Bulletin of the

# American Rock Garden Society

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Cover: *Primula angustifolia, Rhodiola rosea,* with *Pardosa* sp.
by Cindy Nelson-Nold of Lakewood, Colorado

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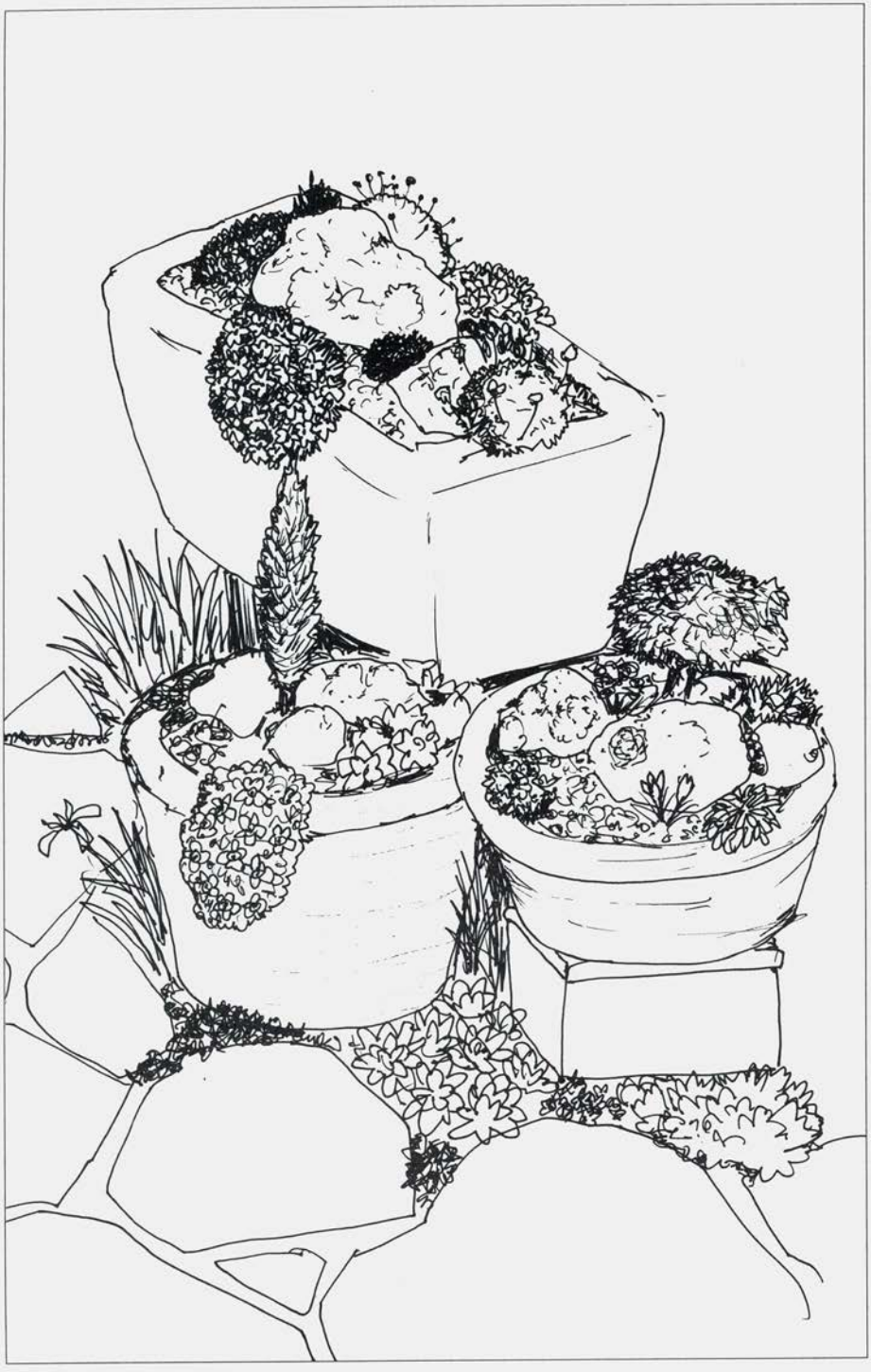
## Features



## Departments



# Troughs:

## A Special Love Affair

*by Gwen Kelaidis*

I am that variety of gardener who gardened although I lived in rented apartments, tilling first one yard, then another. In 1975 I inherited two troughs from my friend Jim Sawyer and planted them to sempervivums and sedums. They sat on either side of the sidewalk leading to the front door, taking the humble place of sentinel lions and eliciting many questions from passers-by. And when I moved to Colorado, they moved with me.

So began my adventures with troughs, but it wasn't until 1985 that I became a real devotee. Our friend Stan Metsker suggested pointedly that I plant anything important to me in troughs until we found a way to buy a house. It made sense, yet I had a large appetite for plants and would need many troughs.

I had tried my hand at making troughs in molds, and it was the unmolding process that was the problem. I have trouble even removing jello from its container. I tried the free-form trough, building upside-down in wet sand. Lumpy bowls with thick rims resulted, their shaved off bottoms usually not in quite the proper plane to have them sit flat when turned right side up. Thankfully, Stan offered to construct troughs for me, provided only that I would plant them for display at the 1986 Interim International Rock Garden Plant Conference in Boulder, Colorado. So began an extra-garden affair that has continued to this day.

A trough is a garden unto itself, a landscape and plant community complete on its own. The container frames and gives this landscape shape. Rocks and soil can be selected to suit the needs of the plants and can easily differ from those of the larger garden. The trough can be designed to represent a little slice of a natural ecosystem, or it may simply be a container with plants of similar stature and ecological needs, such as cactuses, or kabschia saxifrages. If I really want to grow a plant and can't meet the soil requirements in the garden, I dedicate a trough to it, as I've done with *Gentiana verna* (needing peaty soil) and *Petrophytum caespitosum* (requiring a tight, dry crevice).

There are three compelling reasons to place a plant in a trough rather than in the open garden.

*Plants Don't Get Lost*

Some plants are so small that they get lost in a rock garden. Examples include the tiny dryland *Penstemon pumilus,* choice *Talinum* species, such as *T. sedoides (T. okanoganense), T. brevifolium,* and *T. pulchellum. Lesquerella alpina* and *Penstemon acaulis* are almost that small, growing to an inch or two in diameter in some years. Other very slow growers include *Lepidium nanum* and *Kelseya uniflora.* In the garden such plants are easily overgrown by larger neighbors. They also have little visual impact even in bloom, unless planted in groups of five or more. Wouldn't we be lucky to have a dozen or two with which to experiment! In the meantime, I place them in troughs, where they are proportionately important and where I can keep an eye on them.

*Plants Live Longer, Bloom Better*

In the last eight years of growing dryland plants of western North America I have found that many simply survive *only* in troughs and not in the garden. Penstemons like *P. acaulis, P. laricifolius, P. angustifolius, P. humilis, P. caryi* are still blooming every year in troughs, while their seedpot mates have long ago died in the garden. *Astragalus spatulatus* and species of *Townsendia,* such as *T. hookeri* and *T. alpigena,* have long lives in these elevated homes. The ball cactuses, of which I am increasingly fond (*Echinocereus, Coryphantha, Mammillaria, Pediocactus, Sclerocactus*) seem to winter very well in troughs. Cactuses, especially opuntias, can change the design feel of a garden, but in a trough they can have a world of their own. Cactuses often self-sow, and seem happy with companions such as those mentioned earlier in this paragraph.

I can only speculate that this longer life for plants of the West has to do with the drier environment of the trough. All of my garden soils contain a large component of clay loam. In this climate with 12" to15" of rain, some clay is advantageous, giving the soil the ability to hold some moisture longer. However, in wet spells when we receive afternoon thundershowers everyday for a week or two, plants in the garden may get too wet. In winter, also, in the cold north shade of evergreen trees—where there is no shade in summer because of the higher angle of the sun—even acantholimons seem to suffer. In the troughs it just seems that the soil stays drier.

*Freedom of Design*

That great old adage of rock gardening, "Use only one kind of rock," can be sidestepped by the simple use of troughs. My 1986 Conference troughs were a discovery ground for me, a wonderful field of experimentation. I used many different rock types, from rounded sandstone boulders, to gnarled limestone, to slate, to the pebbles of desert pavement, each in a different trough. I had the opportunity to build with all these different rocks on a scale without back strain, front-end loaders, or a large budget. In far-flung places of the West I picked up rocks that I thought would look attractive in a trough, along with smaller rocks and a variety of pebble sizes for mulch. The plastic bags of pebbles have been hard to keep track of in the potting shed (once a garage). I have developed a system of sorts, keeping extra rocks and pebbles for each trough in a gallon-size or larger pot, and the matching gravel inside in a plastic bag. Eventually the mulch needs to be topped up, what with watering, replanting and, in my case, toddlers. It helps to hold your hand over the mulch while watering, so that no gravel washes off. When there

is simply no longer enough mulch, you are forced to return to the original location for more gravel—usually a great pleasure.

A favorite theme for design in a trough is to recreate a natural plant association. I try to achieve something of the feel of the landscape, using the primary or dominant plant types from the area. My Pikes Peak trough, then, had to include the famous *Telesonix jamesii*, the bright blue bells of *Mertensia alpina*, and still it is not really complete without *Eritrichium nanum, Primula angustifolia,* and *Androsace chamaejasme*. I have a trough from central Wyoming with dwarf sagebrush (*Artemisia arbuscula*), *Castilleja,* and a dainty *Erigeron*. I should add an *Astragalus* or two and the small creamy beauty *Physaria eburniflora*. The Laramie Plains trough has a glorious specimen of *Astragalus spatulatus*, along with *Townsendia exscapa*, a penstemon or two, *Selaginella densa* making a low, olive green patch of turf, and *Eriogonum flavum*. This trough I consider a great success, as plants are now self-sowing. I should mention that it is wonderful to have several plants of each species in the trough, echoing each other whether in bloom or out and giving the trough a sort of unity that a group of solitary beauties cannot achieve. Because of my interest in producing seeds, I prefer at least five plants of a kind in each trough.

Soil

My soils mixes vary. Each trough has different components, but all have some sand and most have gravel. Despite the recent bad reputation of these soil components, I find that sand and gravel improve the way water moves through the soil mix, making it easier to wet and faster to drain. Soil scientists speak of oxygen and air space, and sand and gravel often come out on the short end of the equations. This isn't surprising, since they are fairly large solid particles, and inside them there is no room for air and water. If a rock half as big as a pot is added to the soil of a container and the formula recalculated, the air space will be considerably reduced, but the plant roots, since they don't grow inside the rock, will not experience a decrease in available air. What has really changed for the plant is the inside *shape* of the pot. Similarly, large gravel in a mix doesn't impact the *air space* available to roots as much as the formulas imply but rather creates a convoluted soil *shape* within the container. Also, water moves more quickly through the pot along rock or gravel surfaces than it would through, say, a clay. The current formula neglects the factor of time. How *long* it takes for the air spaces to be cleared of water matters.

