me to be a strict deadheader, and so all of my alpiners were pinched, pruned, and deadheaded to a fare-thee-well. But one summer about six years ago brought a combination of overwork, disastrous weather, and necessary travel, and the garden was left to fend for itself. The next spring revealed the true nature of many of these beginner plants. Without pruning and deadheading, *Alyssum*,



through five years of trial and error (and just a little research) using broadcast seeding.

First I must point out that this method does not eliminate proper preparation of the ground. I may be lazy but I'm not stupid! Nothing can be done with soggy, poorly prepared and poorly maintained beds. All of my trials have been conducted on scree or peat beds, prepared in perfectly normal fashion. However, no special care is taken beyond initial preparation, no additional watering or additional soil modification.

Seed is simply sprinkled over the beds where I want seedlings, as thinly as possible and avoiding established plants. This is done anytime between November and March, whenever there is no snow so I can see where to sprinkle. If too many seedlings come up in one spot, I let Nature do the first thinning for me, and

Viola

then eliminate extras. This allows me to be sure that I am saving the strongest seedlings. Using this method of thinning, I am also able to make an evaluation of the seeding vigor of the species I am trying, i.e., am I introducing an alpine or a weed to my garden? If I suspect the latter, I usually pull up all but a couple of plants and then monitor them closely to see if they will grow up to be so irresistible that I can overlook their procreative proclivity.

I used some care in choosing the plants with which to experiment and finally came up with a set of criteria that I could use to decide whether a particular species was suitable. It must, I reasoned, be sufficiently distinctive as a very young seedling to be avoided during weeding. Its seeds must be received from the exchange in large

Arabis, and *Phlox subulata* flowed over their daintier neighbors that had been safe before, and seedlings threatened to drown the garden. I have no great sweeps of rock work to cover and my alpiners must behave themselves, so these all went off to the compost heap (*Myosotis alpestris* still comes up every year at the foot of the compost fencing). At the same time, though, I noticed that other plants had seeded as well but produced only a few offspring. I decided to allow these to remain to fill in what were now large gaps. These seedlings grew strongly, and by the end of the year, I was able to remove a few of their parents who were showing the strain of age. This turned out to be so convenient that I decided to see if other alpiners would be as amenable. This article is about some of the things I learned

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Aquilegia

enough quantity to be useful. It must have a relatively simple dormancy so I will not forget it is there over the passage of time. And last, but certainly not least, it must, if it shows itself to be too successful, be easily yanked up without disturbing its neighbors too much. The following is a list of some of the plants that have done well under these experimental circumstances:

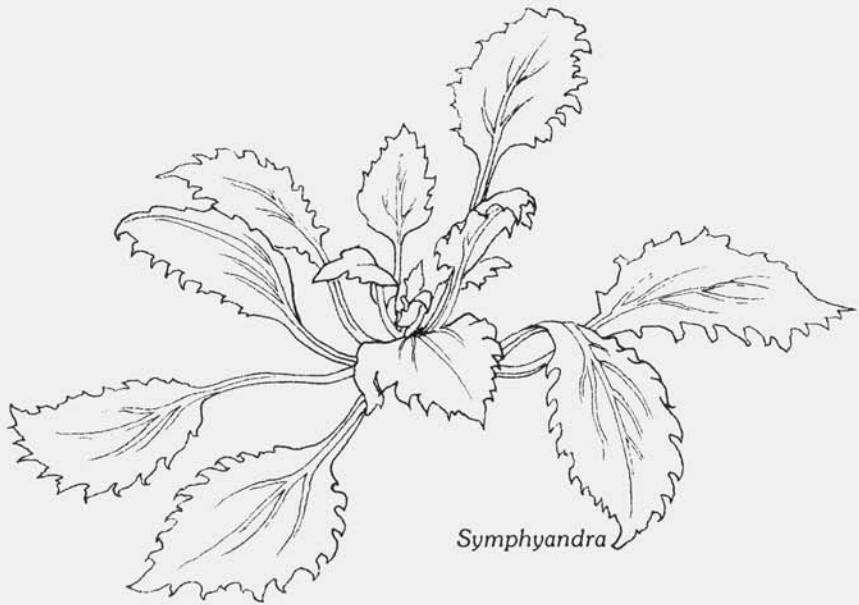
Aquilegias have been very good. No one can mistake their new leaves for anything *but* an aquilegia. If you sow more than one at a time, though, it is a good idea to use separate areas as some species have look-alike babies. I have tried *Aquilegia discolor*, *A. canadensis* 'Nana', *A. chrysantha*, and *A. saximontana*, all successfully. The American alpine species often take two or more years to germinate, so patience is needed. In fact, I am very hopeful that this method will eliminate some of my problems with this group. Because of the erratic germination of this genus I always hated to turn out the whole seed pot to transplant first flush of seedlings, knowing there were still viable seeds left in the pot. Then, because aquilegias are sensitive to root disturbance, I always lost a good portion of the seedlings that were pricked out to leave the seed pot intact.

Semiaquilegia ecalcarata has similar behavior and its babies are very much like those of *A. saximontana* but usually with a flush of purple on the petioles.

This one is very easy, one of my favorites really. Extras are easily whisked away as the baby tap root is very weak. Adults can be quite permanent when happy. I have gone through several generations now in my garden and have weeded out all those with muddy coloration, which has resulted in seedlings that flower a light, clear burgundy color, quite attractive. This species will tolerate a good deal of shade without looking lanky.

Viola brittoniana is a native with dissected leaves that tends to be short-lived after transplanting but is very well behaved when grown *in situ*. Flowers are very large for the scant amount of foliage and it is so dainty that I have had no problems with it even in the kabschia saxifrage beds.

Viola 'Sylvia Hart' is a hybrid violet, with pale, lime-colored leaves with silver variegation in rosettes not much larger than a silver dollar. It is a short-lived perennial, not a biennial. The flowers are relatively large, pale blue with a hint of magenta, and they appear very early in spring before the leaves expand, treating the gardener to the startling sight of violet flowers springing up out of the naked gravel. Once started, this violet can seed itself prodigiously, but as it pulls up easily, it is never a real nuisance. The leaves are too pale to be a really good foil for the silver variegation, so it is not as beautiful as *V. variegata*. I am trying that one



Symphyandra

this year in a separate bed—perhaps it will be as easy.

Hypericum yakushmanum almost does not fit my criteria—it is difficult to pull up in gravel without a forceps, as it is very tiny. But in other aspects it behaves itself nicely. It is a tight, creeping mat, each leaf one-eighth of an inch or so, hugging the ground with grim determination. In a moist, shady situation, it may so far forget itself as to rise a quarter-inch high in its exuberance—but not usually. Three-eighths-inch flowers spangle the vivid green surface for a long season in summer, often continuing right up to frost.

Sedum nevii is an excellent sedum for the shady, moist bed. It forms neat gray-green rosettes of fleshy leaves shaped like stegosaurus back plates. Each leaf may have a faint red streak down the center. A well-grown clump can look amazingly like *Saxifraga*

griesbachii (without the lime pits) from a little distance. Flowers are an unexciting white, plentifully produced. It is a very refined native of the southeastern United States.

Draba hispanica is one of the mid-sized yellow drabas, and I am not sure of the identification. However, I would guess that any from this section would probably do well. As a broadcast seedling, it seems to form a somewhat tighter rosette, and to be a little longer lived than when grown in a seed pot and transplanted.

Iberis jucunda (alias *Aethionema cordifolium*) is a handsome, well-behaved *Iberis*, though not long-lived. Young seedlings are easy to identify—gray-green, rather fleshy leaves that form a tuft before elongating into the candelabra-like form of the adult plant. The good pink flowers are plentiful and are set off beautifully by

the leaves. This plant looks rather straggly in seed, so it is best to choose one for parenthood, and deadhead the rest. Then collect the seed and broadcast it in the desired places.

Silene wherryi, a southern native, is one of my favorites, so I was very pleased to find I could increase its numbers by strategic broadcast sowing. This is a ground-hugging, rosetted plant, with rough, evergreen leaves about 3" long. The summer display of exuberantly pink flowers often completely hides the foliage and is long-lasting. It prefers humus-rich, sandy soil and will flourish among dwarf *Vaccinium* and *Viola pedata*.

Campanula garganica is the most commonly grown of a whole group of similar tufted campanulas that vary in size, flower color, hairiness, and ease of culture. This one has smooth, holly-shaped leaves on thin petioles, drawn together on a tough, non-running, thong-like rootstock. The pale blue, white-eyed flowers are borne on long racemes that splay out flat against the rock work, hugging the contours of the ground. The floral display increases the size of the plant by as much as 10" all around, which might make it a dangerous companion for daintier neighbors, but it makes an excellent cover for dying crocus foliage. Nor does it hamper the crocus spring display, for although it is evergreen, the winter rosettes are rather tight and even a 10-year-old plant may be no more than 6" across in winter. The flower stems are very brittle, which means that when flowering is over, the flower stems and the dead crocus leaves can be pulled gently away, tidying the whole area and deadheading all at once. This campanula is a wonderful crevice plant, as no amount of rain or heaving seems to disturb it.

Symphyandra wanneri is actually a biennial, but it is very reliable about

setting seed. I usually allow only one plant to set seed and then I collect it so I can control the numbers of seedlings. This is a member of the campanula family, forming a furry, deep green rosette the first year and an impressive pyramid of very large, deep purple bells the second year. The rosettes themselves are very ornamental—each leaf is roughly toothed, purple on the underside, and symmetrically arranged. Young seedlings are easy to identify with their distinctive fur and deep purple reverse to the leaf.

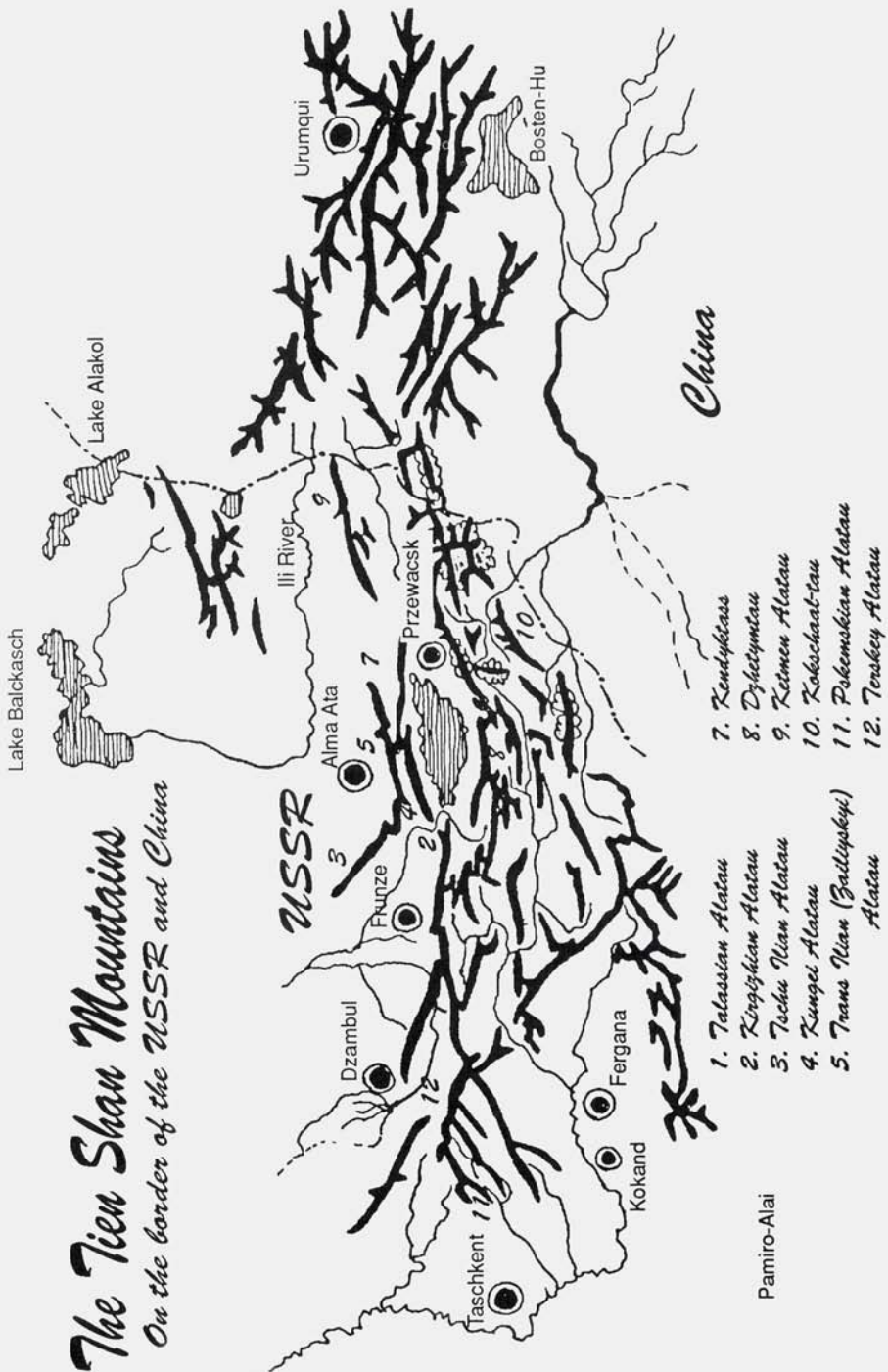
These are just a few of the species I have tried, and certainly others should be tried as well. This year I will broadcast sow about two dozen species to relieve pressure on cold frame space, and also just for fun. Although I started broadcasting sowing just to fill in large spaces in new rock work until initial plantings took over, it has quickly become not only a very useful technique but an end in itself. In spring now I have all the fun of an Easter egg hunt looking for and identifying new seedlings. I also have the smug satisfaction of getting "something for nothing"—almost. Someday I hope to build a section of scree that would be planted *solely* by broadcast sowing. Then all the babies would grow up cheek-by-jowl, just as they do in nature. Perhaps I will even have the courage to sow *Primula minima*, *Gentiana verna*, and *Dianthus alpinus* together as Farrer recommended, creating a mock alpine turf in my own backyard!

Drawings by Rob Proctor

C.J. Patterson sows her seeds near Norwell, Connecticut.

The Tien Shan Mountains

On the border of the USSR and China



Ten Gems of the Tien Shan

by *Josef Halda*

The Tien Shan Mountain system lies in Central Asia between the southern Siberian Mountain system on the north (the Altai and Sayan Mountains) and the Pamiroalpai Mountains on the south (the Turkestan, Seravschan, and Hissar ranges). "Tien Shan" means "mountains of heaven" in Chinese. In the Ujguz national language the name is "Tengri-tagh," which means "Ghost Mountains."

The whole mountain system has been heavily glaciated. It lies between 66° and 100° longitude east and 39°-45° latitude north in China and the Soviet Union. The area is about 2,600 kilometers wide and 600 km wide. The highest peaks are Pik Pobedy (7439m), Pik Dostuk (7003m), and Chan Tengri (6995m). The tree line is between 1,500m and 2,800m. The western part of Tien Shan lies in the Soviet Union—in Kirgizhia, Kazakhstan, Uzbekistan, and Tadzhikistan—and the eastern part lies in China—through the whole province of Sinkiang province to the border of the Mongolian Republic.

On the northeast side, Tien Shan is separated from Dzhungarian Alatau by the Ili River Valley; on the southwestern side are the Alai Mountains; and they are separated on the northwest from the Pamiro-Alai by the Fergana Valley.