My peat trough has mostly peat and a little sand; the alpine troughs have some sand, some gravel, some clay loam, a little peat, and perhaps a little Turface; the dryland troughs have less gravel, usually no peat, perhaps more Turface. Turface is a baked clay product a bit like kitty litter, but baked harder, so that it doesn't break down. It makes the soil fluffier, and the only problem I have with it is that soil mixes with a high percentage of Turface tend to heave in winter. Sometimes I put more clay or more Turface in the bottom layer of soil in a trough, hoping that they will hold a little more water without being too oxygen-depleted. The upper soil layer of the trough is not so much different than the lower that the roots will be stopped at the interface—which is always irregular anyway. I abhor perlite in trough soils, because it floats to the top during watering. I will sometimes use spent potting soil containing perlite, but again, I bury it in the bottom layer of the soil.

Mountain Building

Only in a few cases, such as my desert pavement troughs, do I have the surface of the soil below the rim of the container. Generally I use three to five larger rocks to build a ridge, monolith, or outcrop. These add the dimension of height, the mystery of what's behind the rock, more niches for planting, and soil.

Watering

In Colorado it is necessary to water troughs every day in June, July, and August, unless one of those scattered thundershowers scatters your way. I prefer to water with a slow-running hose, the stream about twice the diameter of a pencil, often letting the rocks take the force of the water. I let the trough surface become completely covered with water to the brim of the container. It is my intention that every spot on the surface be covered with about 1/4" of water, and then I consider that the soil below is going to get enough moisture.

About half of my troughs have been located for three years now where they receive daily overhead water from my sprinkler system, designed to water small flats of seedlings. This works very well for the silver saxifrages, peat trough, and the true alpines, such as *Gentiana verna* and the Pikes Peak trough. Dryland plants from Wyoming grow well, but the mulch becomes covered with mosses. This disturbs me, but delights most Coloradoans who prize lush moss. Seedlings do come up in the moss—it just *looks* wrong to me.

Because of low humidity, intense sun, and wind, evaporation rates are very high here. I no longer attempt to grow plants in troughs containing less than a half-bushel of soil. They dry out too fast. I prefer containers that take about two bushels of soil mix.

Hot/Cold Protection

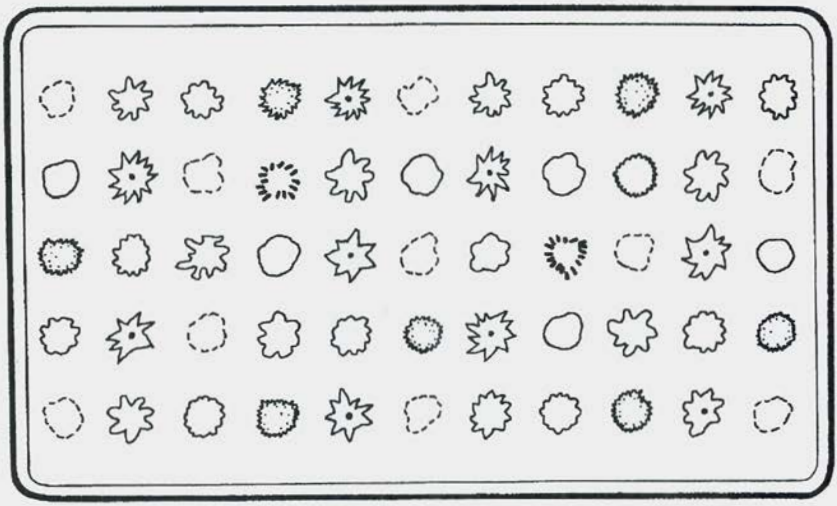
It sometimes get to -25°F in Denver, but within a day or two temperatures will again reach above 0°F. I don't protect my 35 or so troughs in any way from cold, not even by setting them on the ground, where temperatures probably change more slowly. I haven't noticed any winter losses. In summer, the small volume of soil is subject to heating to temperatures that may well be problematic for roots. I move all but the cactus well away from the east wall of the brick house, where the sun is a factor until almost 1 p.m. If it's really hot, I spray the outside of the troughs with water or spray the flagstone and hope that evaporative cooling will decrease the temperature below critical frizz.

Fertilizing

I think the most important fertilizing is to be done when the plants are in active growth, especially before flowering and, for roots, often in cool periods of early spring and early fall. I use Osmocote on the borders in late May and throw it at the troughs then too. It is only actively released in warm weather, so for bulbs and early spring bloomers like *Aquilegia jonesii*, I would think that a liquid application would be better. Perhaps a low-nitrogen, higher-phosphate blend like Peter's Blossom Booster would be most appropriate to rock garden plants staying in character and blooming their heads off. Three applications a year would be good; one is, of course, better than nothing.

Display

Troughs look great at entry ways, on steps, low walls, terraces, or even set into the garden proper. Do try putting some up on blocks or pedestals made with left-over hypertufa.



## Charlesworth Trough
Year 1

SIZE: Length 30" Width 20" Height 8"

EXPOSURE: Morning sun

SOIL MIX: Coarse sand, Jiffy Mix, Osmocote, gravel; No Soil

TOP DRESSING: Gravel or sand

—Allow about 12 square inches per plant

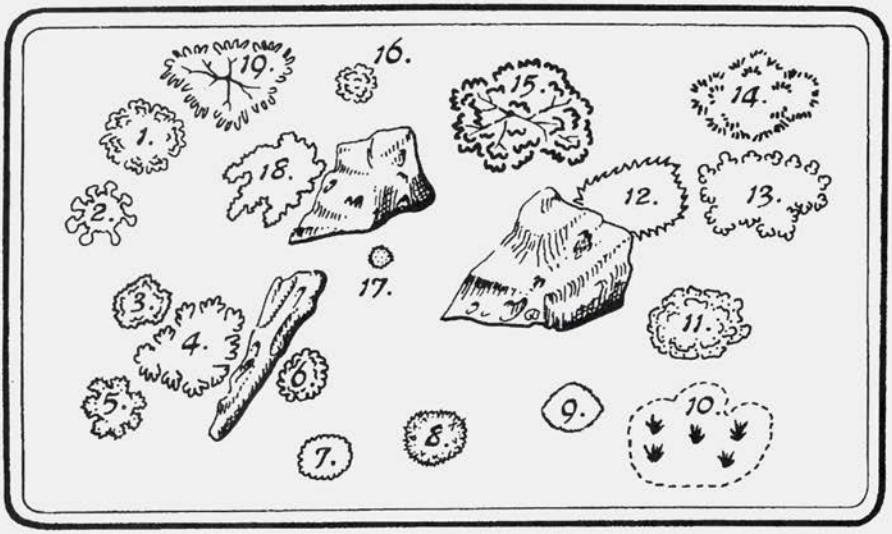
—Don't plant different species of the same genus in adjacent positions. This avoids confusion of names when labels break.

—Don't waste space with rocks, gnomes, etc.

—Plant as many Type 2 plants as you have or can afford.

—All the rest are Type 1a or 1c, but you can fill up with Type 3 and Type 5 if you haven't enough.

Gwen Kelaidis learned to garden at her mother's knee, pinching back tomatoes, weeding tall bearded irises, growing rose bushes, and eating raspberries. She later studied botanical taxonomy. Rock gardening was the inevitable end for such a combination. She now gardens in Denver, Colorado, with her two children, Eleni and Jesse, and husband Panayoti.




## Charlesworth Trough
Years 2-3

SIZE: Length 30" Width 20" Height 8"

EXPOSURE: Morning sun

SOIL MIX: Coarse sand, Jiffy Mix, Osmocote, gravel; NO SOIL

TOP DRESSING: Gravel or sand

—All the Type 2 plants are now dead.
—Introduce *Chamaecyparis*, *Daphne*, pieces of tufa, and seedlings of *Lewisia rediviva* to fill in the gaps.

1. *Arabis bryoides*
2. *Eriogonum ovalifolium*
3. *Androsace carnea*
4. *Campanula raineri*
5. *Androsace mathildae*
6. *Campanula cochlearifolia*
7. *Draba rosularis*
8. *Saxifraga paniculata* 'Minutifolia'
9. *Draba rigida*
10. *Lewisia rediviva* seedlings
11. *Phlox pulvinata*
12. *Silene acaulis*
13. *Dicentra peregrina*
14. *Vitaliana primuliflora*
15. *Chamaecyparis* 'Snow'
16. *Draba bryoides*
17. *Eritrichium howardii*
18. *Androsace villosa*
19. *Daphne retusa*

# Plants for Troughs

## *by Geoffrey Charlesworth*

I should explain at the outset my attitude towards troughs, so that you will be under no illusion about expecting advice from me about actually planting troughs. I admire a well planted trough—"planted for effect"—which is stereotypically a cross between a Japanese landscape, a toy alp, and a doll house backyard, engagingly displaying two or three small lumps of tufa, a couple of dwarf conifers, and closely packed baby plants around the rocks. I admire it, but I don't want to do it myself. Beyond this innocent charm, troughs have at least two good reasons for existence as horticultural tools. The first is aesthetic: you can examine plants with greater ease and pleasure if they are in a trough at a comfortable height—between shin and elbow level. And some plants are so diminutive that they can be easily lost in a rock garden and only make a statement when the frame around them is also small. Using troughs is several aesthetic steps on the way to "natural" beyond growing them in pots in an alpine house. The other reason is horticultural: some plants are happier in troughs, where exposure can be changed or modified relatively easily, where soil mixture and watering are controllable, and where winter protection is more manageable. On the negative side, any care which involves actually moving troughs would have to be avoided by most of the gardeners I know.

So by-passing the discussion of how to arrange plants and how a trough ought to look—taste and aim being very personal matters—I want to mention a few of the plants I have tried to grow in troughs and in their near relation, small raised beds.

We might start with what not to grow. Of course, there is nothing that you couldn't put into a trough if you really wanted to, but it would be perverse to want to grow a tree, unless you were willing to bonsai it, and that would be a different hobby. Nor would you grow border perennials. Actually, even 8"-tall plants look "wrong," unless you stuff the trough full of annuals and trailers as though it were any old planter. But if you want to grow alpine plants with the "right" scale (your judgment), you will want their non-flowering parts

to be less than 6" tall and probably less than 2". And when the flower stalk develops, 6" will seem like a very tall plant, unless the trough is really big. Also, we want the planting to last a long time (forever). This is more of an ideal than a practical aim, because mortality of plants in troughs is at least as high as it is on the slopes of the rock garden. What we must not do is plant a robust grower that will spread to fill the trough in one season. However beautiful it looks, you will have a planter and not a trough. The graceful, green waterfall flowing over the edges of the trough is also colonizing the flat spaces of the interior. Don't plan for this kind of disaster. A trough is a terrible thing to waste.

Unsuitable plants are most *Arabis, Aurinia, Alyssum, Iberis* (regretfully), *Aubrietia, Phlox subulata, Silene, Viola, Delphinium, Aquilegia, Campanula, Thymus, Antennaria, Artemisia.* In fact, most plants are not suitable for troughs. You know after one season whether this or that plant deserves a trough. The worst thing you can do is to plant a rare, expensive, but unsuitable plant that hates to be transplanted in a trough. *Arnebia echioides*, for instance, is far too big for most portable troughs and has a root that doesn't like to be disturbed. A dwarf conifer may have to be avoided for the same reason: you may lose it when the inevitable transplant operation is attempted at the end of the year. You could lose the trough, too, in the struggle. I consider plants such as *Ramonda*, auricula primulas, *Lewisia tweedyi, Saxifraga longifolia*, etc., too large for a trough. You may be able to accommodate one specimen plant of this magnitude, but if it is happy, it will overpower a medium-sized trough, and if it is miserable, it will spoil the effect and die, leaving a large gap that the eye can't overlook.

Another type of plant you may want to avoid is the too happy self-sower. A trough will always look raw and freshly made until there is some self-sowing, and even though a newly planted trough wins a popularity contest at a plant show, it won't impress the *cognoscenti*. A mature trough has volunteer seedlings of good plants along with the inescapable mosses and lichens. But enough of a good thing is all you want, and some species are far too generous. So it may be best to avoid annuals and biennials and plants such as *Chaenorrhinum oreganifolium, Lewisia pygmaea, Erinus alpinus*, and anything else that looks cute colonizing the rock garden too gaily. If I subsequently recommend a self-sower, it will mean it hasn't yet exceeded its quota of offspring in any of my troughs.

Type 1a

Type 1a plants form mounds that grow slowly enough so that even after five years or more you still have a lovable hump about 5" across. Perhaps the most satisfying and satisfactory groups of plants for troughs are *Androsace* and its near relatives, *Douglasia* species and small alpine primulas. I will divide them into types in order to pigeonhole many other species. The first type covers those androsaces that are IDEAL for troughs. *Androsace villosa* var. *arachnoidea* is the epitome of this group, along with its soul-mate, *A. muscoidea*. These beautiful plants are easy-going, too. Growing more slowly is *A. pyrenaica* and its hybrid with *A. carnea*, sometimes called 'Millstream'. These form harder mounds of less fuzzy foliage. You

could also try *A. ciliata, A. hausmannii, A. hedraeantha, A. hirtella,* and *A. obtusifolia* and *A. pubescens. Androsace lactaea* is easier than any of them and self-sows generously, so it might belong in Type 1b. The categories are not clear-cut.

Douglasias are American cousins of androsaces. *Douglasia laevigata, D. nivalis, D. montana* are all highly desirable plants for troughs. Some primulas would be at home with androsaces: *Primula minima, P.* x *bileckii*, and *P. villosa* are low enough.

Other plants with this ideal mound or bun growth pattern include many of the drabas. The very best for beauty and amenability is probably something from the complex of species found under the names *Draba rigida, D. bryoides,* and *D. compressa.* I have had various plants with these names, and by now I tend to call them all *D. rigida.* The mounds are hard and tight, and almost indestructible. Expect contented expansion for at least ten years, by which time there will be plenty of seedlings for the new trough you will have to make. (Troughs don't stay "in beauty" for much longer, and you usually have to empty and replant much sooner.) These drabas are Type 1a plants that perform all through the year. If you are one of those eccentric people who doesn't like yellow, just close your eyes in early spring—you can still grow *Draba rigida* with perfect integrity. Other drabas that fit into this mound-making group would include *D. caucasica* (like an even finer *D. rigida*), *D. rosularis* ( splendidly hairy and totally impervious to winter wet), *D. paysonii, D. sierrae,* and many of the *aizoides* group (for instance, *D. hispanica, D. hoppeana, D. parnassica, D. aizoides).* But every new draba should be tried.

From genera whose other members might be dismissed as unsuitable are *Arabis bryoides, A. androsacea, Edraianthus pumilio, E. serpyllifolia, E. dinaricus, Jasione amesthystina, Eriogonum caespitosum, Degenia velebitica, Gypsophila aretioides*, and the plant everybody wants: *Petrocallis pyrenaica.* Not all the species of *Thlaspi* are worth putting in a trough, but *Thlaspi rotundifolium* and *T. stylosum* are excellent. The best species of *Leontopodium* form mounds, too, even though they don't seem to live very long. Perhaps *L. nivale* is the ultimate in white foliage and elegant form. The western cushion *Phlox, P. pulvinata, P. condensata, P. bryoides,* and *P. hoodii* are all exquisite plants perfect for a trough. Treat *Dianthus* species with caution, but *D. pavonius* would probably behave well enough. One thyme, *Thymus* 'Elfin', and one geranium, *Geranium argenteum,* are not too rampant for a trough. *Helianthemum bryoides* is a tight, tiny shrub that starts off as a bun. *Lesquerella tumulosa* is the best representative of that genus.

*Bryoides* (mosslike), *tumulosa* (mound-forming), *pulvinata* (cushion-forming), and *condensata* (condensed) are all encouraging specific epithets to look for when you are in doubt about using a plant in a trough. *Nana* (dwarf) also sounds good, but you have to know what the regular size would be.

All the Porphyrion section saxifrages are excellent trough plants. You can also raise the species from this section from seed and get good "troughophiles." Try *S. ferdinandi-coburgi, S. ferdinandi-augusti, S. marginata,* and amongst the easiest hybrids are *S.* x *apiculata, S.* x *elisabethae.* But any hybrid Kabschia is worth putting in a trough. Many sax-

ifrage enthusiasts have troughs containing only saxifrages; since all bloom at roughly the same time, there is a spectacular concentration of color in late winter or early spring.

Type 1b

These are small buns and rosettes that tend to self-sow. Clusters of individual plants rather than notable mounds would be characteristic. *Androsace carnea* and *A. mathildae* are the obvious representatives. Well, you could find a mat of *A. carnea* eventually, but mostly what you get is a lot of small plants dotted around your miniature landscape. These are growing from seed overlooked by the local ants. *Androsace carnea* has some lovely forms with large, pink flowers and some indifferent, leggy whites, especially under the name *A. brigantiaca. Androsace mathildae* is always white, with relatively big flowers sitting wide-eyed directly on quarter-sized, hard, deep green buns. Does a single rosette make a bun? As they self-sow, such plants give special continuity to the planting and an escape from the tyranny of the even spacing you are forced to use when you first start the trough.

Other type 1b plants include *Physaria alpina* (not a bun, but it self-sows agreeably), the aizoides drabas, *Gentiana verna* (you have to be good to get this one going), *Primula scotica* (another minor miracle), and *Primula modesta.* By now, I would definitely avoid annual androsaces (*A. lactiflora, A. septentrionalis*) which quickly become a nuisance, taking up valuable space and smothering their betters. *Androsace armenum* is biennial and borderline acceptable, being prettier and less bountiful with its seedlings. *Papaver alpinum* in its many subspecies and forms is also dangerous without constant removal of seedlings. There are many composites that form buns, mats, or rosettes that will self-sow. *Erigeron compositus* is the most reliable, but only allow a really good form to remain (short stems, strong color, tight foliage, and it must have ray flowers). Most *Dianthus* are willing self-sowers and a compact one like *D. freynii* might be tolerated, especially if you are willing to pluck out the larger, more splendid specimens. If you don't, the dianthus will take over.

Type 1c

These are mat-formers that spread by stolons, mostly, but by the time you have a decent mat there may also be some self-sowing going on. *Androsace chamaejasme* is a good example and *A. sempervivoides* an easy one. You may have to remove bits of plant if they encroach on other plants. For this reason, I don't think *A. sarmentosa* is a good trough plant. It will fill the whole space in too short a time. If you plant a trough with other aggressives that can take care of themselves you can have a trough full of color for a couple of seasons. But would you want to use a trough in this way?

Every true mat that roots down as it expands has to be watched in a trough. Some grow so slowly that their tenure in the same trough lasts many years, forms of *Iberis saxatilis*, for instance. The plant may come as *Iberis pygmaea.* Some encrusted saxifrages will take forever to grow into large mats. *Saxifraga paniculata* 'Minutifolia' is one of them, but others grow too large to be in a trough for long. *Erigeron chrysopsidis* var. *brevifolius* and *E. aureus* make low mats of yellow daisies. Townsendias would also make perfect mats, if only

they would live a reasonable length of time. Sometimes you get a glimmer of possibility from *T. rothrockii*, but you have to be content with a transient most of the time. *Petrophytum cinerascens* seems to be the easiest *Petrophytum*. The mat is a tangle of fine gray leaves, and the flowers are 2" astilbes. Gentians of the *acaulis* group form good solid mats at varying speeds. Watch that their splendid fat flowers don't steal the space of their neighbors. Many alpine primulas also form mats that look good in a trough. *Primula clarkei, P. minima, P. wulfeniana* are low. Many of the auricula hybrids are too tall and too vigorous. *Primula auricula* itself can form beautiful clumps of rosettes, but in flower it may look top-heavy.

The small western American heucheras form attractive mats with pretty leaves, as does *Telesonix jamesii*. Try *Heuchera grossularifolia* or *H. pulchella*. Several good penstemons form mats or near mats: *Penstemon laricifolius, P. aridus, P. linarioides, P. teucrioides, P. caespitosus*. Some eriogonums form mats without swamping other inmates: *Eriogonum douglasii, E. kennedyi* , and well-behaved forms of *E. ovalifolium* and *E. flavum*. *Helianthemum canum* var. *balcanum* forms a perfect gray mat and is a mild self-sower. There are many small alyssums such as *Alyssum propinquum*, but in my experience most of the elegant alyssums wither and die after flowering or leave too many offspring.