The terms Altai, Alai, and Alatau have quite different meanings but have often been confused. The Altai is a big mountain system in southern Siberia, west of Lake Baikal. The Alai is a mountain system between the Tien Shan and the Pamir—ranges in this area include the Pamiro, Alai, Hissar, Zeravschan, and Turkestan ranges. "Alatau" or "Aladag" means "white mountains," "Kara-tau" means "black mountains," "Kyzyl-tau" or "Kyzyl-dag" means "red mountains," etc. None of these terms specify a particular mountain range. Almost all of the higher mountains in Central Asia are called Alatau, because they are white with snow through the whole year.

Usually the Tien Shan Mountains are divided into west, central, and eastern sections. The western Tien Shan includes the Trans Ilian (Zailiyskyi) Alatau (5) up to Alma Ata. Together with the Kendyktass Mountains (7), this range is about 400 km long. The highest peaks are in the central part, with Mt. Talgar at 4,951m, and more than ten big glaciers. On the northwest side are the Tschu Ilian Mountains (3),

which are lower—up to 3,267m. Up Issyk-Kul Lake are Kungei Alatau (meaning “to the south turned motley mountains,” (4)), with the highest peak Tschok-Tal at 4,771m. To the east, behind the Scharin River is the Ketmen range (9), with its eastern half in Chinese territory. To the west lies Kirgizhian Alatau (2), whose highest peak is Pik of Semjon Tienschansky at 4,875m. To the southwest is Talassian Alatau (1), with its several parallel ridges, bordered by the Talass River.

In the Central Tien Shan, the Dzhetymtau ridge (8) borders the Issyk-kul Valley on the south. Its north slopes, more than 2,000m high, are very steep and heavily glaciated. To the south are some high, species-rich ridges, 4500m to 5,100m. The glaciers here are more than 10 km long and very wide. Between the ridges of Kungei Alatau (4) and Dzhetymtau (8) lies Lake Issyk-kul, meaning “hot lake.” more than 700m deep. It is free of ice even in the hardest winters. On the south is the highest ridge of Tien Shan, Kokschaal-tau (10). Mt. Chan Tengri, “the king of ghosts,” is at 6995 m; Pik Pobedy, “Peak of Victory,” is at 7439 m; and Pik Dostuk is at 7003m.

Eastern Tien Shan is in the Sinkiang province of China. The westernmost ranges rise to 6800m, with passes covered with snow throughout the year. The lower ridges to the east (2008-4900m) crumble into the Gobi Desert. These mountains are very dry, almost without water. All the glacial streams end in sandy or stony deserts. The whole Tien Shan is drained only by continental rivers. The Talass River and the Tschu rivers end in the Mujunkum desert, the Syrdarja River in the Aral Sea, the Ili in Lake Balkhasch, and the Tarim River in Lob-noor Lake.

Primula turkestanica (Primulaceae)

Primula turkestanica is a close relative of *P. macrophylla*. It loves cold, wet places around glaciers, alpine streams, and waterfalls, and in the mountain spring when a lot of water is running everywhere, it is basically a water plant. Often only the flower stems and leaf tips remain above the water level for several weeks. The leaves have a rich white farina on both sides and the same coating covers the thick stem that grows 5-20cm high. This bears up to 30 purplish or maroon flowers, 15-20mm in diameter. Older plants have more leaf rosettes and flower stems. Seed capsules are very big—25-35mm long—and contain sometimes more than a hundred big, 1-5mm-long, yellowish seed. *Primula turkestanica* in the garden needs a cool but not shady place, a rich soil, and a lot of water throughout the entire growing season. Seedlings grow quickly in favorable conditions and bloom sometimes the first, but mostly the second year. This photograph (p. 177) was taken up Ala-Archa Gorge (Kirgizhian Alatau, (2)) in Central Tien Shan. “Ala-archa” means “white juniper” in the Kirgizhian language; the subalpine forest is created by two species of junipers, *J. serauschanica* and *J. semiglobosa*. Both have pale gray bark on mighty trunks.

Tulipa kaufmanniana (Liliaceae)

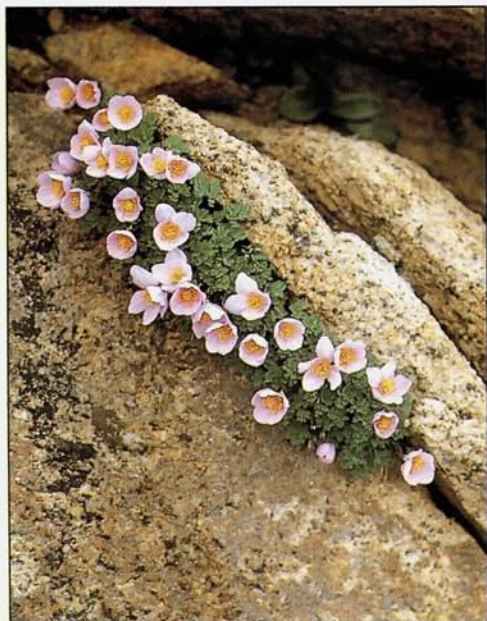
Tulipa kaufmanniana is a well-known species that has been cultivated in gardens for many years. The hybrids are especially lovely garden plants, now usually associated with bedding plant schemes. But in the mountains it is something else: This is typically a plant of alpine meadows and blooms for a long time because it flowers at the edge of the melting snow. The first plants open their buds in June and flow-



Hegemone lilacina on Mt. Tschimbulak, Transilian Alatau (p. 176)

photos by Josef Halda

Paraquilegia microphylla on Mt. Tschimbulak
(p. 181)



Primula turkestanica in Ala-Archa Gorge,
Kirgizhian Alatau (p. 176)



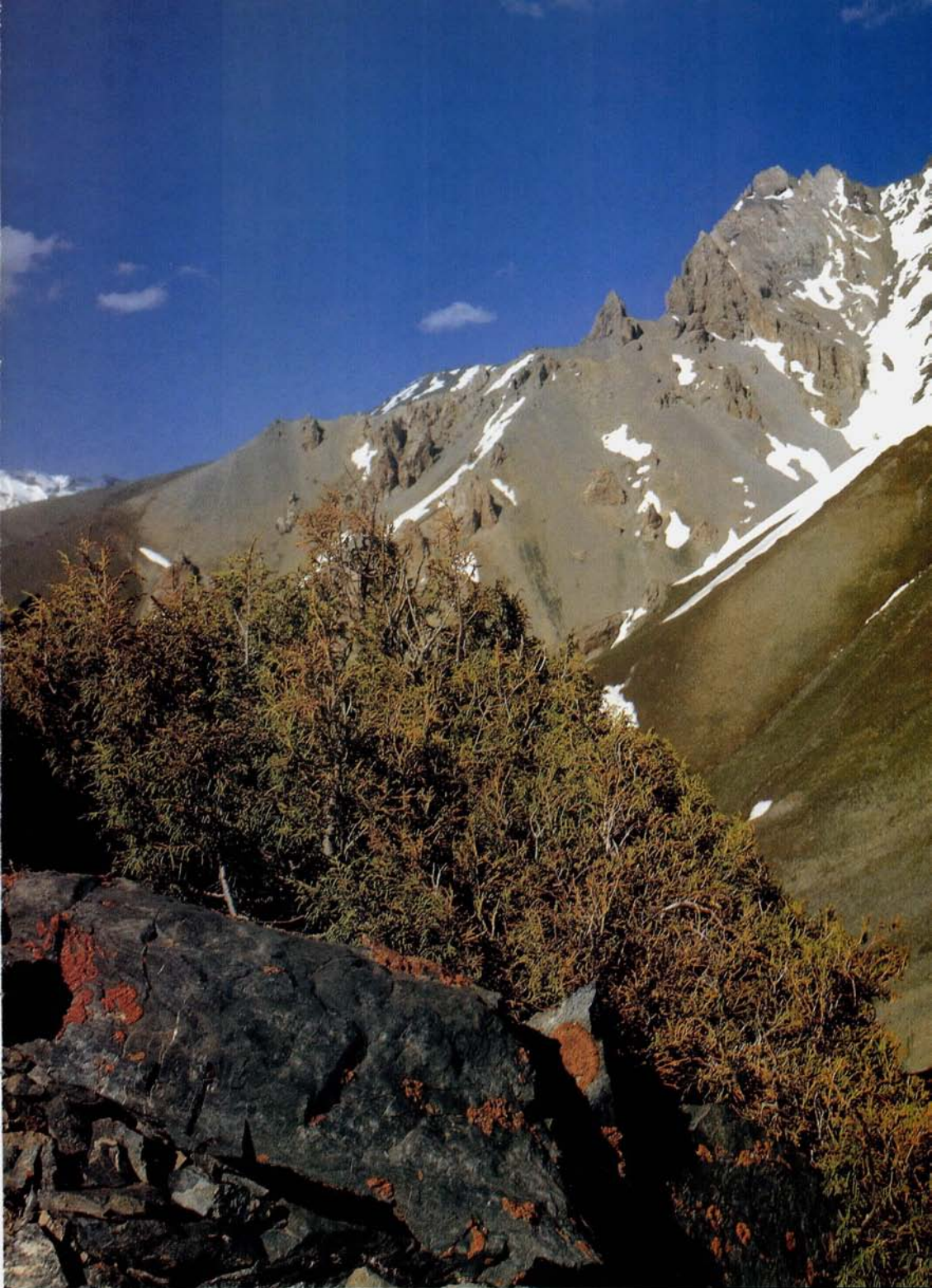


Rhodiola linearifolia on Mt. Tschimbulak (p. 181)

photos by Josef Halda

Atragene (Clematis) sibirica in Ala-Archa Gorge (p. 182)





Juniperus turkestanica on Talassian Alatau, Uzbekistan (p. 181)



Tulipa kaufmanniana in the Bolshoi-Tschingan Mountains (p. 176)

photos by Josef Halda

Allium sp. aff. *oreophilum*
in the Bolshoi-Tschingan Mountains (p. 182)

Dasiphora parviflora 'Zuleika'
Tschimboulak (p. 182)



ers can still be found around snowfields in August. Even before the flowers open, the leaves are very ornamental gray-green with red highlights. The blossoms can be many shades of yellow inside, while the outer surface may be pure red or striped—they are all very attractive. Alpine meadows with tulips may strike people as very exotic, and yet there it is. *Tulipa kaufmanniana* usually grows in deep, heavy clay and the bulb is more than a foot deep. Seeds germinate near the surface, but every year the bulbs plunge deeper and deeper. Big, brown-yellow seeds retain their viability after five or six years with no problems. This photograph (p. 180) was taken in the alpine meadows of Great Tchimgan (Bolshoi Chimgan) in the Pskemskiy range (11) about 100 kilometers from Tashkent in the Western Tien Shan in Uzbekistan.

Hegemone lilacina, past synonym *Trollius lilacinus* (Ranunculaceae)

This is one of my favorite plants in Central Asia—an almost perfect alpine plant with beautiful, dark, shiny green foliage and gorgeous flowers that vary from milky white to pale blue. The many petal-like floral segments give the flower the appearance of being double. The flowers are almost 5cm across on stems up to 15cm tall. *Hegemone lilacina* grows from the southern Siberian mountains through the whole of the Tien Shan. It tends to grow only in very cold conditions around alpine streams or between boulders where snow accumulates, and sometimes on wet, north-facing cliffs together with *Dryadante tetrandra*, *Paraquilegia uniflora*, or *Cortusa pekinensis* and many others. In the garden it requires a cooler exposure with good drainage to thrive. Propagation is accomplished by divisions or from fresh seeds. The photograph (p. 177) was taken on the north slope of Mt. Tschimboulak above Alma Ata in the Trans-Iliian Alatau of the central Tien Shan in the Soviet Republic of Kazakhstan (5).

Juniperus turkestanica (Cupressaceae)

One of the most ornamental junipers, which creates a very low carpet in the alpine zone or a bizarre, bonsai-like shrub at lower elevations, has dark green, tiny, scale-like, imbricate needles. Female flowers are tiny and purplish; male ones are tiny, yellowish cones. In late summer plants are covered with deep blue fruits, which are edible for both people and animals. Montane and subalpine forest is created by two other junipers, *J. seravschanica* and *J. semiglobosa*. Both are smaller trees and represent major competition for the dwarf *J. turkestanica*. This is the reason why *J. turkestanica* inhabits only steep, vertical cliffs and boulders at lower elevations, where it creates the most ornamental mountain shrub in pure Japanese style. This species is not yet too common in cultivation, although seeds germinate without difficulty and seedlings grow easily in conditions that are not too wet. The photograph (p. 179) was taken in the Aksu-Djabagly reservation of the Talassian Alatau about 200 km from Tschimkent in the Western Tien Shan in Uzbekistan (1).

Paraquilegia microphylla (Ranunculaceae)

This frail beauty grows from the southern Siberian mountains through all the mountains of Central Asia, the Himalayas, and southwestern China, where it

inhabits cliffs, boulders, or high alpine grasslands and scree up to 5,000m. It grows mostly in narrow, sometimes almost microscopic crevices, never in deeper soil. This is one reason why it is very sensitive in gardens. Seedlings grow fairly well in little pots, but after planting in the rock garden most die. Their root system is not large or well developed and the roots need lots of air and very good drainage. The best place for them in the rock garden is a northeast- or northwest-facing, narrow crevice with a not-too-heavy soil mixture. Fresh seeds germinate quickly and seedlings may bloom the second or third year. Flowers are 2-4cm across and vary in color from pure white to deep pink or lilac. Petal-like segments are held on the developing fruits for a long time. The photograph (p. 177) was taken on the north-facing alpine cliffs of Mt. Tschimboulak above Alma Ata in the Trans-Iliian Alatau of the central Tien Shan in Kazakhstan (5).

Rhodiola linearifolia (Crassulaceae)

This plant is probably the most beautiful species in the whole genus *Rhodiola*—and it is very easy in cultivation. Seedlings grow without problems. It is unbelievable that it is still rare in gardens. Plants in the mountains grow on rocks, where they create small cushions, or in stony fields, or between boulders, where they create much bigger clusters, sometimes 30cm or more high and a meter wide. They are found in the subalpine and alpine zones, sometimes around streams, on avalanche tracks, or in empty areas left after fire at much lower elevations. Stems are thick and densely covered with gray-green, lanceolate, slightly dentate leaves. Flowers are 5-8mm across and vary in color from orange-yellow to deep red-orange, competing in a big way with the other poor relatives of this genus. A mountain slope full of blooming *R. linearifolia* is an unforgettable experience. The only similar display I have seen was a meadow full of blooming *Asclepias tuberosa* I saw five years ago in Minnesota. The photograph (p. 178) was taken on the west slope of Mt. Tschimboulak above Alma Ata (Trans-Iliian Alatau of the Central Tien Shan in Kazakhstan, (5)).

Dasiphora parvifolia 'Zuleika' (Rosaceae)

This plant is a shrubby potentilla that creates cushions or carpets—absolutely dwarf in exposed places or 6-8cm high in wetter places. It grows near streams, big boulders, or north-facing, wet cliffs. Tiny, vivid green leaves are semi-deciduous, with involucrate margins. The yellow flowers are mostly single and 15-25mm across, with slightly purplish flower-buds. The plant in the photograph (p. 180) is the original wild plant of our cultivar 'Zuleika', which grows near the top of Mt. Tschimboulak (5). The first cuttings were taken in August of 1989. They rooted after one month and last year five plants were in full bloom throughout the whole summer in our rock garden in Czechoslovakia. It seems that this plant should be a good new inhabitant of rock gardens, with its ugly double flowers still considered acceptable.