There is another *Androsace* that needs its own pigeonhole. *Androsace lanuginosa* is a trailer. It sends out long stems that don't root down in any obnoxious way, but in a trough it needs to be planted at the edge and instructed to keep its stems outside the trough. If you want your trough to bloom into late summer, this plant is indispensable. For a similar trailing effect, you might use a small summer gentian such a G. *grossheimii,* or even a fall gentian, *G. sino-ornata*, but their many stems and substantial flowers could wreak havoc unless you allowed them plenty of precious space.

Type 2

These are even better plants than Type 1, meaning more desirable, more beautiful, more rare, more difficult. In an alpine house, they may be easy; in a trough they may only merit the description "possible." The trick would be to regulate soil and weather. One good first move is to plant these prima donnas in a trough you can lift and move. At least you would be able to regulate the amount of sun, and in winter you would be able to haul them into a coldframe for protection against fickle precipitation. Everybody with such a trough should try *Androsace vandellii*, the queen of androsaces. After three or four years you may achieve a perfect grayish mound two or three inches across covered with exquisite white flowers. It will then probably die. But it isn't monocarpic; there will have been a scattering of flowers in the build-up years. And with skill and luck you could keep it much longer. Those that can, do; those that cannot, weep. Close in godliness are *A. alpina, A. helvetica,* and *A. brevis.*

Non-androsaces that would fill you with joy but are more likely to burden you with grief are *Physoplexis comosa, Kelseya uniflora*, any *Dionysia, Veronica bombycina, Primula allionii, Aquilegia jonesii, Draba mollissima, D. acaulis, D. polytricha, D. propinqua, Calceolaria*

*darwinii,* and a long list of other southern hemisphere plants. Some of these plants might be quite easy in a climate less rigorous than mine in Massachusetts, or in an alpine house. So try these plants patiently, and only admit defeat when you are convinced they are not worth the cost of a controlled-temperature alpine house. I haven't yet succeeded in raising an *Acantholimon* that was really happy, nor a *Convolvulus* I could be proud of, but if I could, they would go into a trough. *Eritrichium nanum* doesn't really like living outdoors, even for a summer, but *E. howardii* can live in a trough for two or even three years. Another short list of failures includes: *Notothlaspi rosulatum, Paraquilegia grandiflora, Anchusa caespitosa, Campanula piperi, Centaurea achtarovii,* and *Dicentra peregrina*. Difficult gentians for troughs would include *G. froelichii, G. orbicularis* and *G. pyrenaica.* If you grow as many as five of these ultra plants in troughs you can give yourself a ten for superior plantsmanship.

Type 3

These are less good plants than Type 1 in the sense that they are too vigorous for a long-term sojourn in a trough. *Androsace sarmentosa* is the paradigm: An excellent plant in the rock garden, it grows too fast for a trough. You could use it if you were very firm about not allowing it to spread farther than you want. Use cuttings as propagation material. It roots very easily.

A list of similar plants would be endless but would include miniature mossy saxifrages such as 'Peter Pan'. A normal *Saxifraga trifurcata* wouldn't work though. By the time it has reached flowering time the mat billows over its neighbors; hacking it back then is too late, and the beauty of some large mounds is ruined by indignant scissor-work. Even some encrusted saxifrages misbehave in troughs and don't take kindly to hacking. But if you don't mind growing plants that you will have to discipline, try *Aubrieta pinardii, A. scardica, A. canescens, A. thessala; Alyssum pulvinaris* or many other mat-forming alyssums; *Draba sibirica, Asperula gussonii, Vitaliana primuliflora* and its many subspecies; *Campanula betulifolia, C. raineri, C. cochlearifolia*, and other mats; but not *C. carpatica, C. poscharskyana, C. rotundifolia* or any other rollicking, happy-go-lucky plant that should only be let loose in a large rock garden.

Type 4

There are types of plant with no *Androsace* example: Trees and shrubs. Apart from dwarf conifers, which are almost a cliché in troughs, you could consider daphnes that grow quite slowly in their early years. You would have to find a permanent home in the garden after three or four seasons. *Daphne jasminea, D. petraea, D. retusa,* and *D. arbuscula,* and a dwarf form of *D. cneorum* are all possible. There are excellent shrubby penstemons that can be used to add woody texture: *P. davidsonii* has many forms, and you can find a small-leaved, tight mat. Since you are going to give winter protection to some of your troughs you could try *P. newberryi* and *P. rupicola*. In the open garden these two are liable to get severe die-back. There is a tiny elm, *Ulmus parvifolia* 'Hokkaido', that stays dwarf for a long time. Just be careful when you look for "dwarf" shrubs that the word means small in all its dimensions. You wouldn't want to put in a trough

a plant like *Prunus pumila* ssp. *depressa,* which hugs the ground but spreads far and wide quite rapidly. Many mat-forming salixes are suitable for a time but need room to spread. *Salix reticulata* is the safest, the hardest to find, and the hardest to keep. Some junipers would form mats, too. But I think a list of dwarf conifers would be out of place here. There are so many, and it would spoil your fun to single out any of the scores of beautiful possibilities. Other deciduous shrublets would include *Hypericum coris, Fumana thymifolia, Eriogonum thymoides.* There are a few woody alyssums, for instance *A. davisianum.* But the effect of these little shrubs is more moundlike than tree-like, and none of them takes the place of a daphne.

Type 5

These are plants that blaze away for one season but cannot be relied on to do it twice. They are irresistible for a trough because of reason 1 above (the aesthetic reason) and if you can actually succeed with them, reason 2 (the horticultural reason) comes into play. *Dianthus alpinus, Phacelia sericea, Iberis candolleana, Calceolaria biflora* come to mind. Also, the dwarf lupines from the Rockies: *Lupinus breweri* and *L. lepidus* ssp. *lobbii* rarely stay a second year. Nor does *Mertensia viridis* or *M. alpina.* Even *Polemonium viscosum* is unreliable. You could call them the only annuals worth growing in a trough, except that there are genuine annuals I wouldn't exclude such as *Sedum pilosum.* Townsendias too are always welcome whether they are annual or biennial. *Inula acaulis* is a biennial and *Laurentia minuta* an annual, and both are worth growing.

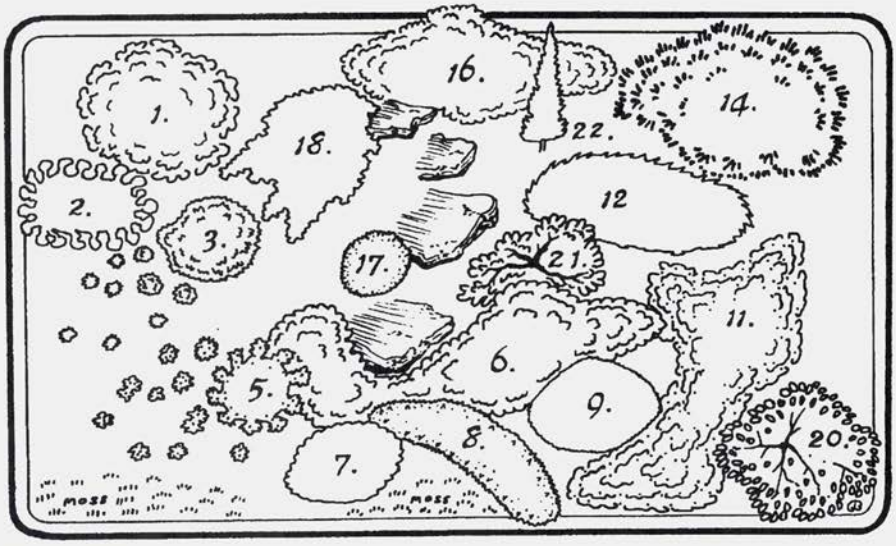
Type 6

Succulents and cacti may need troughs for themselves. We tend to have immovable prejudices about them, associating them with desert conditions. But many alpines grow in desert conditions, and many cacti are alpine plants. My reasons for segregation would be self protection and possibly aesthetics. Anyway, you can find room for *Coryphantha vivipara* and other *Escobaria* and *Echinocereus. Orostachys spinosa* would fit into any planting. Other succulents would include *Talinum okanoganense* (*T. sedoides*), *Lewisia rediviva, L. rupicola, Spraguea* (*Calyptridium*) *umbellata,* and any other miniature example. *Lewisia cotyledon* is worth a monoculture trough. If well-grown to portly perfection, it would use too much space in a small trough. Sedums, sempervivums, and delospermums are tempting as groundcover, but even the smallest is too vigorous to be allowed near Type 1 plants. Better to try monoculture for them, too.

Well, I could go on inventing types forever, and there are many plants that are useful that don't fit into any of the categories so far. Where shall we place *Astragalus* and *Oxytropis*? We obviously don't want to put *A. gmelii* in a trough, but there would be nowhere else for *A. ceramicus*, which needs all the coaxing you can muster to produce its spectacular pods. Then there are the multiple rosette formers such as *Jurinella moschus, Claytonia megarhiza, Carduncellus rhaponticoides, Crepis pygmaea,* and *Limonium minutum.* Shall we grow *Delphinium luteum*? You can answer questions like the last one by trial and error. If you like it, obviously you find a way to grow it. In time we form our own ideas

about what a trough should be used for and ultimately what it should look like. The miniature scene becomes irrelevant. If you insist on a reduced version of Nature, you will think of a trough without rocks and miniature trees to represent the alpine tundra or even a woodland clearing. You can do and think what you like.

*Geoffrey Charlesworth's new book,* A Gardener Obsessed *(David Godine, Publisher) will be off the press in August.*




## Charlesworth Trough

### Years 4-5

—The *Chamaecyparis* was too big, the, *Daphne* died. The tufa looks awful, so remove it. Fill the gaps with flat rocks. Several plants are now self-sowing, and a few have become large mounds and mats. The moss is not yet a pest. You have room for a few additions, so why not try some kabschia saxifrages?

1. *Arabis bryoides*
2. *Eriogonum ovalifolium*
3. *Androsace carnea*
5. *Androsace mathildae*
6. *Campanula cochlearifolia*
7. *Draba rosularis*
8. *Saxifraga paniculata* 'Minutifolia'
9. *Draba rigida*
11. *Phlox pulvinata*
12. *Silene acaulis*
14. *Vitaliana primuliflora*
16. *Draba bryoides*
17. *Daphne retusa*
18. *Androsace villosa*
20. *Penstemon davidsonii*
21. *Daphne arbuscula*
22. *Picea* 'Little Gem'

Assorted troughs, West Chester, Pennsylvania — Michael Slater

Troughs in the garden of Gesa Robeson, Denver, Colorado — Dick Bartlett

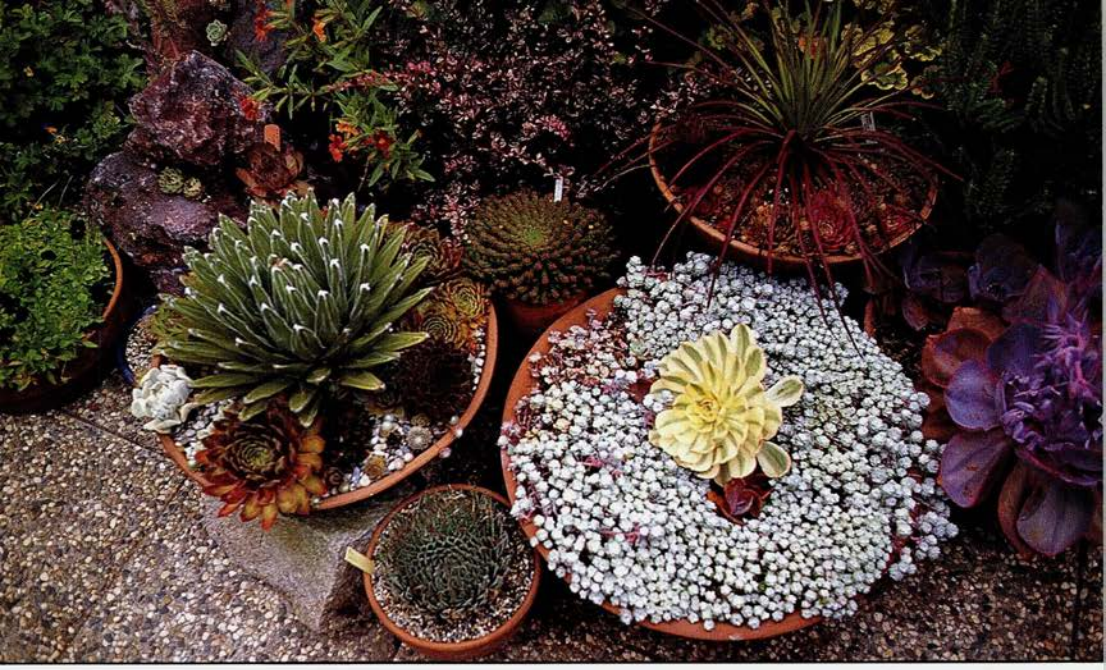
Trough at Royal Horticultural Society Garden, Wisley Dick Bartlett

Jane Grushow

Trough display in Rex Murfitt garden,
Victoria, British Columbia

Rex Murfitt

Jane Grushow



Container gardens in San Francisco — Dick Bartlett

Regional trough display, June 1979
at Vanderpoel garden, Barrington, Illinois — Waid Vanderpoel

# Trough Construction

## *by Michael Slater*

A trough is a planter for alpines and other small plants, made of simulated stone. The simulation of an old stone sink or watering trough is a very important part of trough making. A mixture of Portland cement with peat moss and perlite (as a substitute for the sand and gravel of normal concrete) is used. This special mixture is often called hypertufa. Because of its ingredients, hypertufa is much lighter than regular concrete. A trough made of hypertufa can be very strong and durable.

Troughs should be good for growing small plants, long lasting and good looking. Let's face it, making troughs is in fact work. Very few people make troughs for the fun of it, although children can get great pleasure out of the mud pie aspects. Rock gardeners make troughs to grow plants in. If you build a trough, and plants won't grow well in it, or if you don't like the way it looks, you have wasted your time building it. Ideas for designing trough plantings to meet plants' cultural requirements and your aesthetic needs are thoroughly covered elsewhere in this *Bulletin*. This article discusses some recent techniques and refinements of previously described methods for trough construction.

I first learned of the use of extruded polystyrene foam for molds and of fibers for reinforcing hypertufa at the 1990 Eastern Winter Study Weekend. Nicholas Klise shared his methods of using acrylic bonding agents and of metal rings with hardware cloth for large drainage holes. I am grateful for this information, as it has made my trough making much more productive and pleasurable.

### DESIGN AND PLANNING

You probably have some idea of the kind of trough you want. First determine size, shape, color and texture you want for the finished trough. Consider the size of the plants you want to grow and the probable weight of the fully planted trough. The proportions of length to width and to height are important. A trough that is deep and narrow looks strange and unnatural. One tall, square trough I made bore an uncanny resemblance to an old milk box sitting on a front porch.

Make a plan for your trough, a detailed drawing or a good mental picture, depending on your experience

and how exacting your desire for your trough to look just so.

SIZE

For the purposes of this article small, medium and large troughs are defined as follows:

Small

Less than 12" in the longest dimension and usually less than 8" deep. A small trough can usually be moved by one person without much difficulty.

Medium

12" to 24" in the longest dimension and 6" to 12" deep. When planted, two people will be needed to move it safely.

Large

Greater than 24" in longest dimension and 12" or more deep. My largest trough is 36" long, 18" wide, and 12" tall. Even empty, it requires two people to move it, and after planting two *strong* people are needed to lift it.

Based on my experience and empirical observations, small and medium-size troughs should have walls 1.0" to 1.5" thick when made as described below. Large troughs should have 1.5"-2.0" inch thick walls to be frost-proof and strong enough to handle.

DRAINAGE HOLES

There are several different ways to provide drainage in a trough. Holes may be drilled after the trough has cured by using an electric drill and a 1/2" masonry drill bit to put in as many holes as wanted in the lowest spots in the bottom. Some people like to pre-form the holes by putting dowels in the bottom, packing the hypertufa mix around them and then removing them at the unmolding stage. For those who want large holes, put a metal or plastic ring the same thickness as the bottom of the trough in the center. After the wet hypertufa is in place then put a piece of hardware cloth (metal screen) over the hole to keep the soil in the trough. Put some hypertufa on the hardware cloth where it extends beyond the hole to keep it in place. A metal ring can easily be made from a tuna can or from metal flashing cut with tin snips and edged with duct tape to prevent cut fingers.

No matter what type of drainage hole I put in a trough, at planting time I cover it (them) with material to keep fine soil in and creatures like pill bugs out. I use Reemay (spun, bonded polyester) or fiberglass window screen.

FORMS AND FORM MATERIALS

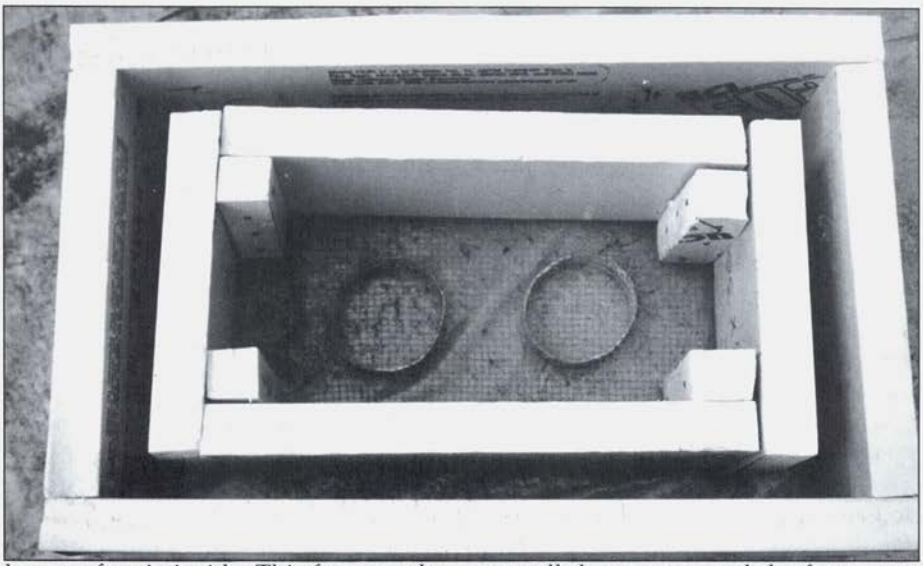
There are two basic construction techniques for troughs described below. A stable and strong work surface is recommended. The two methods really only differ as described in this section.

FREE-FORM TROUGHS.

Make a pile of sand, the shape and size you want the inside of your trough to be, cover it with plastic and then apply the hypertufa mix until the desired thickness and shape is achieved. Upside-down bowls may be put under the sand to take up space and save on the amount of sand needed for the form. Thus the trough is upside down while you make it. You must lay the plastic on carefully and fold so it lies flat against the mold and the ground around the mold. Everywhere the plastic sticks up there will be a grove or hole in your trough, which may weaken it.

FORMS

The second way to make a trough is to use an upright form and pack the



hypertufa mix inside. This form can be square, rectangular, round, or oval. Extruded Polystyrene foam insulation board makes excellent forms for rectangular troughs; it is both easy to work with and durable. Foam molds are reusable, much better than cardboard boxes, and easier to build than wooden forms. This foam comes in 1" and 2" thicknesses. I use the 1" for small troughs and 2" for medium and large troughs because of its greater rigidity. Ask for Polystyrene foam at places that sell building supplies. I usually get 2' x 8' sheets instead of 4 x 8' because they are easier for me to get on top of my car.

The foam is easily cut with a thin-bladed paring knife. Just pull the knife along at a shallow angle and cut halfway through, then pick up the foam and break it over your knee or on the edge of a table. Cut two pieces of foam to the desired width of your trough, two to the desired length plus the thickness of the foam (these will overlap the shorter two sides). Place your four pieces in the desired position and push long nails into each corner. Then wrap the form with duct tape all the way around the form near the top and the bottom to hold it all securely together. I have recently found that 4" deck screws applied with an electric screwdriver work even better than nails to hold the corners together.

I have given up using an inner form when I make troughs, for several reasons. First, it is difficult to get the hypertufa mix packed in well unless it is mixed up with too much water. Second, I find that I end up with thin weak corners and bulging sides, which is exactly the opposite of what I want for strength.

For oval and round trough molds, check plastic tubs, waste cans, and such at your local discount store for shapes and sizes you like.

Grease is NOT needed to prevent the trough from sticking to the mold.

Hypertufa Ingredients and Recipes

The standard recipe for American hypertufa contains 2 parts Portland cement, 3 parts sieved peat moss, and 3 parts of perlite, all measured by volume. Then enough water is added to make it moist. This basic mix has been very effective for making frost-proof

troughs for many NARGS members since it was first published by the Fosters. The proportions are important. Don't put in more cement than the recipe calls for; it won't gain your trough much—if any—strength! Ratios of proven effectiveness are 2: 3: 3 and 1:1:1. With the 2: 3: 3 ratio you will need about 30 pounds of cement, 1 cubic foot of compressed peat moss, 1.5 cubic feet of perlite to make one small to medium trough. Splitting this into at least two batches makes it easier to mix well and fit in a reasonable mixing bin.