Allium species affinity *oreophilum* (Liliaceae)

This is an almost stemless species with long, narrow, procumbent, glaucous leaves and richly colored flower heads, composed of bright purple flowers with dark

throats about 10-15mm across. This allium is a typical scree plant, growing on the exposed south slopes of the western Tien Shan. Probably it is an unknown species, reminiscent of *A. oreophilum* in its flower structure, but with quite a different appearance. I have been growing this plant for more than 20 years and we have given many seedlings to our friends and all are much the same—the same color and shape of flower, the same stemless habit. Propagation is very easy by division or from fresh seeds, and seedlings bloom the second or third year. In the garden plants bloom all of June and July. They need a warm, sunny place, a soil that is not too heavy, lots of drainage, and not too wet a winter. The photograph (p. 180) was taken on the south slopes of Mt. Bolshoi Tschingan (West Tien Shan, Uzbekistan, 11).

Atragene sibirica (Ranunculaceae)

This is a white relative of the blue flowered European *A. alpina*, basically the same size and with similar leaves and flowers. In nature, this plant climbs on various shrubs and trees, developing long, thick branches sometimes to 5m, useable for making ropes or fences. It grows mostly in light, open montane forest but is not rare at timberline on various shrubs of *Salix*, *Rosa*, *Lonicera*, *Ribes*, etc. The fruit is very ornamental, too—white, cotton-like seed heads often survive through the entire winter. Seeds germinate easily and seedlings bloom the second or third year. *Atragene sibirica* has a widespread distribution through the whole of Siberia, Tien Shan, and Pamiroalai. It blooms from mid-May at lower elevations to August in the subalpine dwarf forest. In the garden it does not like too hot or too dry a place and prefers rich soil—any kind of compost. It is easy to propagate from seed or cuttings early in summer. The photograph (p. 178) was taken in Ala Archa Gorge (Kirgizhian Alatau, central Tien Shan, (2)).

Saxifraga albertii (Saxifragaceae)

Saxifraga albertii is a cushion species that grows on vertical cliffs, mostly under roof-like hanging rocks in tiny crevices or narrow terraces, almost without soil, in very similar conditions as dionysias. Its silver-gray rosettes are extremely tiny—3-5mm across—and are composed of scale-like, imbricate leaves. The flowers, carried on stems 1-5cm high, are white (in the Mt. Tschingan populations) or pink (Mt. Dzhabagly populations). Some plants have single flowers but mostly plants have two to four flowers per stem. This species does not grow at very high elevations—it inhabits cliffs from the foothills to the low subalpine level. In nature its growing seasons are spring and fall; in gardens plants are very sensitive about moisture through the summer and need much the same maintenance as dry-loving dionysias. Propagation is by cuttings (of interesting color forms) or from seeds. The home of *S. albertii* is the western Tien Shan—this is only one of many known species of the Section Porophyllum in Central Asia that are not often grown yet in gardens.

Josef Halda is a native of Czechoslovakia where he developed an extensive garden and large collection of unusual plants. He has travelled throughout eastern Europe and Asia in search of choice, new rock garden plants and continues to introduce them as seed.



Primula wigramiana

Difficult Primulas— or Difficult People?

by Herbert Dickson

From my experience growing the uncommon primulas I have concluded that there is no such thing as a difficult plant. There are only difficult people trying to grow plants under impossible conditions. To grow a plant native to high mountains (where there is deep snow all winter and summers are cool and moist) at sea level, with little or no winter snow, lots of winter rain, extreme and sudden changes in temperature, and hot, sometimes dry, summers—that is difficult.

Where you live and garden will determine which plants you can grow easily. To some extent you can alter your local conditions to control temperature, light, humidity, and the growing medium. But complete control of conditions is very expensive and in some situations impossible.

For a plant established in cultivation information is available as to its requirements. For a newly introduced species or rare plant, you need to find out where it grows in the wild and under what conditions. Modern science, with the development of systemic insecticides and fungicides, electric heat complete with thermostats, high inten-

sity grow lights, evaporative cooling pads, mist systems, etc., has made it easy to grow many so-called difficult plants once you know the conditions you are trying to replicate.

Only a few of these aids are available to those of you who grow your plants in the ground in your garden. For the past 15 years I have been unable to get on my knees to weed and as a result I now grow all my primulas in pots, so I can pick up the pot to weed it. Many primula species must be grown in the ground to be hardy in the winter here in the Pacific Northwest. Of this type, I grow a few in pots in my cool greenhouse where they are heated just enough to keep them from freezing.

I have grown many of the so-called difficult species from seed to flower. The first year, seedling to flower, is easy with normal seedling care. It is after flowering that these primulas take special conditions and care, which I seldom give. *Primula caudoriana* did fine for a couple of years, then died without producing seed. *Primula wigramiana* and *P. wattii* died after flowering once. All of these species have beautiful belled flowers with a



Primula deorum

delightful perfume. *Primula reidii* seems to be well established in cultivation and seed is available. I plant some every year but have not yet learned what it really likes. Sometimes it does better out in the weather and sometimes better in my cool greenhouse, so I grow some in both places. Sometimes the plants do well in both situations. *Primula reidii* goes dormant in the winter. I have to keep the moss and liverwort on the surface of the pot thinned so the new growth can push through in the spring. Its heavenly smell is worth all the trouble it takes to grow it.

The petiolaris primulas are reportedly hard to grow. They have exacting requirements, but if you supply those requirements they grow easily. Where they grow in nature they are under snow in winter, and when the snow melts they are in running ice water. That is when they bloom—with no

overhead water. After blooming they start a growth period during the two or three month monsoon season of almost continual rain. Following that there is a short dry period and then they are under snow again for the winter. Here in the Pacific Northwest it is impossible to duplicate those conditions.

Experience has taught that low light, dry and cool conditions never much below freezing can substitute for a snow cover. I keep these plants in my cool greenhouse with very little water (never overhead) in winter,

followed by hand water around the edge of each plant almost daily during the flowering period. After flowering, they get a thorough watering overhead everyday, sometimes twice on hot days, until fall when I gradually dry them down to an occasional watering around the edge through the winter.

Back in the 1950s I had eight different species of the petiolaris primroses growing in 6" clay pots in a little alpine house with a split bamboo shade hung up to protect them from the sun. One hot day while I was at work, something knocked the shade down. When I got home the sunny side of each plant was cooked and shriveled. Within three days every plant was dead. There was no other American source for plants and seed was not available. Not until in the 1970s did I convince Jack Drake to ship by airmail one fresh-picked seed pod of *P. edgeworthii* and one of *P.*

calderiana. The seeds germinated with mist and grew to bloom. *Primula calderiana* had a bad odor so I did not keep those plants very long.

In a book published at that time, it was said that there was a report of a white form of *P. edgeworthii*, but the author had never seen it. I grew about 50 plants from that one pod of seed and every one was a beautiful, pure white.

I lost some unusual primulas to root rot every summer until I found I could use a systemic fungicide to control this disease. With this simple preventative, the primulas now grow and increase like weeds.

Once I had just one plant of yellow *P. aureata*. It was in perfect flower and won me a trophy at the show. It looked a little sick when I brought it home. Three days later it was completely dead. Every time I have entered a petiolaris plant in full flower in a primrose show, it has died afterwards.

Primula auricula is hardy here, needs lime, and will take our outside winter conditions with a few exceptions. *Primula allionii* needs alpine house conditions in a gritty, lime soil with little water—none on the foliage.

Primula minima likes a peaty soil with no lime. Each spring as it starts to grow, add soil around the stems to just under the leaves. New roots will develop in the new soil, making division easy. I use a slow-release fertilizer that has trace elements added. I have grown *P. deorum* and *P. glutinosa* to flower



Primula secundiflora

but have not kept them to flower a second year. Probably I kept them too dry in summer and too wet in winter.

Primula clusiana, *P. glaucescens*, *P. spectabilis* and *P. wulfeniana* (Section *Arthritica*) all require an exceptional amount of lime to flower well. I do not believe you can give them too much lime. *Primula wulfeniana* is my favorite of this group because of its neat, compact foliage.

The American species that grow at streamside or where they never get dry are easy. The ones that depend on snow melt to grow and flower, and then dry up for the long, hot summer, I cannot grow. *Primula angustifolia*, from above timberline in the Rockies, will survive in pots. Its winter resting bud goes about 3" down in the pot.

Primula suffrutescens from the high Sierra Nevada I grew in a large pot. The plant was wedged between two

large granite rocks in a sand and pumice mixture with a little peat. Water drained through in a hurry. The primula grew over the pot and out across the raised bed of my cool house. It bloomed well, although it was not as compact and beautiful as it is in the mountains. This primula roots easily from cuttings. It requires very sharp drainage and frequent watering and appreciates a rock to grow against or for the roots to grow under.

Many of the plants in the farinose section are basically easy to grow but need dividing and repotting in late fall. Our winter wet will rot a crowded plant from the center out.

The candelabras are considered easy plants if you have a constant supply of water. They are not so easy to keep over for the second year in pots. The critical time for candelabras is after they flower. They have used up their storage roots and are starting to grow a new set for the next year. If they get even a little dry they do not develop new roots. When fall comes, they go dormant with nothing to carry them through the winter.

Given favorable conditions the candelabras and the sikkimensis section reseed themselves to the point of almost being weeds. *Primula florindae* is my favorite of this group because it is fragrant and blooms over a long period

Drawings by Lisa Moran.

Herbert Dickson inherited his interest in gardening from his grandfather who was a commercial vegetable gardener. Herb has been interested in primulas since the late 1940s and has operated a commercial nursery since 1955.

Herb started Chehalis Rare Plant Nursery (2568 Jackson Highway, Chehalis, WA 98532) in 1969 and specializes in primulas. He still grows vegetables and fruit, and says he wishes he had started growing flowers 30 years sooner.

of time in the middle of summer. I always grow some *Primula secundiflora*, not because of its beauty or fragrance, but because of its interesting second flower head that comes up 3-4" above the first flowers as they fade.

For success with primulas, or for that matter any plant, you must learn to read the sign language of the plant. It will talk to you and tell you if it is happy or sick, and even tell you why it is sick. Then you must do something about it in time or it will die.

You also have to have a feel for handling plants the way they like it. One fall I had a boy working for me. I showed him how to divide and repot. He was doing it apparently the same way I did it, but every plant he handled died and all I repotted lived. They were all in the same growing medium and exposed to the same conditions.

There are no difficult plants or they would not be growing wild. Each plant has a set of requirements. If you can meet those requirements where you garden, the plants are easy. If not, they are impossible. We, being human, keep trying the impossible. Once in a while someone succeeds. Do not take my word or experience as the answer to anything because what works for me may not work for you, just as your methods might cause failures for me. Good luck and have fun trying!



Why are Dwarf Irises so Rare?

by Robert Pries

The American Iris Society recognizes miniature dwarf bearded iris (MDBs) as being under 20 cm (8") tall, not to be confused with Standard Dwarf Bearded Iris (SDBs), which are up to 40 cm tall. The tiny miniature dwarf bearded are perfect rock garden or trough plants with all the character and charm of rare orchids. Yet despite the existence of over a dozen species and hundreds of varieties, these plants are seldom encountered.

Probably many rock gardeners see these plants as tiny replicas of tall bearded iris and think there is no challenge in growing them. Ironically, the average iris grower finds them too difficult and demanding. Culture varies somewhat for each species. The most popular and readily available species is *Iris pumila*. Although it is a long-lived perennial, some authors have suggested it is almost an annual when grown in faulty conditions. *Iris pumila* can tolerate 100°F weather, but if this is sustained it prefers to go dormant. Water and fertilizer given during hot, humid conditions will almost certainly cause rot. *Iris pumila* must have well-drained conditions—a scree soil will suit

it admirably. It requires a period of freezing weather to initiate bloom. Probably most failures occur from conditions that are too lush.

Flowering begins at the end of the crocus season and provides a nice complement to daffodils. Many of the hybrids bloom with the creeping phlox, so by growing these as well, one can expect easily a month of bloom.

Although best planted shortly after flowering, rhizomes ordered through the mail are usually received in midsummer. At this time they are totally dormant and easily shipped bareroot. When placed in warm soil, they quickly start to form new roots. Establishment can be tricky, for too much moisture will cause rot. Better to err on the dry side. The first winter often brings frost heaving, unless a stone is placed on top of the rhizome. After the second season the roots will be developed enough to prevent heaving. In the Midwest, plants perform best if they remain undisturbed for several years.

Garden centers rarely offer true *Iris pumila*—usually the plants offered under this name are the larger, coarser SDBs. An easy way to distinguish these

imposters is to look for a stalk under the flower. *Iris pumila* has a long perianth tube, but the ovary and subsequent seed pod are borne directly on the rhizome. The larger imposters will have stems an inch to several inches long.

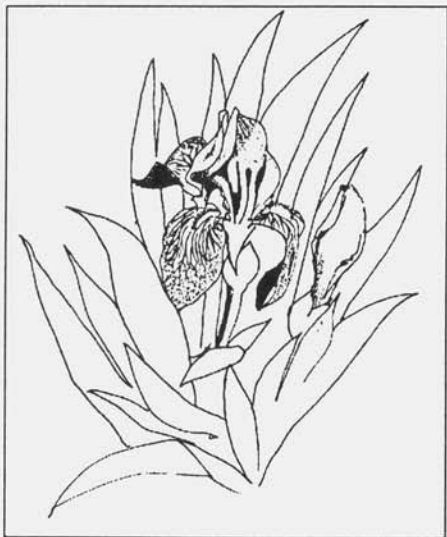
Iris lutescens has naturally occurring forms in the mountains of southern France that are under 20cm and at one time were called *Iris chamaeiris*. These have a flower stalk and a rather limited range of colors in yellows and browns. However, this iris will bloom without as much winter cold. Both *I. pumila* and *I. chamaeiris* will grow successfully as far north as Canada.

For many years *I. chamaeiris* was the chief iris masquerading as *I. pumila*. Then in the 1930s Robert Schreiner received seeds of the true *I. pumila* from the University of Cluj in Rumania. By 1950 a new generation of seedlings from the true *I. pumila* stimulated so much interest that a Dwarf Iris Society was formed. In the next forty years approximately 1,000 varieties were named and registered. During the 1960s and 1970s, the golden years of dwarf iris hybridization and selection, corresponding enthusiasts from

Germany, Hungary, Czechoslovakia, Rumania, and the USSR selected clones with exciting variations within the natural populations of *I. pumila* and shared them with their American counterparts. Unfortunately, the loss of many of these plantsmen brought a decline in the cultivation of dwarf iris. Today only half the recorded selections are still being grown and there are only a handful of comprehensive collections in the USA. In its native lands, *Iris pumila* is now becoming threatened and no indigenous enthusiasts seem to be at hand.

Iris attica and *I. pseudopumila* are two more species offering promise for gardeners with mild winters. Because they are diploid, the range of variation in flower color is less than in the tetraploid *Iris pumila*. These two diploid species have been theorized to be the parents of *I. pumila*. *Iris attica* is very tiny, usually under 4" tall, while *I. pseudopumila* is often as large as 9".