Use white Portland cement and cement coloring powders if you want to have a final color that does not contain gray. Or even if you want a gray, you have control over how much. I like my troughs to be brownish or gray-brown. Many different shades of cement coloring powders are available; the browns and black (for making gray) are very suitable for naturalistic, simulated stone troughs. They are not degraded by the strong alkali produced as the cement cures. Look for them at masonry or concrete supply houses. Suppliers who will weigh out and sell you the amount you want in bulk are usually much cheaper than those that have only pre-boxed coloring powder available. You will have to experiment to get the depth of color you want, but start with a cup or so of powder to a batch of hypertufa.

Sieve the peat moss before using it to break up lumps and eliminate sticks from the mix. This makes it easier to mix and mold the hypertufa.

The perlite is used as it comes from the bag. Some people dislike the look perlite gives their troughs and use sand or gravel instead. This is great if you are willing to live with significantly heavier troughs. I find that after a year or two you can't see the perlite any more on the surface of the trough, and even when visible, I think it gives a trough a granitic look.

For safety, use a dust mask when working with dry cement, perlite, and peat moss. Waterproof gloves prevent skin irritation from either wet or dry cement.

## ACRYLIC BONDING AGENTS

Modern additions to hypertufa are liquid acrylic bonding agents (for

strength) and synthetic fibers (for reinforcement). Add acrylic bonding agents to the mix when you add the water. Look for an agent labeled permanent or non-rewettable. Available brands include Acryl 60 and Embond. These may make the final trough stronger, but no experimental data exist to prove it. I usually add one or two cups to a batch of hypertufa mix. The acrylic liquid is used in the masonry trade for making mix adhere to other things, as in patching or repairing. For repairs to troughs, mix the appropriate coloring powder with a ready-made mortar mix, and add an acrylic bonder according to directions for maximum adhesion. Fill the crack or break and hold the pieces together for a day or two. Placing the trough in the original mold works very well for this purpose, if it is available.

REINFORCING FIBERS

Fiberglass or plastic fibers replace the chicken wire that was formerly used as a reinforcing material. The fibers—or chicken wire for that matter—are technically referred to as secondary reinforcing materials. As concrete cures, small cracks form. Secondary materials prevent these cracks from growing together to form bigger cracks. Neither material in itself provides much rigidity to the trough, as both are flexible.

Several brands of fiber are available. The only brand I have used is Hi-Tech Fibers. This brand has worked very well when added to the *wet* hypertufa mix as they have a hydrophilic coating. Since the fibers are mainly used by professionals on large jobs, the instructions say things like "use 1.5 lbs.. of fibers per cubic yard of concrete." This works out to 1/10 oz. per gallon of mixed and wetted hypertufa. Since this is a difficult measurement to make, just put in enough so you can see a significant number of fibers as you mix. Add them slowly while mixing continues, to avoid formation of large "fur balls."

Follow the directions when using other brands. Finding a source for fibers can be difficult. Home building centers may not have them. Look in the Yellow Pages under building or masonry supplies, and when you call just ask for fibers for reinforcing concrete. They will either know right away what you want, or they will give you the telephone equivalent of a blank stare. I get mine at the same supplier who sells the extruded foam. The cost of the fibers is generally modest.

MIXING

Measure the dry ingredients (cement, perlite, peat moss, and coloring powder, if you want it) into your mixing container, and mix them thoroughly. Then start to add the water slowly (mixed with the acrylic bonder, if you wish). The amount of water needed depends on the dryness of the ingredients, especially the peat moss.

Use as little water in the hypertufa as possible. After each addition of water test the mix as follows: Take a handful and squeeze it to try to form a ball that will hold together when you open your hand. When you squeeze the ball, it should be firm and just a little water (a few drops) should come out between your fingers. Instructions on trough making that I used when I made my first troughs called for water to be added until the mix reached the consistency of cottage cheese. Apparently the "wateriness" of cottage cheese varies from dairy to dairy around the country. Many people (including me in my early batches) made the mix too wet.

The amount of water used has a huge effect on the final strength of the trough. Too much water in the mix

will cause a weaker final product. Twice as much water will cause the final trough to be half as strong. Work with as dry a hypertufa mix as you can get to do what you want in the way of shape.

As you add water, stir the batch so the material gets uniformly wet. After the mix is partly wetted, I add the High-Tech Fibers a few at a time so they are evenly dispersed. When you get close to the desired consistency, add water ever more slowly, until the mix reaches the firm ball stage described above. The mix should not be runny or pourable. If it is too wet, add some more dry ingredients in the proper proportions.

Many rental centers have small electric cement/mortar mixers available. If you want to make many troughs at one time, renting a mixer renders the job much easier. These mixers will fit into a small station wagon. If you use a cement mixer, you will discover what we have come to call the meatball stage. At the meatball stage, very little more water and mixing is needed. If you reach the slush stage you have put in too much water.

Put down a large plastic sheet on the work surface (sheets of plywood are handy) to contain the mess. Place your form on the plastic sheet. Make your provisions for drainage at this point. Prepare to cover the trough whenever you are not actively working on it.

BUILDING

Take handfuls of hypertufa mix and begin to apply them to the form. Place and pat the hypertufa mix on the inside of the mold, first doing the bottom and then working up the sides. When the mix has the proper amount of water you will have no difficulty in making the walls this way. If you do, your mix is too wet or too dry. Return it to the mixer and adjust. Firmly place the mix, and pat it in so it adheres to the form, making a seamless container of the proper thickness. In rectangular forms, build up the corners a little thicker for strength and to allow whatever material you may remove from the outside to make nice rounded corners at the roughing-up stage. Place one hand on the outside of the mold to support it while you use your other hand to pat and put the hypertufa mix into place.

Once you get the trough walls built to the height and thickness you want, cover the whole form with a plastic sheet to keep it moist. You are done for the first day. Except for cleaning up your mixing container!

For upside down "bowl" forms, apply the mix to the plastic covering the form until is evenly covered with the desired thickness of hypertufa. This may be tested with a nail or wire. Pat and press the mix until it is seamless, except for your drainage provisions. Be certain you make the bottom (what will be the bottom when it is in use) thick enough and flatten it so the trough will sit level. When you are done pull the plastic sheet over the trough to cover it tightly.

CURING

There are two stages to the curing process. The initial stage lasts about 24-48 hours and is followed by unmolding and texturing; for the final, long-term hardening, I recommend four weeks.

UNMOLDING

You have to judge when to unmold your trough. Any concrete produces heat from the chemical reactions that occur as it cures. The hotter concrete is, the faster is cures. Too much heat can be a problem if you are building Hoover Dam, or pouring bridge abut-

ments, or some such large engineering project. On our miniature scale (are we miniature cement contractors just as we are miniature landscapers?), the effect to remember is that a big trough will be ready sooner than a small trough. A foam mold's insulation effect will keep the chemical reaction's heat in and cure a trough in a foam mold ready for unmolding sooner than a bowl-shaped one that is wrapped only in plastic. Generally speaking, upside-down troughs and small, foam-form troughs are ready to rough up after 36-48 hours. Large troughs in foam forms are quite ready in 24 hours.

Gently uncover the trough and feel it. If it feels hard, try to scratch it with your fingernail. If your fingernail scratches it, cover it and wait another 12-24 hours. If your fingernail doesn't scratch, try a screwdriver. If the screwdriver can scratch it, but only with some difficulty, then the trough is ready to be unmolded. Be gentle as you remove the mold from the trough or vise-versa. This is the trickiest part of trough construction, not to unmold it too soon.

"Bowl" shaped troughs can be gently roughed up on the outside before they have hardened enough to pick them up.

If you crack or break a trough, it can be repaired as described under acrylic bonding agents.

## FINAL SHAPING AND TEXTURING

When simulating an old stone sink or watering trough, avoid smooth sides, especially the ultra-smoothness that results when the mix lies against plastic sheeting. Avoid also the funny bulges or protrusions that result from too much mix being forced into the mold. A finished trough should not look like it is made of concrete, so all resemblance to concrete blocks must be eradicated during the roughing-up phase while the material is still workable. All troughs exhibit some flaws when they are unmolded. Fortunately, these problems are usually rectifiable.

Roughing-up is glossed over by many people, who say something like "then rough up the surface with a wire brush." I say the trough at this "workable" stage is just the beginning of possibility. You are not quite at the

stage of the sculptor starting with a boulder, but you can do quite a bit of shaping and heavy-duty surface texturing. As a rule of thumb, you should spend at least half as much time roughin up as you spend constructing. Various "implements of destruction" may be used. A hammer and chisel may not be out of place. Try wire brushes, knife-type weeders, the pull style of paint scraper, and stiff putty knives. Flimsy won't do! If the hypertufa is strong enough to handle, it won't be soft enough to work on with weak tools.

After 24 to 48 hours, the hypertufa has hardened enough that you can carefully texture the surface. Shape the corners and edges, and make the wall thickness as uniform as you like. Let testing and experience be your guide for how soon and how much you can rough up the trough. Round all the corners and top edges with a pull type paint scraper or knife weeder. Put horizontal scratches in if you want the trough to look sedimentary. You can gently chisel or chip at the surface with the sharp end of a brick hammer or knife weeder for a rough, carved look. After the rough carving is done, use a wire brush to remove loose material and to add a little refinement. After you are finished roughing up the surface, there should be fibers sticking out all over.

On bowl-shaped troughs that have been molded upside-down, scrape and shave away the top edge so that it isn't disproportionately wider than the walls below. A real stone trough may look good with a wide top edge, but I haven't seen a big-lipped hypertufa trough that I think looks aesthetically satisfying. Also, make sure to scrape the bottom smooth, so that the finished trough will sit level and not rock.

## FINAL CURING

Let your trough cure for a month at room temperature, wrapped in plastic sheeting and kept moist. This will give you the strongest possible trough. BE PATIENT. LET IT CURE THOROUGHLY. The final strength of your trough is dependent on the length of time and the temperature at which you cure your trough. After Portland cement mixes with water, chemical reactions com-

mence that result in gluing together the aggregate of our choice into a final hard product. The chemical hardening of concrete (or hypertufa) is called curing. Curing is not drying! The desired reactions and crystallization will not occur in the absence of water, so the trough must remain moist in order to cure well and reach its maximum strength. Letting your hypertufa trough moist-cure for four weeks instead of one will give you a trough that is about 25% stronger. If you can wait longer, do so. These times apply to room temperature; at cooler temperatures, the reactions are slower and more time is needed.

SINGEING AND AGING

After the trough is cured, let it dry thoroughly. Once the surface is dry, use a soldering or brazing torch to lightly singe off the protruding fibers. Don't hold the torch in one place for more than a moment, or you may boil a water pocket under the surface and explosively crack the surface. Relatively cheap torches are available in home centers for do-it-yourself plumbers.

The trough is now complete, but it must be weathered before use. Back to chemistry for a moment. Portland cement produces calcium hydroxide, also known as free lime, as it cures. Calcium hydroxide is somewhat soluble in water, and leaving it out in the rain for a few months will dissolve away this very alkaline chemical. I expect that acid rain is most effective at this. If the rains don't come often enough for you, an occasional (or frequent) sprinkle with the hose will help. Considering this weathering requirement, it is good to schedule your trough making during the fall and winter, so the troughs can be put out in the weather for three or four months before the temptation to plant becomes irresistible. Soaking the trough in a solution of potassium permanganate is reported to speed up the aging of a trough, so it can be planted sooner. If you don't remove the calcium hydroxide, it could be very detrimental to your alpine treasures.

Obviously trough making can be an involved, tedious and tiring process, but a beautiful, well-made trough will bring you immense pleasure for many years to come.

Addresses

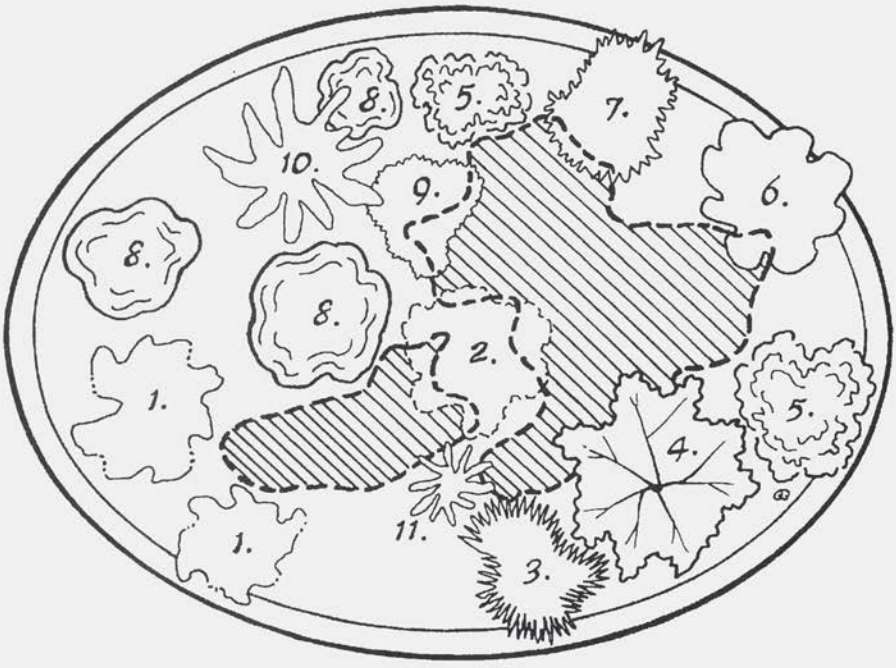
Hi-Tech Fibers
PO Box 469
Edgefield, SC 29824
1 800 344-1572

Fibermesh Co.
4019 Industry Ave.
Chattanooga, TN 37416
(615) 892-7243

*Viola verecunda* var. *yakusimana*

Photos by Jane Grushow
Drawing, Rebecca Day-Skowron

*Michael and Jan Slater garden on a 1-acre property in southeastern Pennsylvania. In a vain attempt to grow a ridiculous variety of plants they continuously make new planting beds to accommodate the hordes of rare plant seedlings that keep coming up, not to mention the things friends give them and the ones the UPS truck brings. Mike's current philosophy of life is "I never met a seed I wouldn't sow."*




Mike Slater
Oval Trough, Pennsylvania

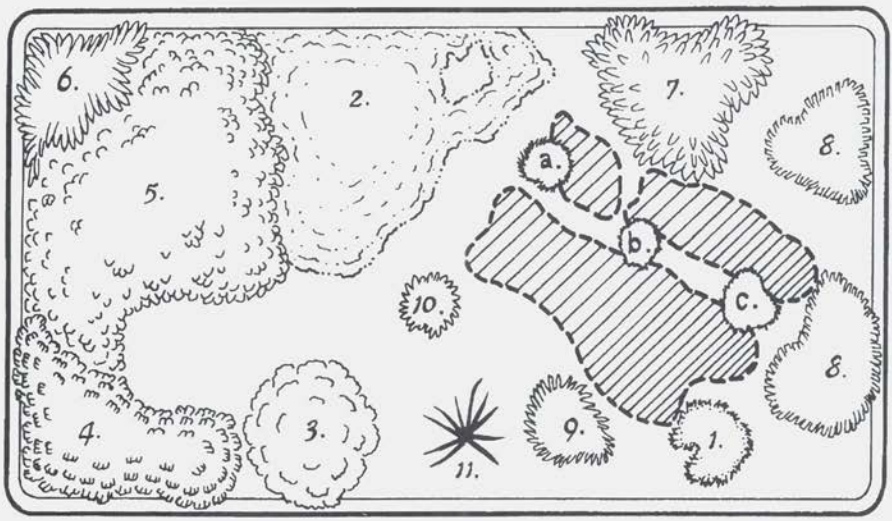
SIZE: Length 23" Width 18" Height 5"

CONSTRUCTION: Made in 1989, free-form, with Hi-Tech fibers.

SOIL MIX: 1 part garden soil: 1 part Calcined Clay Grit: 1 part ProMix

TOP DRESSING: Flattish stream-worn pebbles of mica schist 0.25"-2.5" in diameterLarge rocks are weathered limestone.

1. *Sedum spathulifolium*
2. *Erigeron scopulinus*
3. *Dianthus microlepis*
4. *Cotoneaster* 'Toulon Porter'
5. *Bellium minutum*
6. *Saxifraga paniculata*
7. *Festuca* sp. (2-3", from Bighorns)
8. *Dianthus simulans*
9. *Asperula gussonii*
10. *Lewisia pygmaea*




## Mike Slater
### Rectangular Trough, Pennsylvania

SIZE: Length 36" Width 18" Height 12"

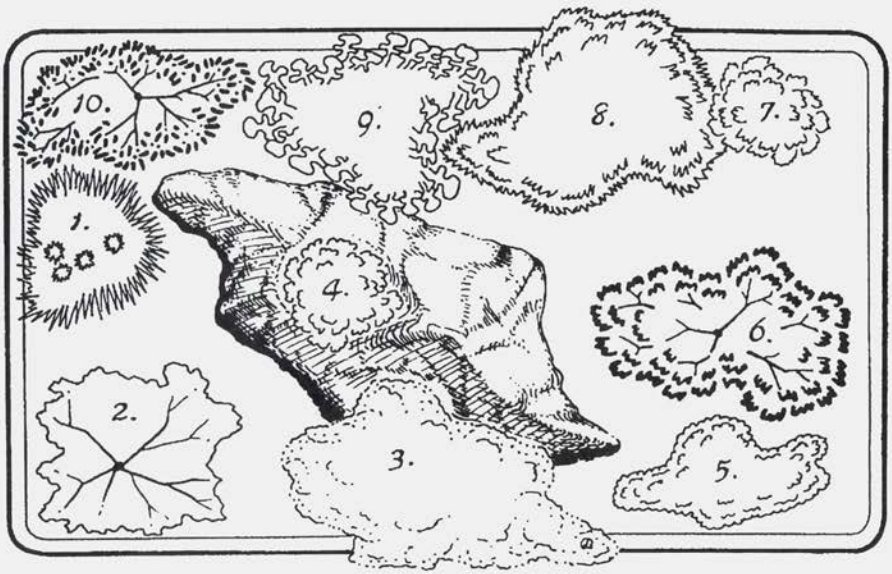
EXPOSURE: High shade, morning sun

SOIL MIX: 2 parts Turface, 1 part garden loam, 1 part limestone chips, 1 part ProMix

TOP DRESSING: Limestone chips (approx. 1/16")

1. *Saxifraga* 'Opalescent', kabshia
2. *Asperula pontica*, white form
3. *Draba bryoides* var. *imbricata*
4. *Saxifraga* x *androsace integrifolia* encrusted, Siskiyou Rare Plant Nursery
5. *Saxifraga paniculata*, small form, encrusted
6. *Saxifraga hostii*, encrusted
7. *Saxifraga* 'Foster's Red' encrusted
8. *Saxifraga* x *engleri*, encrusted
9. *Saxifraga* 'Winifred Bevington', encrusted
10. *Saxifraga* 'Lady Beatrix Stanley', encrusted
11. *Mibora minima*, grass

*a) Saxifraga* x *mariae-theresiae*, kabschia
*b) Saxifraga* x *petraschii*, kabschia
*c) Saxifraga x salmonica* 'Salmonii', kabschia




Elise Felton
Maine

SIZE: Length 36" Width 18" Height 12"

EXPOSURE: Full Sun, due to high spruce trees, eliminates early morning and late afternoon sun. Shade during periods of high heat and humidity. Winter in unheated garage

SOIL MIX: Metromix #360; 1" Terragreen on bottom

TOP DRESSING: limestone pea gravel

1. *Allium geyeri*
2. *Cotoneaster apiculata* 'Tom Thumb', copper-wired to cascade over edge
3. *Arenaria balerica*
4. *'Draba bryoides* 'Imbricata'
5. *Antennaria dioica*
6. *Chamaecyparis obtusa* from Joel Spingarn
7. *Draba ericoides*
8. *Dianthus hungaricus*
9. *Thalictrum kiusianum*
10. *Juniperus communis* 'Compressa'

# Soils for Troughs

## and Other Containers

*by Jim Borland*

A trough is merely a special name applied to a particular container for growing special plants, and, as such, it differs little or none from a window box, redwood tub, or the pot on the window sill growing Grandma's favorite African violet.

The one dimension shared by all these containers and the one that proves most important in determining how water and air behave in their soils is depth—or more precisely, restricted depth. This same dimension is also shared by soils of fell-fields, shale outcrops, and gardens, but their depths, by comparison, are relatively unrestricted.

In a container, it is the depth of soil and the associated bottom of the container that determine the quantity of both air and water remaining in the soil after the container is watered and allowed to drain. Of the two properties, it is the amount of air and its connections with the surface that determine if the roots in that soil will be adequately supplied with oxygen and have a quick means to rid themselves of toxic levels of carbon dioxide.

When water moves downward through soil in a container, it does so just as it would in a similar soil in the garden, until it meets the bottom of the container. Here it stops, regardless of the material composition of the container.