Another group of dwarf species is distinguished by sharply keeled bracts subtending the flower buds. Each is a favorite of mine for their unique personalities, but only one is easy to grow. The easiest and also the tallest, between 4-12", is *I. reichenbachii*, with forms given synonyms of *I. balkana*, *I. bosniaca*, and *I. skorpilii*. With tucked falls and domed standards, it has been described as having the appearance of a bishop's miter. *Iris suaveolens* is about half the size of *I. reichenbachii* and starts to bloom earlier. It may continue to bloom off and on all year but the quality of flowers is poor during warm weather. Its appearance is very similar to *I. reichenbachii*, with pointed standards. The two species are generally distinguished by the perianth tube, that of *I. suaveolens* arising almost directly from the rhizome, as in *I. pumila*. Late flowers may violate this rule by producing a stalk an inch or



more in length. *Iris suaveolens* is better known under the name *I. mellita*, both specific epithets referring to its sweet scent. Some forms have a hairline of red around the leaves and have carried the name *I. rubromarginata*. *Iris suaveolens* requires a well-drained rich soil in a sunny location. It seems to profit from frequent division and is notorious for suddenly dying out. Perhaps the most enticing species has been *I. timofejewii* (photo, p. 221). Sadly, even scree conditions were not enough to maintain it here. Perhaps it would grow in a bulb frame with onocyclus and junio iris where summer moisture and winter cold might be moderated. Its architectural purple flowers rise about 8" over the sickle-shaped leaves. Unfortunately, I know of no source for plants in the USA but occasionally seed may be donated from its native Daghestan.

There are many other dwarf species including sand irises and aril irises. Some have been used in hybridizing, producing miniature dwarf bearded of unusual form such as 'Buddha Song' and 'First Call' from *I. suaveolens*, and 'Tampa', 'Butterball', and 'Promise' from *I. flavissima*.

Botanists often harbor prejudices against hybrids since it is complicated to identify them, but it would be a mistake to ignore the wonderful creations in dwarf iris that have come about both naturally and by the hand of man. Perhaps one of the reasons the MDBs have been overlooked is that gardeners have met first with an inferior plant, one that doesn't do justice to the group. My first *I. pumila* was a washed-out yellow that didn't show up in the garden. It gave no indication of the vibrant yellows, purples, whites, and lavenders available in the pure species, nor the greens, oranges, browns, and burgundies arising from the hybrids.



One of the oldest named varieties was 'Atroviolacea', a natural hybrid collected by Todaro in 1856. This had been dispersed across the USA as cemetery iris and can still be found on old grave sites. Clones such as 'Atroviolacea', 'Coerulea', and 'Azurea' are probably crosses of *I. lutescens* and *I. pumila* and are sterile. Recent crosses with tall bearded hybrids have produced plants that are amphidiploid and fertile among themselves. The short stature of *I. pumila* seems to be a dominant genetic trait, and many fine irises 20-26 cm tall are being produced. Although crosses are easy, less work has been done with pure pumilas, which may produce a blooming plant only 5 cm tall. Since *I. pumila* produces many flowers from a single fan of leaves, the effect can be a cushion of flowers. Other varieties space their rhizomes in such a way that each flower is noticed individually. Since the variations are considerable, one cross may give many clones, each different in appearance.

Miniature dwarf bearded irises can fulfill several roles in the rock garden. In



a trough garden only the tiniest would be desired. 'Bink', a little purple-flowered iris, rarely exceeds 2" in height when in bloom, and although the leaves elongate after blooming, it still would probably not top 4". Similarly, 'Blue Capers' is a small, light lavender. A good, clear yellow is 'Carpathia'; the brown spot pattern on the falls surrounded by bright yellow and topped by yellow standards is an attention grabber. 'Baby Tiger' is a tiny plant which, along with the larger 'Vari

Bright', also displays this pattern (photo, p. 221). 'Knick Knack', a vigorous plant bearing white flowers with lavender markings, can hold its own against *Phlox subulata* but often reaches 10". Some other, older varieties that might be easily found are the red-lavender 'Red Pixie', the white-and-purple-marked 'Dunlin', and the yellow-and-white 'Cupcake' (photo, p. 221). These enjoy growing out of mats of creeping veronica or thyme.

Growing seed of the dwarf irises is easy with winter stratification. Seedlings may bloom within two years. Obviously the hobby gardener can become a noted plant breeder in this field with little effort.

In their native habitats, these dwarf irises are often found growing with other popular rock garden plants. For example, I'm told that in Hungary *Iris pumila* grows with sedums, sempervivums, and *Pulsatilla*. Surely with the selection of appropriate varieties, these plants may enhance even the most discriminating rock gardener's bed.

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The Dwarf Iris Society, with Walter Welch. 1968. *The World of Little Irises*. Elsie Zvercher: Portland, Indiana.

Sources

A list of specialists in miniature dwarf bearded irises is available from the Dwarf Iris Society, Lynda Miller, Treasurer, 3167 E. US 224, Ossian, IN 46777. The newsletter is available for \$3.50.

Drawings by Panayoti Kelaidis

Bob Pries is a rock gardener in High Ridge, Missouri. He has a dwarf iris display garden including more than 500 selections. He is a director of the Dwarf Iris Society and the Species Iris Group of North America. His garden is open to members by appointment during April and the beginning of May.

Growing Wenatchee Wildflowers

by Stephen Doonan

One and a half hours east of Seattle by super-freeway exists a floristically varied range of mountains, the Wenatchees. The climate in this range is predominately continental, that is, warm in summer and cold in winter. The vegetation is totally different from the Puget Sound flora a mere ninety miles away. Rainfall there on the lee side of the Cascade Mountains is considerably less. Low moisture and relative humidity greatly affect the density and stature of plants: unlike the coastal rain forests, the woods of the Wenatchees are open and one can easily walk through them. Because of the distinct climate, many of the unique and desirable plants of these mountains are a challenge to grow for alpine enthusiasts both here in the Pacific Northwest and around the world.

The dry, treeless eastern hills near the Columbia River are extensions of the greater Wenatchee Mountains. They are made up mostly of lava flows. Evidence of prehistoric flora remains as petrified wood and leaf fossils. Such notable trees as the ginkgo and metasequoia were found here as fossils before the discovery of living relicts in China.

On one hill in this rain shadow area, Whiskey Dick Mountain, grows a barrel cactus. The body of *Pediocactus simpsonii* is less than 6" tall by 3" wide (photo, p. 223). The balls occur singly or as clumps and its intense cerise flower petals are coupled with bright yellow stamens. *Eriogonum thymoides* is a picturesque, shrubby little plant of this area, its tiny leaves curled under at the edges in an adaptation to conserve moisture (photo, p. 199). The short flower stems bear clusters of small, bright red to yellow flowers. The apparent age of the plants is a testament to hardiness—this area is not only dry, but extremely hot in the summer and may have winter temperatures of -25°F with strong winds at times. *Eriogonum thymoides* (photo, p. 199) has survived for many years in a pot with sharp drainage for us, but it never equals the wild specimens. Another eriogonum of intense beauty is *E. douglasii*, developing flower red buds in the early spring that open to a bright yellow (photo, p. 197). The contrasting color between the developing buds and the open flowers on these small shrubs makes this one of the showiest members of the genus.

In this same area, large sagebrush (*Artemisia tridentata*) forms a continuous low cover intermixed with *Phlox longifolia* (photo, p. 198), *Fritillaria pudica*, the lovely desert *Viola trineruvata* (photo, p. 198), many showy composites, and bunch grasses. This combination of plants continues from the Columbia River westward towards the high peaks of the Wenatchees. *Fritillaria pudica* (photo, p. 199) occurs nearly to timberline in open fields. It grows 2-3" high with two leaves at the ground and one on the flowering stem. As tempting as this plant is to the gardener, it is best left to the bulb specialist. Its culture is complex. A large bulb is necessary to produce flowers, but the bulb tends to break down into many smaller bulblets and then doesn't bloom. The flower consists of a golden, five-petaled, nodding bell that turns deep orange-red as it ages. The large maturing seed pod stands erect long after all traces of the leaves have disappeared.

During the short spring interlude another bulb make its colorful appearance. *Calochortus lyallii* has an odd, three-petaled flower with a complex of hairs on the inside and outside surfaces of the petals. It is quite successful in what appears to be barren terrain. Also found in these dry places is *Penstemon gairdneri*, a rather weak-growing plant, whose large, pink flowers with hairs in the throat make it the showiest penstemon (photo, p. 198). Surprisingly, it is showing promise as a garden plant, where others of its genus resent our moist coastal climate.

From these very earliest plants of low elevation the flowering season extends with the receding winter snows to the plants of higher elevations as the summer progresses. Growing on exposed rocky spines of the low foothills where there is a small accumulation of loess soil, *Ranunculus*

glaberrimus is one of the first to show color (photo, p. 199). This elfin buttercup will capture your fancy, its intense, bright yellow flowers of exceptional size compared to the overall plant, but successful garden or pot culture is difficult. *Ranunculus glaberrimus* produces lots of seed, but chipmunks are very efficient collectors and few seeds are found. The plants completely wither away after flowering and no trace of their existence is evident. The shallow soil in which they grow becomes quite dry, and only infrequent summer thunderstorms temporarily drench the dormant crowns. These environmental conditions are hard to imitate in pot culture or rock gardens experiencing different climatic cycles.

The terrain of the foothills breaks into deep canyons, often with clear running streams, steep hillsides with varying amounts of soil, and rocky outcrops. On sites with better soil, the predominate conifer at the lower elevations is *Pinus ponderosa*, a stately tree with a patterned, yellow-brown bark that may reach over 100'. The cones of previous years litter the ground along with fallen needles and form a carpet of unique design. The resinous aroma of this dry forest sets an adventurous mood for a flower hunt.

One of the most beautiful flowers found only in the geographically small area of the Wenatchees is the famous *Lewisia tweedyi* (photos, pp. 200, 201). We have made many observations of this plant over the years. Since we are so close, a trip can happen on a spontaneous whim, and we often have a whim to see *Lewisia tweedyi*. It first flowers at lower elevation sites along with the buttercup. On rocky outcrops with a scattering of ponderosas and Douglas firs bloom will commence in early May. Large plants of *Lewisia tweedyi* with dozens of flowers grow on the road cuts, the motorist passing

apparently oblivious to the roadside floral display. Along Highway 97 as it follows the canyons of Tronsen and Peshastin Creeks into the mountains, many large plants yearly produce their colorful show. The rock here consists of uplifted strata bearing gold that has attracted miners for over 100 years. The lower canyons on the east side warm up early and *Lewisia tweedyi* will have gone to seed and withered to a less stately appearance here while at its highest elevation plants are just beginning to flower. *Lewisia tweedyi* is basically an evergreen species, but in drier years the leaves can completely disappear, leaving only dormant buds that re-emerge when fall rains occur.

The culture of *Lewisia tweedyi* has tested the skills of the best alpine gardeners. How can a plant that can stand -25°F in the winter, and over 100° in the summer, be so temperamental in captivity? In nature the plant is attacked by a rust that disfigures the leaves but seldom does serious damage. In rare years when the weather pattern in the Wenatchees is a reverse flow, with clouds approaching the mountains from the east, bringing spring rain for an extended period of time, wild plants may suffer rot to the leaves and crown. For garden culture, use a well-aerated soil mixture. Keep the main stem under the whorl of leaves free of soil for more than an inch down and water moderately. The plant must not be allowed to dry out completely, since this will weaken it and make basal rot more likely. A raised bed facing east, preferably under a canopy of evergreens to shed excess rains, is ideal. In pot culture, the plants can be placed under cover and protected from cold below 20°F for best results.

There are three other lewisias in the Wenatchees: *L. triphylla* is a small, insignificant species found in heavier soils that are wet in the early spring and

considerably drier in the summer. *Lewisia columbiana* occurs along ridge tops in decaying rock soils among dwarfed trees; the flowers are white with a pink stripe through the middle. *Lewisia columbiana* is totally resistant to rot if the soil is well-drained and is a useful hybrid parent because of this characteristic. Its small size and longevity make it a good prospect for troughs. The fourth species, *L. rediviva*, is wide-ranging in the western US. It occurs in the Wenatchees from rocky outcrops near the Columbia River to over 5,000' on Entiat Ridge. Distinct color races occur in scattered colonies, the pink flowers very pale in one colony and an intense pink 50 miles away. Seed grown from these different sources comes true. On Entiat Ridge a large colony of broad-petaled, white *Lewisia rediviva* grew in a sunny, open space, while nearby under the dappled shade of ponderosa pine and Douglas fir *Lewisia tweedyi* covered the ground in a nearly complete mat. Unfortunately, a bulldozer fire break made to stop a large fire destroyed this colony, at least temporarily.

Lewisia rediviva flowers two months later at higher elevations than by the Columbia River at Vantage. It revives from its summer dormancy in the first fall rains. The foliage consists of tufts of fleshy leaves that photosynthesize throughout the cold winter months. By the time the large rose-pink flowers open in the spring, the foliage has nearly disappeared. Garden culture requires a soil with sharp drainage and protection from all summer rains or irrigation while the thick, fleshy root is dormant. If we mimic nature's weather pattern, this lewisia will indeed revive come autumn. If the growing medium is properly drained, excess winter moisture will not cause decay.

A sprawling, tangled vine clambering over and under rocks, *Clematis*

columbiana makes colorful displays. It has nodding, bell-like flowers ranging in color from pale lavender, blue, to very nice pinks (photo, p. 204). The plant has an extended altitudinal range. Attempts to cultivate it have so far not been successful. Cuttings are slow and weak to root, and further, slugs find the foliage appetizing. Near the clematis, a perennial violet makes its appearance for four months each year, its lobed leaves flat to the ground. The slight purple undercoloring of the leaves gives *Viola purpurea* its name; the flower is yellow and has the shape typical of the genus). When collecting seed from this plant, remember the seed is "either green or gone." I pick the ripest pods and keep the cut stems moist in a closed container until the ripening pod explodes, sending the seeds for several feet in all directions.

The intense color of *Dodecatheon pauciflorum* stands out in the Wenatchee landscape. In early spring, it can be found at lower elevations persisting in seasonally wet seeps, where it makes its yearly displays and then completely disappears, leaving only maturing seed capsules as the seeps dry up through the summer and fall. On higher, rocky, open spaces that have a thin layer of wind-blown soil, the dodecatheon produces spectacular displays with hundreds of plants from the time the last snow melts until summer drought brings complete dormancy. In garden culture, an excess of summer moisture will cause most dodecatheons of this growth cycle habit to rot, so caution against excess moisture in the hot summer months is important. Plants planted with a very open, loose soil around the crown and heavier soil below for the extensive root system have been successful.

Dodecatheon hendersonii, a white-flowered species, can commonly be found growing along cold, fast-moving

streams in the moist accumulation of peat-like soil amongst mosses and sedges. In this same environment, *Mimulus lewisii*, with its bright rose-pink flowers, forms colonies with dozens of blossoms in midspring and early summer. Both these plants are better enjoyed in their native haunts, as they will never equal their wild charm or vigor away from these natural gardens. One orchid, *Habenaria dilatata*, also is occasionally found in these wet areas, its tall spires of miniature flowers with their sweet fragrance a pleasure to find. We know one colony that has persisted for more than 20 years and is increasing slowly.

Another orchid, *Calypso bulbosa*, is found in the humus-rich soil under *Abies amabilis*, nestled among mosses with *Viola sempervirens*, *Linnaea borealis*, and *Chimaphila umbellata*. *Calypso* is difficult to grow away from its native haunts, as fungus attacks the leaves and prevents formation of the large, bulbous storage stem. As the plants rest through the summer, slugs, mice, and birds find them tasty treats in the garden. To enjoy *Calypso* properly, get down on your knees so you can better see it and enjoy its delicate smell. This is the proper homage to pay this plant, and then return another time to enjoy it. Often in the same location *Corallorhiza maculata*, the spotted coral-root orchid, will make small clumps of blooming stems. Coral-root does not make any of its own food from photosynthesis but exists on decaying humus as a saprophyte. Again, to your knees with a hand lens to see the floral design.

The showy *Cypripedium montanum* makes a many-stemmed clump in open spaces of the forest but generally produces only a single stem in the deeper shade of trees. One particular *C. montanum* plant that we know has continued to increase in size since we



Foothills with open woods near Eagle Creek,
Wenatchee Mountains (p. 164)

Coleman Leuthy

Eriogonum douglasii (p. 193)

Phil Pearson





Sagebrush and *Phlox longifolia* (p. 194)

photos by Phil Pearson

Viola trinervata (pp. 164, 194)



Penstemon gairdneri (p. 194)



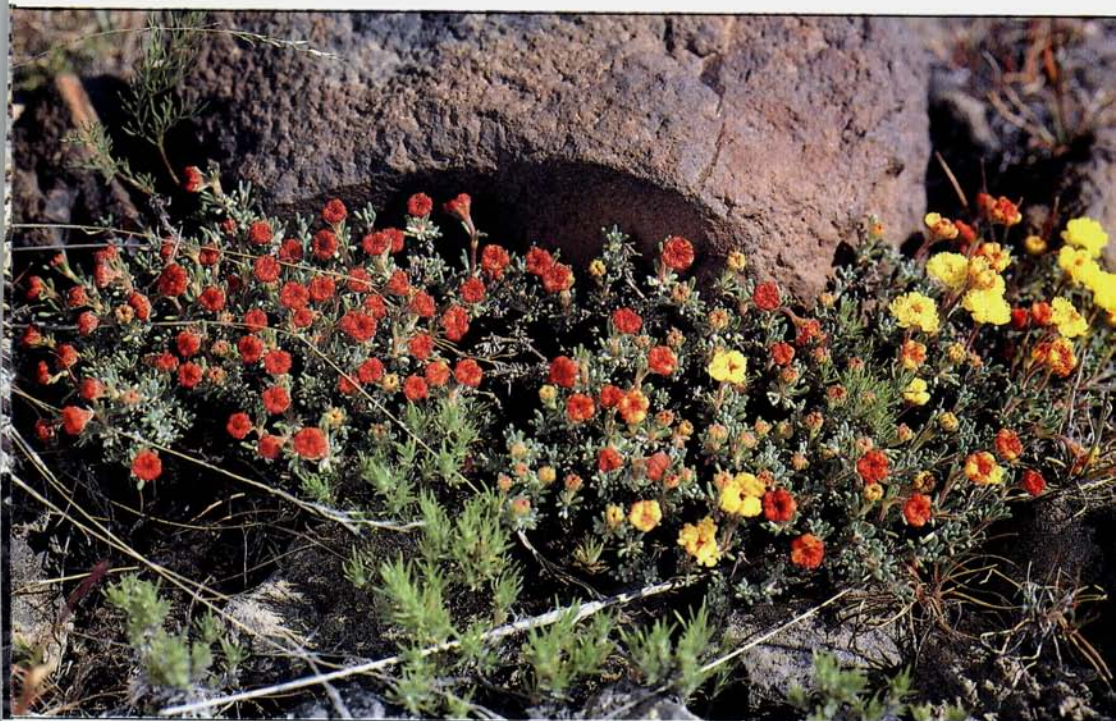


Ranunculus glaberrimus (pp. 167-194)

Eriogonum thymoides (pp. 164, 193)



Fritillaria pudica (pp. 167-194)





Lewisia tweedyi (pp. 164, 168, 194)

Phil Pearson



Lewisia tweedyi, showing leaf development at blooming,
above, flower color variations below

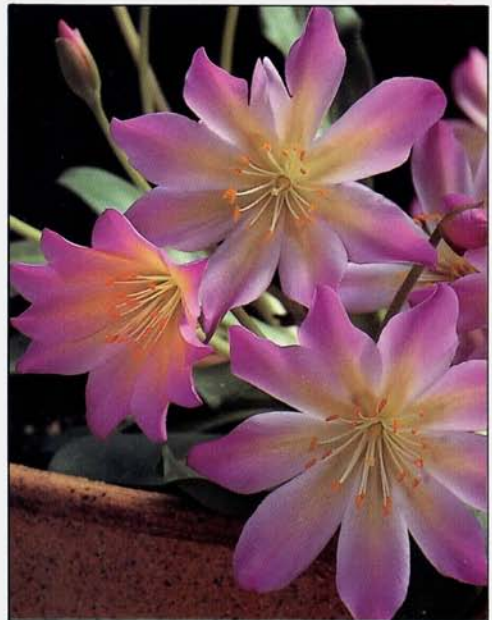
Coleman Leuthy

Coleman Leuthy



'Drake's Strain'

Phil Pearson





The Mt. Stuart Range above the Enchantment Lakes (p. 167

Coleman Leuthy

Douglasia nivalis (pp. 165, 205)

Ned and Betty Lowry





Granodiorites at 6,000-8,500' with *Larix lyallii* in fall color
in the Wenatchees (p. 167)

Coleman Leuthy

Penstemon rupicola (pp. 164, 205)

Phil Pearson





Clematis columbiana, pink form (p. 196)

Phil Pearson

Claytonia megarhiza (pp. 165, 206)

Coleman Leuthy



discovered it and now boasts more than 60 blooms. The sepals are brown, the white pouch lip veined with purple, and the central column that contains the reproductive parts is golden yellow with red spots. These flowers are also fragrant. The plants have large, vigorous root systems extending through heavy soils that never completely dry during the summer. *Cypripedium montanum* has been successfully grown here in a container. Success in the open garden in the Pacific Northwest is problematic because slugs consistently destroy new buds. Collection from the wild is now prohibited by law in the hope of protecting wild populations from extinction. Recent progress growing seedlings of temperate orchids in laboratory situations may shortly make them available to gardeners from commercial sources.

At higher elevations, in open fields and in *Abies amabilis* groves, great patches of *Erythronium grandiflorum* make known their presence with myriads of swaying yellow flowers. The stamens and pistil of the flower pose pointed downward and the petals reflex upwards. Plants grown from seed collected at lower-elevation colonies succeed in cultivation.

The spring flower show of *Penstemon fruticosus* turns the hillsides and ridges of the Wenatchees blue for a month. When out of flower, the penstemon is rather inconspicuous. Some plants are more than 3' across and completely cover themselves in June with snapdragon-like flowers. *Penstemon fruticosus* is rather large for most rock gardens but once established on dry walls or in poor stony soils it can be just as nice any wild plants. In areas of high rainfall, fungus attack to the foliage can disfigure its appearance. Selections more amenable to garden culture have been found and these proven cultivars should be sought out.

Penstemon rupicola is not as ubiquitous but the intense cerise flowers coupled with the rounded blue-gray foliage make it an eye-catcher (photo, p. 203). Driving along easily passable automobile roads, someone is sure to yell out, "STOP!" when this plant appears. It roots readily from cuttings but sadly rarely makes the same show in the garden as it does in the wild. *Penstemon rupicola* grows on southeast-facing rock cliffs in cracks in nature. It requires a well-drained soil mix, readily supplied. The difficulty is that in areas with cool, wet springs the developing foliage is seriously attacked by foliar fungus. One year we had a perfectly dry spring at home and the *P. rupicola* was disease-free and made a spectacular show.

As we climb to higher elevations, taller eriogonums make their appearance, occurring with *Penstemon fruticosus*. The eriogonums have large heads of intense yellow or soft cream. These plants grow among large rocks and in the grand spaciousness of this vast wilderness, they are completely in scale. On sunny days *Eriogonum umbellatum* makes unbelievable floral shows, each plant vigorous and about a foot high.

Along the road on north-facing slopes at intermediate elevation we might occasionally see *Rhododendron albiflorum* with its bell-like, white clusters of flowers. This species is so distinct in the genus *Rhododendron* that it has been assigned to its own section. The Cascade azalea, as it is commonly known, has been successfully grown by few people; it seems to require a cool, moist habitat.

On some of the highest roads, built for access to now dismantled fire look-outs, we reach an environment that favors extensive colonies of *Douglasia nivalis* (photo, p. 202). The plants form rounded mounds of glaucous,

needle-like foliage, and the flowers resemble those of the genus *Androsace*. The flower color is intense rose-violet. Again this is a difficult plant to grow in a maritime climate. What a shame! If we could succeed with them, the cushion phloxes would have real competition.

The plants mentioned so far can be seen botanizing from the car window, but to see the gems of highest elevations we need to don our hiking boots. The peaks are home to many special plants worth the arduous climb. Growing in magnesium-rich soil is the lovely alpine *Claytonia megarhiza* var. *nivalis* (photo, p. 204). The spoon-shaped leaves arranged in compact rosettes with large, pink flowers make this a plant worth all effort to grow it. The large black seeds will germinate in a heavy soil, or side shoots can be readily rooted in sand. Transfer small seedlings to a better-drained soil when they are about an inch across. To prevent rot to the congested crown, continually make cuttings and keep excess moisture from the crown.

On north-facing rock chimneys, *Saxifraga oppositifolia* forms mound-ed cushions. Its sessile, rose-purple flowers appear long before the trails are free of winter snow pack. Snowshoes help us get to ridge tops to see this spectacular plant in bloom. Most North American forms of *S. oppositifolia* are not amenable to cultivation; they resent our hot summers and can literally die overnight.

Along Beverly Ridge, southwest of Mt. Stewart, *Erigeron aureus* forms a large colony. The large, golden yellow daisies with short stems on rather small rosettes of leaves are worth the hike. The erigeron is also found in other high places, but generally as small, scattered plants so that the effect of masses of bloom is lost. *Erigeron aureus* makes a good garden plant, grown from seed or

divisions, providing sunny flowers on short stems in the scree garden. A loose, gritty soil or a deep sand bed will suit its needs. Routinely bait for slugs, since they like this plant, too.

Phlox diffusa, a colorful cushion plant, grows in rocky screes and out on shallow soils. The color range varies in the extensive population, as do size, shape, and overall habit of the plant. Each specimen is unique and it is difficult to make selections because of the variety from which to choose. Cuttings made from wild plants can be difficult to root; take larger cuttings and place in a north exposure until rooted. Once *P. diffusa* is established it is a long-lived plant and flowers profusely every spring. Cuttings taken from garden-grown plants will root more readily.

One of the showiest plants in the Wenatchees is *Phacelia sericea*, a spire of blue flowers with gray-blue, pubescent foliage. The species is found in many western mountains, but the particular form found here is shorter and more colorful. It has grown and flowered well in a scree bed, but excess winter wet combined with cold has caused loss in the open ground. Gardeners in more arid locations could succeed with it.

These are only a few of the worthy plants found throughout this mountain range. A lifetime would be needed to find, study, and enjoy them all, not to mention the challenge of growing them.

Stephen Doonan is an avid hiker and plant explorer in the mountains of the Pacific Northwest. He grows superb specimens of Northwestern natives and many other rock plants at Grand Ridge Nursery in Issaquah, Washington.

Fort Courage

by *Ev Whittemore*

Eight years ago, my husband and I decided we would never survive one New England winter together in the retirement planned for April 1989. Some firm plans had to be made for life in a warmer climate. We then lived on a half acre, the greenhouse was stuffed, and the garden finished. As I am the gardener and outdoors person, the choice of our new location was left to me. I decided on three acres in the country with just enough level area for a small house. The rest of the property was to be hilly, with rocks, water, a dormant cold period for my plants, and a very short one for me. According to weather statistics, the mountains of North Carolina were the answer, so we went shopping on a Labor Day weekend. We found five heavily wooded acres that met my requirements. We became the proud owners of "Ft. Courage."

The next year, we took three weeks' vacation in April and lived on the property in a tent while we constructed an 8' by 10' building. This was to be my home during the growing season for the next few years and then to become the garden shed. The shed had been

carefully thought out during the long winter, since we knew we had only a short time to finish the project. There was no electricity and all lumber had to be cut by hand. It was my first (and last) time living in a tent. There were nights of record cold. One morning we had an inch of snow. Of course we continued working!

Life was primitive in the completed garden shed, but the rent was free, and I was living at the scene of action. I had a kerosene heater and lamp, a cooler for a refrigerator, a charcoal pit and a propane gas stove for cooking or heating water, foam mat for sleeping on the floor, luxurious pail shower at the end of the work day under the rhododendrons, water lugged from the stream for everything and yes! even an outhouse with chemical toilet. Gardening was the main issue, who needed more?

Our lives settled into a pattern. Bruce came down on vacations and we cleared property while I spent most of the growing seasons commuting between North Carolina and Massachusetts, moving plants from the Westfield garden. One year I made 14 trips of 925 miles each way.

We chain-sawed and burned rhododendrons, scrub, and trees for days, matted out roots and trunks of *Rhododendron maximum* and *Kalmia latifolia*. If the stumps remain in the ground, every one will start to resprout almost immediately! This thicket clearing was our major task during the first years.

The second year we built an 8' by 10' addition to the main garden shed. This lovely addition provided enough room for a small chest of drawers and handmade bunk beds—our future potting bench and storage space. We added a tiny deck where we could eat and listen to the music of the stream.

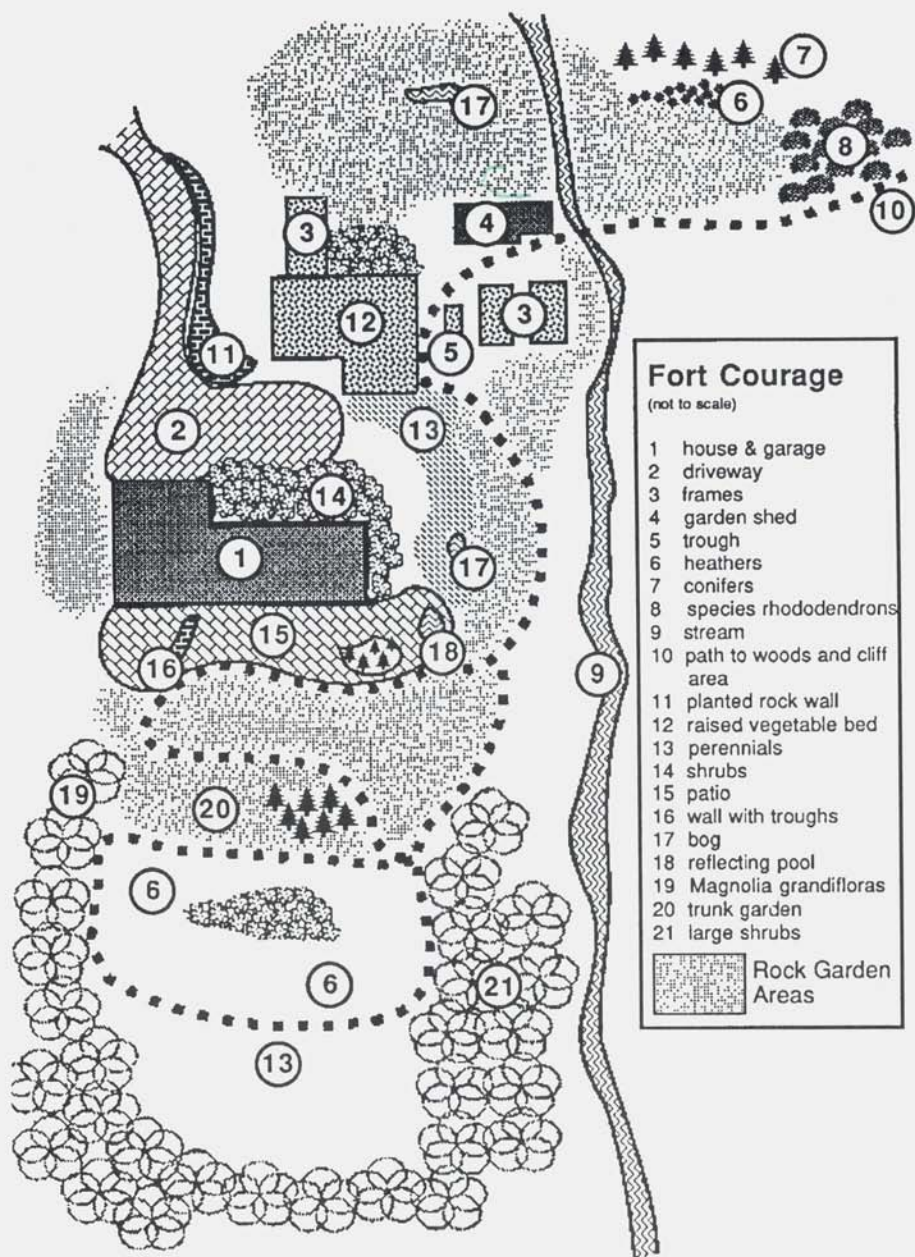
We sold the house in Massachusetts after three years and Bruce moved into an apartment there to finish out his working years. Channy, our toy poodle, and I moved permanently to North Carolina and lived in the shed until a new home was built. We lived this way for three and a half years, with Bruce coming down for work vacations, tackling his running lists, one for rainy days and the other for fair weather days. This is called working for the future. All projects were planned so I would be set up to work until the next vacation.

Let me take you around the garden. (The diagram on page 209 may help you to visualize it.) The house is near the north-south center of the property and is at the highest point on the west side of the property, with a long drive leading up the hill from the north. Instead of a water-demanding lawn around the house, we opted for a large planting of shrubs, including many hollies for the winter snacks of robins and bluebirds. These plants are mulched with chopped leaves topped with pine needles. To convey a natural feeling, the flat stone walk was made to resemble stepping stones in the woods.

A border of heathers is along the west side of the drive with blueberries, raspberries, and a melon, corn, and 'tater patch on the slope below. Another area along the driveway holds extra supplies of rock mulches, creek sand, and top soil, close to the drive for easy dumping. Next to the garage, a shady raised bed and a rock garden support the slope off the driveway and prevent our cars from slipping over the steep bank down the huge drop. What better excuse to order two and a half truck loads of sand and build a rock garden with excellent drainage? All one had to do was arrange the sand, mix in top soil, add rocks, then plant and mulch. Plants like this west-facing slope and quickly reseed from the top. *Saxifraga chrysantha*, *Pieris floribunda* 'Millstream', and *Lygodium palmatum* like the shadier spots. *Potentilla miyabei*, *Dianthus alpinus*, *Globularia nana*, and *Androsace carnea* forms live in the sunnier places.

The east side of the drive has a 50'-long rock wall planted with lewisias, *Penstemon rupicola*, *Dryas octopetala v. minor*, *Thymus caespititius* in the sunny parts, *Asplenium platyneuron* (*A. ebeneum*), *Gymnocarpium dryopteris* 'Plumosum', and *Hedera helix* 'Duckfoot' in the shade. Planted on top of the wall is a miscellaneous collection of plants, including *Sagina procumbens*, *Erinacea pungens*, and *Gonolimon speciosum*. The bank behind the wall to the east is clay, and much excavation had to be done. Luckily, another area needed fill, so nothing went to waste.

To the north, a dwarf fruit tree orchard is underplanted with spring bulbs, where the foliage can be left to ripen. *Phlox subulata* forms, *Dicentra eximia*, and *Viola pedata* readily reseed into the sawdust mulch. For a more attractive appearance, a thin layer



Fort Courage

(not to scale)

- 1 house & garage
- 2 driveway
- 3 frames
- 4 garden shed
- 5 trough
- 6 heathers
- 7 conifers
- 8 species rhododendrons
- 9 stream
- 10 path to woods and cliff area
- 11 planted rock wall
- 12 raised vegetable bed
- 13 perennials
- 14 shrubs
- 15 patio
- 16 wall with troughs
- 17 bog
- 18 reflecting pool
- 19 *Magnolia grandifloras*
- 20 trunk garden
- 21 large shrubs

 Rock Garden Areas



of pine needles covers the sawdust. When the breeze comes sweeping up the drive almost every morning the sawdust is held in place by the needles.

Conveniently near the house on the north are the raised vegetable beds. They are mulched with chopped leaves. Someday strawberries will border all the beds. An asparagus bed, planted the old-fashioned way with a truckload of cow manure at the bottom, is so rich with top growth that we have enclosed the bed; a three-sided fence prevents the greens from smothering the other vegetables. Three grape vines, planted along the fence, enhance this area. The large, round, concrete well cap, a souvenir from the well-drilling project, is in one raised bed and is disguised with a double-tiered frame planted to cactus. Included within another raised bed is a 7.5' x 3' protective frame, devoted to lettuce, leeks, parsley, and radishes for a winter garden. A peren-

nial border with curved lines surrounds part of the beds, softening the angles.

Southern rock gardening is different from New England rock gardening. I have had to learn and to compromise. Gravel is unavailable here, so rock gardens must be created on a creek sand base of 8-21" for drainage. A layer of clay underlies the forest soil in many areas. Since drainage is essential in a rock garden, it is much easier and quicker to dump, move, and arrange sand than to remove existing soil and amend it. The property is at the base of an old quarry farther up the mountain and the underlying soil contained huge rocks, which I didn't want to dig out. Work is faster and easier using the dump and arrange method. If I know rocks underlie an area, I may increase the depth of the sand or choose plants with shallower roots, or both.

The creek sand was dumped off the truck in piles, and I tackled it with my

wheelbarrow, shovel, and rake, forming my mountains. After mixing in top soil, finding and setting rocks, and planting, all the gardens were covered with a layer of "fines." Fine is a combination of tiny particles of rock and rock dust, the largest particles about one-quarter inch in diameter. Next a layer of stones about 3/4" in diameter were added and then more fine sifted into the crevices to seal in most of the weed seeds and give the rock gardens the appearance of a mountain top. Rock mulch was carried down to the garden areas in pails, day after day, year after year! It is an on-going procedure called WORK.

North of the raised vegetable bed, east of the orchard, lies the oldest rock garden. North Carolina sun can be brutal, but it does keep plants in character. *Silene acaulis*, *Dianthus*, *Draba* species, *Androsace*, *Cerastium alpinum* ssp. *lanatum*, and many other plants assume good, tight growth. Most profit from a mulch. *Viola pedata*, the 'Alba' and bicolor forms, reseed pleasantly with help from insects, including beautiful butterflies. *Acantholimon*s, *Tanacetum densum* var. *amani*, *Erigeron chrysopsidis* ssp. *brevifolius*, *Eriogonum ovalifolium*, *Petrophytum caespitosum*, *Geranium argenteum*, *Potentilla dickinsii* (dwarf form), *Santolina elegans*, and *Penstemon thompsonii* thrive here. *Potentilla megalantha* prospered when moved to a shaded, damp spot where it now reseeds with abandon. Campanulas and penstemons struggle here.

Smaller rock gardens and woodland gardens with shade-loving plants are on the west side of the stream, east of the house. One doesn't plant *Epigaea repens*, *Goodyera pubescens*, *Cypripedium acaule*, *Mitchella repens*, *Cleistes divaricata*, *Gentiana quinquefolia*, or *Galax urceolata* here. They appear where they choose to live.

I have added ferns, *Tricyrtis* species, arisaemas, forms of *Iris cristata*, the white form of *Mitchella repens*, and New England and North Carolina natives. Again, woodland gardens are mulched with chopped leaves topped with pine needles to keep leaves from blowing and having to be raked again. These rock gardens have the usual crusher fine plus small rocks carried from the stock pile. The woodland and rock gardens are intertwined here and then change into woodland and then the cliff.

Another shady rock garden slope nearby has been planted to approximately 50 saxifrages among tufa rocks. A few plants of other species are interspersed so the area won't be boring—*Silene acaulis*, *Aquilegia saximontana*, *A. jonesii*, *Gentiana acaulis*, a nice *Erigeron* species, and *Androsace* 'Millstream'. The completely brown *Silene acaulis* plants of winter all turn into bright green, tight buns when the weather warms. At the top of this east slope is a reflecting pool, built to be enjoyed from a bedroom. Here I didn't have to dig down for a footing; our ground rarely freezes deeply. This pool is surrounded by plantings of rhododendrons, grasses, *Salix*, and huge-flowered hybrids of *Iris ensata* (*I. kaempferi*) sent by a generous Japanese correspondent.

In a sunny spot is a raised bed. This soil is a lean mix, mostly sand, for western dryland plants. *Eriogonum*s are among my favorite plants and I sow seed whenever it is available. They are planted here along with *Lesquerella*, *Physaria*, *Astragalus*, and *Oxytropis*.

Nearby, carnivorous plants hybridize in a woman-made bog. A larger bog was constructed recently to absorb some of the overflow. Pitcher plants, with their striking red-and-yellow flowers, love the hot sun. *Dionaea muscipula* and *Darlingtonia californica* are brought in

for the winter. One bog contains an abundance of *Vaccinium macrocarpon*, tasty in cranberry muffins.

Along both sides of the meandering stream the trees were thinned, rather than cleared, and this area is being planted to *Primula japonica*, *Bergenia*, Japanese and native forms of *Shortia*, *Soldanella*, and other plants for a damp situation. A small moraine constructed in one part of the stream slopes east and has been planted to bulbs—lilies, trilliums, cyclamens, and fritillaries.

Also across the stream, on the north end of the property, a steep slope is planted to conifers, with heathers at their feet, a saxifrage bed on one side, and species rhododendron started from seed on another. Some distance from the stone mulch supply pile, this area is mulched with chopped leaves topped with pine needles.

A rock gardener is sometimes defined as a person with a weak mind and a strong back. I now agree. Although our garden was to be limited to the area cleared by 1989, the appeal of a large cliff across the stream proved irresistible. The area is inaccessible by vehicle, and last January we began the back-breaking task of removing more rhododendrons and trees to give light and air to our cliff garden. The wood had to be burned and the stumps matted out. As a consolation, the soil, once cleared, is beautiful and friable, although loaded with rocks and roots.

This slope is extremely steep, so paths were laid to make walking as easy as possible with rocks for steps. An end section of the cliff 25' long has been uncovered and has several steps of rock layers with many corners, ends, and crevices for plants with a natural depression for a tiny pool. With a cool root run saxifrages will thrive. Aquilegias, drabas, tiny primulas, and poly-

gala primulas have been planted. Transylvania County in North Carolina has an abundance of rainfall and moisture seeps through much of the cliff for those plants which appreciate this.

Between rainfalls, when the ground is solid, I climb a ladder and plant small seedlings or tuck seeds into crevices. The ledges will be beautiful with willow species, kalmias, and trailing plants. It's a dedicated gardener's dream.

A 12'-long bog has been created at one end of the path. Imagine carrying large bales of peat from the car up the slopes, across the stream, and into the woods! A stream from the woods was re-routed to wet the peat and to water new plantings. Forms of *Andromeda polifolia*, *Vaccinium macrocarpon*, *Lysichiton americanum*, and *Daboecia* species, plus many other species, will be planted here.

An old damp gully with stones breaking the fall of the slope is being planted to primulas and *Adiantum pedatum*. Remnants of an old walnut tree retain the soil of the slope for planting. Someday cyclamen will peep over the log. Another huge section of log was moved near the path. Both logs were wire brushed to bring out the wood grain. Masses of primulas and dodecatheons are planned at the base of the cliff with *Trillium*, *Hepatica*, *Lewisia tweedyi* and *L. cotyledon*, *Phlox* species, *Shortia galacifolia*, *Orchis spectabilis*, and other plants for shifting sunlight.

A typical gully-washer of 5" of rain in 36 hours indicated where our drainage problems were; railroad ties now channel the water where it should go.

We walk toward the house, passing plants of *Cypripedium acaule* 'Album' sporting fat seed pods. Around the hill to the south, the garden has a more casual, expansive feeling. It is an area with larger plants and more large

groupings of similar plants. On the back patio, various *Dianthus* species have germinated from chaff and seed tossed off the decks during seed cleaning. A small collection of grasses arranged around an old root, shaped and colored like a snake, forms a short border rimming the patio (my own snake in the grass). Incorporated into the slope of the back garden is a long curved bed of daphnes, the larger plants at the bottom, the smaller ones like *Daphne petraea*, *D. petraea grandiflora*, *D. 'Thauma'*, and *D. cneorum 'Pygmaea'*, at the top. The entire bed has a pine needle top-dressing, although the soil underneath varies. This is a solid space of green and brown among rock mulch.

The gardens nearest the house will be constructed last, since I will not need to carry supplies so far when I will be most tired.

One of the newest rock gardens is in the rear garden on a lovely south-facing slope. It contains one and a half dump trucks of sand, as well as top soil, rocks, and a truckload of stone mulch. This is the central core and is being planted to dwarf shrubs, bulbs for early color, sun lovers and plants to be kept in good tight growth. *Townsendia rothrockii*, *Erysimum helveticum*, *Edraianthus pumilio*, *Geum pentapetalum*, *Erigeron 'Meadow Muffin'*—all respond to our efforts. A similar amount of material was used to make beds on either side and, since there is a deep sand base here, drainage is super, so this area is being reserved for plants demanding this condition.

There is a natural shady, mossy, 3'x8' area at the foot of a slope which I thought would be totally useless. Growing happily there are *Silene acaulis 'Alba'*, *Aethionema oppositifolium*, and self-sown plants of dwarf *Aquilegia canadensis*, drabas, gentians, and

Androsace carnea. That too, is a nice contrast among all that rock mulch.

At the foot of the rock garden area, there is a small garden built of patio blocks and an old tree trunk. This is backed by a bed of shrubs reaching to the center of the cleared area, so it doesn't stick out like a sore thumb. Hollies, rhododendrons, azaleas, and other shrubs reach to the center of the cleared area. The outer edge shows native *Kalmia latifolia*, *Rhododendron maximum*, and *R. calendulaceum*. Someday, I plan to add my rhododendron seedlings there and let the garden drift into the woods on the west side.

More than a hundred kinds of heaths and heathers sweep down from the trunk garden, in easy view from the house. Below this meadow of contrasting foliage colors, with its late summer and early winter flowers, and in the sunnier parts of the lower edge of the clearing tall, brightly blooming perennials are being planted in a curving border to give bursts of color visible from the decks and house. Grasses have been used here, too, and soon species peonies and seedling viburnums will join them. At one side of the clearing is a grouping of seven small *Magnolia grandiflora* trees, donated by a Connecticut friend. The outer area of the back garden, with the perennials and shrubs, is mulched with leaves; the inner one, planted to heather, is mulched with sawdust, and both are covered with pine needles.

On the north side of the house, south of the garden shed, is my largest trough, a 3'x9' converted raised bed built with concrete blocks covered with hypertufa. The property contains a collection of 14 troughs, from the "Oh, I don't like it there, I'll move it" to "That one stays there forever!" size.



The smaller were built over damp sand forms using a recipe from Nina Lambert in Ithaca, New York. Add three parts Sakrete to less than one part dry peat, mix, and add water. My premise is, if it is hardy in Ithaca, it will be hardy here. For two large troughs I used a huge industrial light cover as a form. A few troughs were lightly covered with black swimming pool paint to give a different contrast to the stone garden mulch. In several are miscellaneous collections of plants and others are filled with plants from various areas in Montana, Wyoming, Idaho, and Colorado.

Here in North Carolina, a large frame serves as my alpine house. Since we have many hot, sunny days with blue skies, I knew I could never successfully cool a real alpine house. Plants are planted in the soil of the frame and mulched with stone as in a real garden. *Acantholimon*, *raoulias*, *Rhodohypoxis*, and *Ranunculus calandrinoides* love it, as do *Gypsophila aretioides*, *Potentilla speciosa*, *Origanum microphyllum*, tight drabas and dianthus. *Jankaea heldreichii* and *J. x*

vandordemi grow slowly. *Silene hookeri* freely reseeds. This frame is divided into two sections; the plants mentioned above grow in one half and the second half is reserved for plants germinated from the Southern Andes expedition.

The remainder of this area near the shed and the house is devoted to the growing of seedlings and tender plants. Paralleling the orchard is an 8'x20' raised sand frame, which is winter-protected with one-inch, 4'x8', rigid aluminum-foil-sided panels of building insulation. These insulation panels are lifted almost every day during winter and replaced in their grooves each night. This has to be a labor of love! If there is a threat of snow, plastic panels are placed over the insulation so the snow can be shoveled off without tearing the aluminum layer. The frame is used to line out germinated seedlings in rows. These will be planted in the garden the following spring. The frame has a base of sand and grit a foot deep with just a bit of top soil. I wanted lots of sand, so I could easily dig out the seedlings without root damage. All the plants are mulched with chicken grit as

soon as planted and are occasionally fed to push them along. Part of the frame has alpine in pots, sunk to the rims in sand, waiting to be moved to the garden. These seedlings germinated during late fall and were potted from December on. The capacity of the frame is approximately 1500 plants.

A smaller, sunken frame is at the end of the large sand frame, built to house the non-hardy *Cyclamen*, *Corydalis*, *Fritillaria*, and plants like *Flagellarisae-ma kiushianum*. This is winter-protected in the same manner as the larger frame. Pots in either frame are sunk in sand.

South of the garden shed, next to the alpine house frame, is another sand frame 8'x16'. It is used for sowing out seedlings. One section is under a screen frame to protect tiny primula, rhododendron, and saxifrage seedlings from heavy rains.

I prefer to grow my plants from seed for several reasons. With many germinations, one has extra plants to swap. The seedlings become acclimated to North Carolina weather more easily than mature plants, so there is a greater chance of survival. I don't like a spotty look in the garden—I want several plants of the same species. The garden then is more naturalistic. And for me, growing seeds to garden specimens is a pleasure.

Many of the plants in the garden have been started from seed swapped with other enthusiasts throughout the world. I find gardeners in Czechoslovakia appreciate subscriptions to our gardening magazines, hose sprayers, empty window cleaner spray bottles, as well as seed. I have sent three sprayers to friends because "We don't have anything like that." On the other hand, they have beautiful small gardens filled with choice material which produces superb seed. One correspondent plays

around with grafting daphnes which he shares. Another in eastern Germany collects in the USSR. A friend in Japan is a master gardener who grows his plants in pots sunk in the ground. I sent him *Dicentra eximia* 'Alba', which crossed in his garden with *Dicentra peregrina*. We learn from each other and our gardens are the better for this. I also watch for advertisements of expeditions to areas which I doubt I will ever visit. I am perfectly willing to contribute a bit of money for a share and avoid leeches, brutal weather, and rough camping conditions and long absences from my garden.

For several years breaks from hard labor have been trips to the western mountains with my dog as companion, living out of my vehicle and collecting seeds used for my pleasure and for exchanging with friends and societies. As a past American Rock Garden Society seed director, I understand the importance of fresh seed.

I don't consider the garden finished. My original ten-year plan called for seven years to do most of the hard labor, as I guessed it would be easier to work ten to twelve hours a day while I was in my early and middle fifties rather than the late fifties. I was right! Now a typical day is six to eight hours. The last three years are to upgrade the plants in the garden, mainly by growing from seed.

You may have concluded that I am a confirmed mulcher. Right you are! Weeds are less in number, plant roots stay cooler in summer and warmer in winter, and now with possible water shortages, I know I am doing my plants a favor by mulching. I never plan a garden area without a mulch in mind. I lean to using the crusher fine, because it is lighter in my pails and doesn't wear out. We use it for driveways and it becomes rock hard after a few rains,

although a good gully washer can move even this. I cannot understand how plants can reseed, grow, and flower in this rock material! *Dianthus* particularly seem to think it is a rare treat to be able to grow in this medium. Leaves are used in areas with plants that prefer this to an organic mulch because it is available and free—I have a mulcher. As they decay, the leaves feed my plants and amend my soil. Sawdust, used as a mulch in the orchard and the heather bed, is cheap and light to carry a long distance in the wheelbarrow. I don't like the color but a light sprinkling of pine needles easily changes this. I usually use 150 bales of needles a year and prefer the long-needled southern pine, which seems to last longer.

I have learned the hard way to avoid freezing and thawing problems in the southern winters by not planting out seedlings later than the end of July. The frames are a help here as I am able to carry over late germinations. There is no way to stop label popping, so I reprint labels on a sunny winter day.

All garden watering is done from the stream with a 35th wedding anniversary pump from Bruce. There is a small log dam at one point in the stream and if a pail is placed there the water will fill the pail and be drawn by the pump into the garden hoses, which reach to the end of the heathers and perennials. I usually place a screen over the pail and a double thickness of Remay to strain out bits of sand.

Looking back at the past few years and at the months ahead, our impression is of horrendously hard work, day after day. But when we stop working and look up at the garden forming, yes! it was worth it!

Now we can slow our pace if we choose. Bruce can work at the fruits and vegetables, put in a watering supply from the stream to the cliff area,

thin trees and rhododendrons between the cliff and the conifer slope, bring electricity to the garden shed, chop up leaves for mulch, and keep our equipment in running order. I can finish planting the cliff area and mulch it, keep up all the other gardens, finish planting the areas waiting, work at growing plants from seed, lug pails of rocks for mulching, burn whatever Bruce thins out, cook, and clean house. Are we crazy, or what?

Ev Whittemore gardens near Penrose, North Carolina. Since writing this article, she and her husband have built an alpine house and continue to develop their garden with a high level of both energy and enthusiasm. Fort Courage will be on tour at the 1994 annual meeting.

When the Cactus are in Bloom

by John Spain

From mid-April until August there are hardy cactus blooming in my gardens in Connecticut. Cactus can make a significant contribution to extending the flowering season of any sunny rock garden with good drainage. The season began April 1 last year when I saw round pink buds at the very apex of the ball of *Pediocactus simpsonii* in my south-facing rock garden (photo, p. 223). The blooms, up to 3/4" in diameter, opened by April 15. The almost-white to dark pink flowers have a double row of slightly pointed petals. At times flowers cover the whole top of the plant, and bloom continues for several weeks.

Next to flower are several varieties of *Echinocereus triglochidiatus* (photo, p. 223). Buds start appearing about April 10. My clump of *Echinocereus triglochidiatus* var. *melanocanthus*, which contains about 30 heads, had 22 flower buds showing April 25. By May 29 bloom had started and continued past June 13. These blooms, described by Allan Taylor and Panayoti Kelaidis as shaped like "badminton birdies," have a claret or scarlet color typical of all *E. triglochidiatus*. A blooming

clump in the wild can be seen from a half-mile away. Varieties *gonacanthus* and *triglochidiatus* have both bloomed for me as early as the end of May. The blooms of all varieties of *E. triglochidiatus* stay open for several days (unlike the opuntias) and most clumps produce a series of blooms over a period of ten days or more.

Soon the blooms of *Echinocereus viridiflorus* follow (photo, p. 223). Buds may appear as early as April 25, open at the end of May, and continue for several days. Blooms are borne in a ring around the base of the plant and are chartreuse green and lemon-scented. The flowers are small, not more than an inch across, and open wide only in full sun. On occasion I have had 15 or more blooms open at the same time on one plant. Seedlings may bloom in their third season.

Echinocereus viridiflorus var. *davisii* is a tiny jewel. A mature plant 2" in height may produce blooms twice the size of the type species. Each petal is lanceolate with very narrowly pointed tips, greenish yellow, and has a brownish stripe down the middle. Blossoms open as early as May 15.



Coryphantha (Escobaria) vivipara selections form buds by May 1 (photo, p. 223). Bloom will start about a month later and continue until June 15. The type subspecies *C. vivipara* ssp. *vivipara* is extremely hardy and produces a breath-taking series of shimmering pink blooms with yellow centers borne on the top of the ball. The blooms, often an inch and a half across, consist of a triple row of lanceolate petals. The shades of pink vary. My most attractive bloomers have dark petals with even darker pink stripes down the middle of each petal. At times flowers will cover the whole top of the plant.

After late May buds and blossoms are everywhere in the hardy cactus gardens. *Neobesseya missouriensis* and its subspecies *caespitosa* are blooming. Buds show just a few days ahead of bloom. These will continue blooming from about May 25 until mid-June. The flowers of *Neobesseya missouriensis* itself are not spectacular (photo, p. 222), despite their abundance and 2" size, because they are pale in color, tan to light green. They

are striking in shape with long, narrow petals radiating out like a sunburst. The flowers of *Neobesseya missouriensis* var. *caespitosa* are, on the other hand, spectacular, composed of petals 2" long with broad, brown mid-stripes that shade into greenish yellow on the edges. The flowers emerge from the top of the plant and a single flower may be larger than the ball.

Overlapping with the long season of flowers of the ball cacti, the hardy opuntias bloom in a rush in mid-June. They throw splashes of color over the garden, producing brilliant accents among dark green conifers and gray boulders. The earliest to bloom of these flat-padded cacti are forms of *Opuntia basilaris*, *O. rutila* (*rutilens*), and one of my favorites, *O. polyacantha* 'Crystal Tide' (photo, p. 222). This last plant was, as I have learned from Mrs. Mary Ann Heacock, discovered by Hazel Grapes in Nebraska. 'Crystal Tide' was introduced by Claude Barr and must have been named for the delicate, creamy white flowers. The blooms are more than 3" across with a mass of china-red stamens in the center of the cup and are, in my

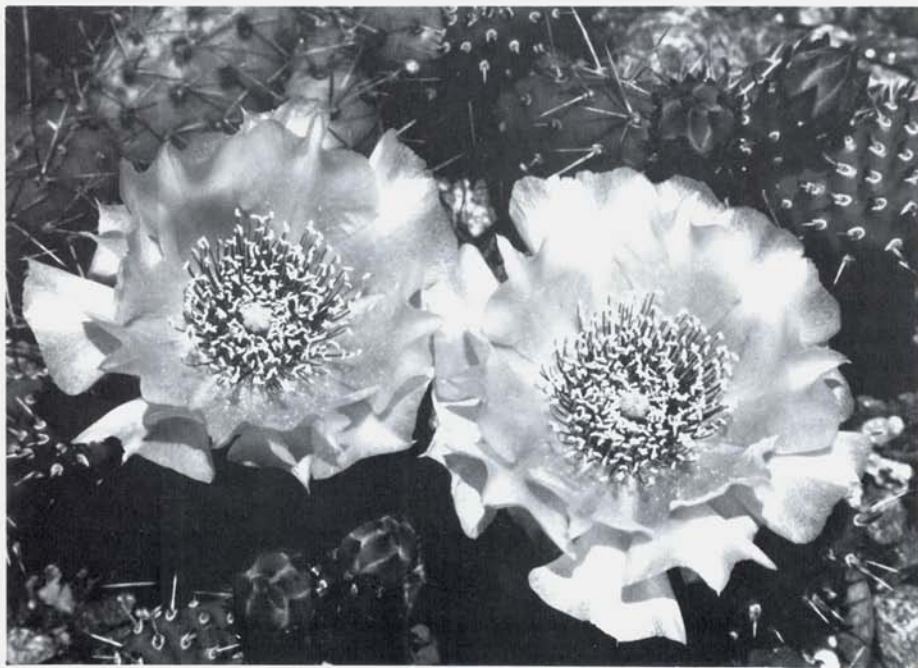
view, the most beautiful of the opuntias. This selection blooms profusely in mid-June. The large blooms of *O. basilaris* are up to 3" across, bear multiple rows of flower petals, and, like all opuntias, are produced on the top edge of the pads. Flowers may be yellow, pink, or almost pure white. My favorite opuntia, lost some years ago, was one called 'Utah Rose'. It had almost as many petals as a rose and these were a very dark pink. I have pictures to look back on but have not been able to replace the plant. Hybrids and selections of *O. basilaris* provide most of the early pink flowers. The flowering season is short for any particular plant, lasting no more than a week.

Also blooming in mid-June are *Opuntia polyacantha* and its varieties *polyacantha*, *juniperina*, *rufispina*; *O. fragilis*, mostly in shades of yellow, and blooming in a shy fashion; *O. humifusa*, in mostly yellow, some flowers with red centers; and *O. schwerni-*

ana, with beautiful double pink flowers and yellow stamens (photo, p. 222).

In late June come *O. phaeacantha*, with a variety of plum or salmon-colored selections from the mostly yellow wild populations; *O. p.* var. *comanchica*, with double rows of pointed yellow petals fading into a red center; *O. macrorhiza*, some all yellow, but I have an excellent selection with a double row of deep yellow petals and a star of bright red radiating from the center (photo, p. 222); and *O. m.* var. *pottsii* Benson, with a loose double row of wine-red petals with yellow stamens (photo, p. 222). This bears up to eight flowers per pad.

In early July *Opuntia whipplei* blooms with small, light yellow to chartreuse flowers. This has only a few petals per flower and mine did not bloom until I had had it for 15 years. *Opuntia imbricata* flowers have a single row of deep rose petals, 2" across. It is a shy bloomer here, but



beautiful. *Opuntia whipplei* var. *davisii* is the last of the group, with a double row of grass-green petals shaded with brown. Prominent, awl-shaped green "leaves" emerge from the areoles on the ovary during flowering.

Two more Claude Barr opuntias that bloom later include a hybrid named 'Claude Arno' (photo, p. 222). It's a small-padded opuntia looking much like a small *O. polyacantha*. The flowers consist of a loose single row of rose to red petals, and it is a dependable bloomer. I've called this plant "Little Red" for years. The other is *Opuntia* 'Smithwick', named, I presume, for the town of Smithwick, South Dakota, near Claude Barr's ranch. It is said to be a cross between *O. compressa* and *O. fragilis*, although the flower is larger than that of either parent. This is a fast-growing, small-padded plant that produces a mass of large, double, deep yellow blossoms with many bright red stamens. It is the best yellow opuntia that I grow. A plant that Claude Barr listed as *Opuntia rutilens* has been blooming in my garden for close to 18 years. It blooms in mid-June. The very large, satiny, pink blooms have an

unusual sheen. It's a beauty but I have yet to track down just what are its origins. It is unique in that it produces only one flower per pad.

The barrel cacti continue to bloom through July with *Echinocereus reichenbachii* varieties *baileyi*, *albispinus* and *perbellus*. These produce the most spectacular flowers of all the winter hardy cacti. Mature plants may bloom for a period of several weeks. There are pinks and purples, all with many rows of fringed petals. The large, brilliantly shiny flower cups are accented by prominent green stigma lobes surrounded by bright yellow anthers.

You will find that cactus in shapes from the bush-like *Opuntia imbricata* to mats and clumps of pad-shaped *Opuntia* species, to the balls of *Echinocereus* and *Coryphantha* can be integrated into most rock garden situations. I grow my cactus with dwarf conifers, sedums, sempervivums, dwarf iris, *Dianthus*, *Armeria*, heathers, early blooming rock garden bulbs, and other rock garden plants. Their flowers are unmatched in their shimmering variety of bright colors. Try them—you'll be glad you did.

Winter hardy cacti are available from the following sources:

Plants and seeds:

Mesa Garden, PO Box 72, Belen, New Mexico, 87002.

Plants:

Intermountain Cactus, 2344 South Redwood Rd., Salt Lake City, UT 84119 Tel.: (505) 864-3131

Desert Nursery, 1301 South Cooper, Deming, NM 88030 Tel.: (801) 972-5149

Cactus Patch, RR 2, Box 159, Radium, KS 67550 Tel.: (316) 982-4670

Midwest Cactus Sales, PO Box 163, New Melle, MO 63365

Membership in the Cactus and Succulent Society of America (US, Canada, Mexico) \$28. PO Box 368, Lawrence, KS 66044.

Photo, p. 218, *Pediocactus simpsonii*, by Phil Pearson. Photo, p. 219, *Opuntia* 'Smithwick', by John Spain.

John Spain gardens in Middlebury, Connecticut.



Iris 'Dunlin', right, and 'Cupcake', right (p. 192)

photos by Robert Pries

Iris 'Varibright' (p. 192)



Iris timofejewii (p. 191)





Opuntia macrorhiza (p. 219) John Spain



Opuntia schwerniana (p. 219) John Spain



Opuntia pottsii (p. 219) John Spain



Opuntia polyacantha
'Crystal Tide' (p. 218) John Spain



Escobaria missouriensis (p. 218) P. Kelaidis



Opuntia polyacantha
'Claude Arno' (p. 220) John Spain



Pediocactus simpsonii
var. *minor* (pp. 193, 217)

P. Kelaidis



Echinocereus viridiflorus
(p. 217)

John Spain

Echinocereus triglochidiatus
(p. 217)

Josef Halda

Coryphantha vivipara (p. 218)

Josef Halda





*Primula
allionii*,
Crowasley
Variety
(p. 187)

*Primula
allionii*
'Apple Blossom'
(p. 187)



*Primula
marginata*
'Linda Pope'



photos by
Phil Pearson

Plant Portrait

Leucocrinum montanum

by B. LeRoy Davidson

"The White Lily of the Mountains," wrote Farrer, "is a common beauty in the central Rockies, but not by any means frequent with us. It makes a tuft of soft, narrow leaves, and then in early summer prepares an umbel underground in such a way that each large, spreading, narrow-tubed star, sweetly scented and in whites that vary to blue, seems springing by itself from amid the tuft on a stem of 3-4". It is a most entrancing species, worth any comfort that its fleshy roots exact. It should be grown in fullest sun, in a sheltered and specially well-drained bank, in light, rich, and especially sandy warm soil of ample depth; and the apple of the eye should not be more cherished."

Yet in spite of such outspoken adoration, how seldom do we find this today in cultivation! Dr. Carlton Worth said of it in addressing the Third International Rock Garden Plant Conference: "One of the most attractive of our monocotyledons, and I believe among the least known, is *Leucocrinum montanum*. A plant of dry meadows in the foothills, it is amenable and long-lived in my garden. I have never seen it growing wild, for although I have been told where it grows, it has remained dormant during the recent drought years."

Claude Barr so aptly described it: "Several thick, moisture-storing roots, from a tiny crown two inches underground mark the precocious little sand-lily, . . . in place of the expected bulb. All growth arises from this buried crown: channeled leaves of a light glaucous green, 4-8" long; and six-segmented, white corollas diffusing a gentle breath of spring, where dozens or hundreds sparkle on a warming slope on which a snowbank has lately lain . . . and a mature plant may produce as many as 40 flowers. Since the long tube of the blossom comes from underground, the large, angular, black seeds are formed deep down. One digs for them."

Margaret Williams once raised the question of dispersal; as the capsule matures within the sheathing neck of foliage below ground, she suggested that its widespread occurrence could be due to the tireless industry of ants. The sand-lily is found in favored places from Dakota Badlands to Nebraska and New Mexico west to Oregon and northern California. It is not in Washington, where forces have brought *Talinum*, itself arrested against the Cascade barrier on the dry eastern slopes, found in likely looking places for the sand-lily.

Now here is the answer, another of Nature's secret's revealed, and of course only by the most persistent observation. John G. Lemon had also puzzled over this and wrote of his consternation over a century ago. "For two years I was baffled in my efforts to gather seed of the beautiful *Leucocrinum*, abundant in Sierra Valley (he taught school at Sierraville) but rare elsewhere in California. During the first season I found how oddly the pericarp remained down in the ground, thought the

large creamy white flower was exerted two or three inches. But not until too late to save seed at the close of the second season did I discover how the shining black seeds were spirited away. They are carried off by the incurved bases of the withered leaves and blown with them by the winds over the plain. Not a seed remains in place after the plant ripens and its leaves are gone."

Ain't Nature grand!

Books

Gardening from the Heart: Why Gardeners Garden. Carol Olwell. Antelope Island Press: Berkeley. 240 pp., 82 color photographs. 8.5 x 11". \$18.95, paperbound; \$24.95 clothbound library edition. ISBN 0-917946-05-7 (paper), 0-917946-04-9 (cloth).

by Tamsin Goggin

Gardening from the heart, why gardeners garden—that is what this book is all about. Twenty-one gardeners are interviewed and their gardens photographed. I'll admit I was worried that rock gardeners wouldn't be interested. However, after reading it, I'd be surprised if each reader can't glean an inspiration from at least one of the biographies.

The author has grouped the individuals by gardening motivation. The garden as paradise, provider, teacher, and healer. A diverse assortment of gardeners comprise each section. For example, the chapter on the garden as healer profiles jail house gardening, terminal illness, retirement, a Zen center, urban community gardening, and organic farming. Although the gardens appear very different from one another, there is a common thread linking them. The interviews unveil what the title alludes to: the human need to nurture and the incalculable benefit derived from doing so. Twenty-one different people have twenty-one different ways of expressing virtually the same theme. My compliments to the author for carefully preserving the individuality of each gardener. Their own words and personalities are loud and clear. The gardening artist, the desert gardener, the blind market gardener, the Alaskan gardener, the fruit tree lover, the highway landscaper and the geneticist who gardens in circles are all unique individuals with interesting life histories that help shape their view of the world and their gardens.

The American Rock Garden Society is included in *Gardening from the Heart* through profiled members Ted Kipping of San Francisco, California, Hazel Suedes of Casper, Wyoming, and Mary Kenady of Duval, Washington. All the gardeners included in the book live west of the Mississippi. The appendix includes a 30-page discourse about the dangers of pesticides and also a helpful glossary.

I have been inspired by reading this book and plan to bring these personalities to mind as I garden.

The Alpine House. Robert Rolfe. Timber Press: Portland, Oregon. 148 pp., 20 color photographs, 18 line drawings. 6 x 9". \$27.50, hardbound. ISBN 0-88192-185-8.

by Panayoti Kelaidis

Ordinarily, I would hesitate to recommend a rather slender book costing more than I first paid for Farrer's *English Rock Garden*. Nevertheless, this volume packs a surprising amount of information into its 148 pages. It is utterly and delightfully free of misprints, the garbling of Latin names, and parroted idiocies that are so common in recent horticultural books. Robert Rolfe is to be congratulated on producing a general manual full of specifics and still very readable. In addition to learning about the pros and cons of clay and plastic pots, the optimal height of staging, and the light needs of some of the leading alpine house plants, you will discover that "*Centaurea achtarovii* will often emerge following on from the demise of the original topgrowth" (something I wish I knew last year before I threw out my last pot of it!).

Rolfe is an erudite plantsman who is steeped in British horticulture, and American readers will quickly realize that his recommendations must be tempered in view of our widely varying conditions. If you presently have a cool greenhouse, a full-fledged "Alpine House," or if you dream of getting one some day, your investment in this book will be quickly repaid.

Designing with Perennials. Pamela Harper. Macmillan: New York. 326 pp., 300 color photographs. 9 x 10". \$40.00, hardbound. ISBN 0-02-548180-0.

by Rob Proctor

I am probably not the right person to review this book. I completely lack objectivity, for I am an unabashed Pamela Harper fan. Although she speaks as an authority, I would not label the text with the dreaded word "authoritarian." It is absolutely straightforward and does not hide behind artistic clichés. It doesn't have to. Since the author grows and lives with the plants, she doesn't gush; she simply relates what she knows—which is considerable.

There is a bit of a philosopher and psychologist in her as well: "Romantics like their borders full to overflowing, with no bare earth showing, while those of an engineering frame of mind prefer a less voluptuous approach. What do the *plants* prefer?"

One might expect an eastern seaboard bias toward traditional perennials from the Virginia-based plantswoman, but the photographs and text reflect time well spent on the road in this country and England. Pamela is a writer for all regions and all seasons. The section on so-called invasive plants should be read by every writer before they brand something with the label. The way plants are used, and the climate where they are grown, determines garden worthiness.

Nor does she dictate a style to follow, but rather embraces and celebrates individuality in the garden. Rock gardening is not considered outside the realm of perennial gardening, as in many books. Pamela has tongue-in-cheek advice. "If

your garden is small and you want to get a quart into a pint pot, rock gardening is for you." She also relates that they work well on a bigger scale: "...devotees have shown great ingenuity in providing settings that bring the plants into scale with larger properties, standing many of the rules on their heads in the process."

Pamela is not a formula-type gardener. The chapter on placing plants, considering shape, size, and texture, brings the whole artistic business down to earth. She talks about spikes, spires, clouds, see-through plants, and sprawlers—and tells how to use them, not to try to make them into something else. She likes to break the rules: "Setting tall plants behind shorter ones is the logical thing to do but not always the right one." Pamela also has a sense of humor; consider this caption for *Panicum virgatum* with astilbe plumes in October: "Dead is beautiful."

There are a number of combinations within the pages that I blatantly intend to copy, as well as a number of plants I can't wait to get my hands on. To prove that I have a shred of credibility as a reviewer, I might mention that the color reproduction does not always do the photos justice. I am, however, a better gardener for having read this book, and I'll be an even better one if I really study it.

Flowers of Sichuan. Kazuo Mori. Japan. 144 pp., 276 color photos, 13 b. & w. photographs, several drawings and maps. 10 x 11". 6800 yen, hardbound. In Japanese with Latin tags for photographs. ISBN 4-88257-004-1.

by Panayoti Kelaidis

A few members of ARGS first met Kazuo Mori in February of 1981 when he presented dazzling slides of Japanese wildflowers at the Western Study Weekend in Portland. A few have done business with Trinity Alpines, his preeminent alpine nursery, or visited his nurseries or the public gardens he has helped develop in Japan. Others are aware of his many expeditions through the Himalayas and Western China. Anyone interested in the rich flora of East Asia should take pains to obtain this remarkable volume, filled with dazzling photographs, designed with the snazzy elegance that characterizes so many things Japanese.

Each family is grouped together, so you can feast on page after page of primulas, rhododendrons and aroids (as you would expect). You may be surprised to find five pictures of unfamiliar blue *Corydalis* or a true blue *Adonis* (*A. caerulea*). For lovers of the truly recondite, there is a closeup of an albino blossom of the normally scarlet *Meconopsis punicea*, and among the many remarkable orchid pictures, a 15-flowered clump of *Cypripedium flavum* x *C. macranthum* with chartreuse lip and pink-flushed, reflexed petals. The luminous yellow cups of *Meconopsis simplicifolia* with the snowy peaks of Sichuan in crisp focus in the background will transform even the most jaded gardener into a yearning alpinist. Bravo Mori-San! Long may you wander!

Errata

—#@!☆@#☆@!!!—

Bulletin of the American Rock Garden Society 49(2): Spring 1991.

Photo top of page 142 is by Judy Glattstein.

The Seed Exchange

1. *Seed will be accepted only until November 1, 1990.* An exception is late-ripening seed, which will be accepted later if an alphabetical listing has been received before that date. Overseas members, please try to mail before October 15.
2. *Send a minimum of 5 different kinds of seed suitable for rock gardens* to meet the requirement to receive donor privileges of 10 free packets and to have your order filled before those of non-donors. We do appreciate any amount of seed, even if you can't meet this quota. Emphasis should be placed on varieties suitable for the rock garden.
3. *Send clean, dry seed of suitable rock garden plants early.* Do not feel you have to send your whole offering at the same time, at a date close to the deadline.
4. *Use envelopes no larger than 2" by 4" (5cm x 10cm).* One envelope of this size filled with seed is likely to be sufficient for our requirements. As few as five seeds of a variety will be accepted.
5. *Mark each envelope clearly and legibly with the botanical name.*
6. *Include an alphabetical listing of the species sent, and, if collected in the wild, the location where collected and the altitude.* with the seed packets. Please make every effort to verify the accuracy of the names and to have the list correspond to the actual packets sent. For greatest convenience the listing should be on a standard 8 1/2" by 11" sheet of paper.
7. *If only the generic name is known, include a brief description such as height and color.* Both generic and specific names should be given where at all possible.
8. *Bind envelopes together with a rubber band in alphabetical order and place in a mailing envelope along with the alphabetical list.*
9. *Be sure your name and address are clearly written on the list and on the outside of the mailing envelope.*

All current members of ARGS will receive a seed list.

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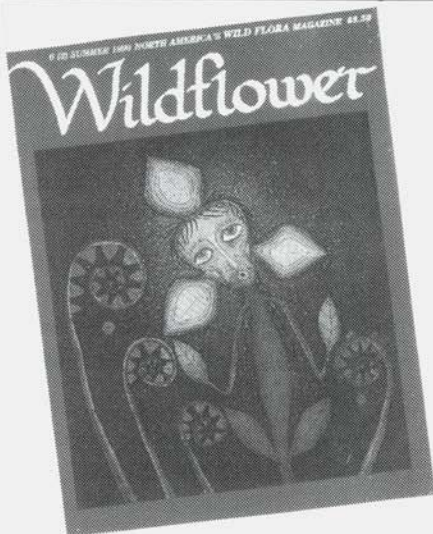
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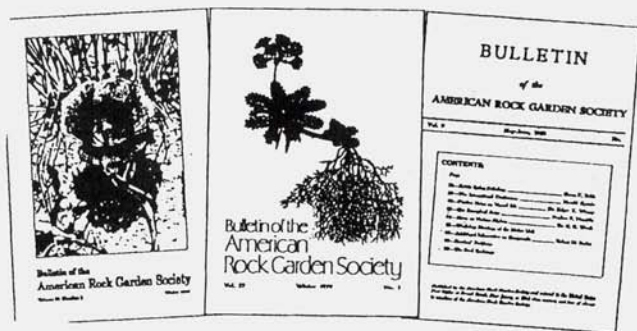
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