The meeting of soil and container bottom creates an interface that prevents water from moving across and out through the drainage holes until there is a sufficient weight of water above the bottom to force the water across. When drainage is complete, a picture of the soil in the container will not be one of evenly distributed moisture and air throughout the soil, but one in which each successive horizontal slice of soil from top to bottom will hold increasing amounts of water and decreasing amounts of air. The soil at and close to the bottom of the container will be almost completely saturated with water and nearly devoid of air. The total percentage of water and air held by the soil in the container after drainage is directly proportional to the depth of the soil. The same volume of soil confined to a shallow container will hold more water and less air than that volume of soil confined to a deeper container. In the same way, a rectangular sponge holds more water when laid flat than when stood on

end. Neither container width nor total volume of soil in the container has an effect on these characteristics.

This effect of water held at the interface between the bottom of the soil and the container bottom creates what some call a perched water table, and it occurs in any container of any depth and width. Not until the container depth exceeds 2 feet do the air and water characteristics of the soil contained begin to simulate those found in the garden.

It follows, then, that soil in a shallow container will contain less air (oxygen) than it will in the deeper one. It is contradictory, then, that shallow-rooted plants be planted to shallow containers, if, as suspected by many, one of the reasons that these plants are so rooted is that they possess an inordinate need for the higher amounts of oxygen found close to the soil's surface. When such plants are grown in shallow containers with inherently lower capacity to hold air, the grower is constantly attending to watering practices and often heard to complain about "overwatering" problems. It is not excess water that creates continuous difficulties with plants in this situation, but the under-aeration of the soil due to the high water table of the shallow container.

Similarly, the placement of a layer of "drainage" material in the bottom of the container effectively shortens the depth of the container by creating another, higher interface. The container now holds less soil, and water must cross two interfaces before it can exit the drainage holes, rather than one. Instead of improving drainage, pot shards, gravel, and other materials actually *increase* the amount of water in the soil and *decrease* the amount of air held after watering. Single, small pieces of shards or other materials may be used in pots, but only to prevent soil from flowing out through the drainage holes—if that is a problem.

These are only some of the reasons why soils from the garden or from the plant's native site should not be used in containers. Another is the destruction of soil structure that always occurs when these soils are dug and moved to the potting table. Structure, or the physical arrangement of soil particles, is strongly responsible for much of the aeration and water-holding qualities of a native soil. When this is destroyed, and the soil is placed above the perched water table in a container, both air- and water-holding characteristics are severely affected.

These are the major controlling factors associated with the behavior of soil, water, and air in a container. Those who find that watering containers is a chore complicated as much by the vagaries of weather as it is by the danger of overwatering should take special heed of the ingredients used to make the soil mix. But whatever the ingredients, if the final result is a soil mix inherently low in air content after watering, then problems begin at planting and continue as long as the plant is grown in that mix.

Ingredients that can be used to grow plants vary widely, but no successful soil mix can be had by combining fine-textured ingredients with large or coarse-textured ones. An example of this is the mixing of clay, silt, or other finely textured ingredients with gravel, resulting in a mixture that resembles that of a bucket of marbles mixed with a bucket of flour. Neither the water nor the air-holding capacity of the mix is improved. Only the weight has been increased.

Components of the soil mix should be made from particles of uniform size. The more equal they are in size, the less the chance that smaller particles will surround and fill the spaces

## Determining Water and Air Capacity of Any Container Soil

1. Select a plastic container as deep as the trough to be planted and tape the drainage hole shut with duct tape.

2. Measure the container's volume by filling it with water from a measuring cup or graduated cylinder, noting how much water it takes to fill the container to the top. This volume of water is equal to Total Pot Volume.

3. Dump the water, dry the container with a towel, and re-fill it to the top with dry potting soil (near-perfect dryness can be attained by heating the soil in a 150°F oven for several hours or overnight.).

4. Measure the amount of water it takes to completely saturate the soil in the container by filling the pot slowly until moisture causes the soil surface to glisten. Allow any components requiring time to absorb water (like peatmoss) to do so, but prevent the evaporation of water in the meantime by placing a piece of plastic wrap over the pot. Add more water if necessary. This volume of water is the Total Pore Space and is the soil volume occupied by air and water combined.

5. Carefully remove the tape covering the drainage holes and allow water to drain into a container. Measure this drained volume of water and label it Air Space.

$$\text{Percent Porosity} = \frac{\text{Total Pore Space}}{\text{Total Pot Volume}}$$

$$\text{Percent Air Space} = \frac{\text{Air Space}}{\text{Total Pot Volume}}$$

Water-Holding Capacity = (Percent Porosity) — (Percent Airspace)

between the larger ones. Mixing particles of varying sizes is precisely the premise behind the preparation of road base (highway underpavement) designed to be dense and impervious to water and air.

"Sharp" sand, a common coarse component of home soil mixes, is always described as the superior sand type, even though particle size and shape, or the qualities of the alternative sand types are never discussed. In fact, "sharp" sand *is not* the superior sand type.

A container of sharp-angled objects, when shaken, will result in many of these objects fitting together, as facets (faces) of the particles meet each other. A container filled with same-sized, equilateral-sided pyramids will eventually fit together perfectly if shaken long enough, leaving no room for water or air. Conversely, a container of even-sized marbles will never fit together, no matter how long it is shaken, leaving plenty of room for air and water. The best sand, then, is marble-shaped or spherical. Sand of this shape is found in some regions as wind-deposited (aeolian) sand. In areas not lucky enough to be near wind deposits, the sand that most closely approximates aeolian sand's shape is usually that discarded by the construction trades because it does *not* fit together.

Space does not permit a full discussion of soil amendments, particle sizes, impurities, chemical properties, etc., but a giant step forward in growing better plants can be taken by knowing at least how to determine the amount of air and water held in any soil confined to any container, including troughs.

With these simple procedures, air and water characteristics for any soil or soil mix in any container can be determined, including troughs. Several other important soil mixing features can be determined as well using this procedure. It can be learned, for example, that air and water capacities are difficult to improve when combining more than two or three soil components. It can also be discovered that the volume of the final mix will often be less that of the sum of the volumes of the individual components. When this happens, the total air space of one of the components has been decreased by the second ingredient fitting into air spaces that existed in the first ingredient.

Some gardeners succeed in growing plants in pots only when their pots are plunged into a sand bed. Plunging effectively lengthens or "deepens" the pot, because contact with the sand allows the water to drain out of the water table at the bottom of the pot into the sand below, thereby increasing the percent air space and decreasing the water-holding capacity of the pot.

Depending upon the depth of the container, most commercial growers strive to attain 20% or more air space in their soils after drainage, and water-holding capacities of 60%, 70%, or 80%—or more. With numbers like these, growers do not worry about drainage (always an ambiguous, ill-defined quality) or give much thought to over-watering, since there is always enough air in their soils to keep roots alive and healthy.

The perfect soil mix does not exist, simply because there are too many physical and chemical variables involved with each of the numerous components commonly used. Several decades ago, commercial growers finally relented and gave up believing that each of their several hundred or thousand species required its own soil mix. Even though each of these growers may use different components, their knowledge of the air and water characteristics of container soils has allowed them to grow everything they produce in one or two soil mixes.

Regardless of the components used in the creation of a soil mix that has optimum air and water-holding qualities, all is for naught if the grower then proceeds to ruin these qualities with planting practices. Excessive mixing grinds individual soil particles to a fine size, thus reducing pore size; pressing the mix firmly into the pot, striking the container sharply on the potting bench after transplanting, or stacking filled containers atop one another all contribute to the physical destruction of the mix's original air and water-holding spaces. All these counteract the effort expended in creating the optimum soil mix.

These and other "secrets" of a good soil mix can be found in any college-level greenhouse or nursery production textbook. Although texts do not discuss troughs or the plants that are typically planted to them, plants are plants, and containers are containers.

*Jim Borland has been growing plants for 40 years and has specialized in nursery production and greenhouse production for about 17 years. His interests include western American native plants, rare plants, and horticultural myths and fables.*

Trough in garden of Drs. Alan and Hilary Hills, Scotland — Dick Bartlett

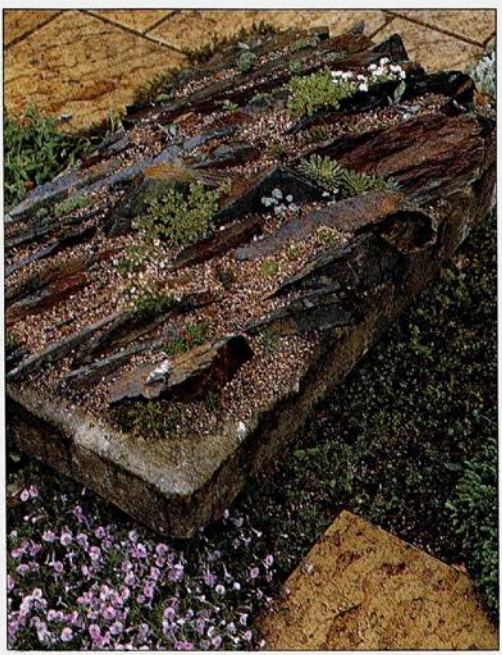
*Edrianthus serpyllifolius* 'Major' in trough — Rex Murfitt

Monoculture trough of sempervivums in Royal Horticultural Society's Garden, Wisley

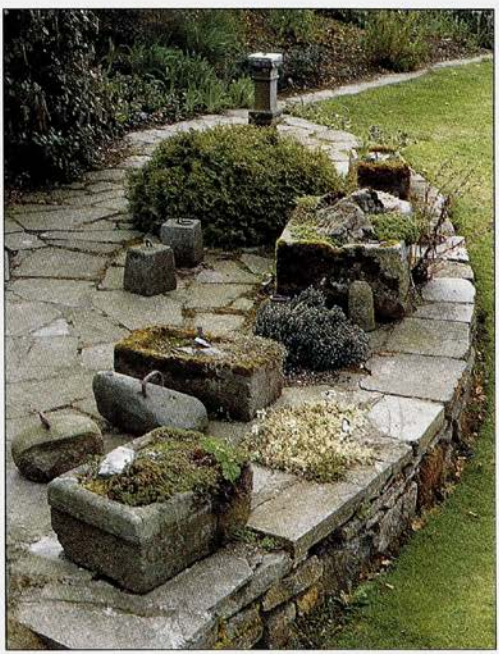
Drilled tufa, Victoria, British Columbia

photos by Dick Bartlett

Angled slate trough
at Royal Horticultural Society's Garden, Wisley



Trough display at Branklyn Garden, Scotland



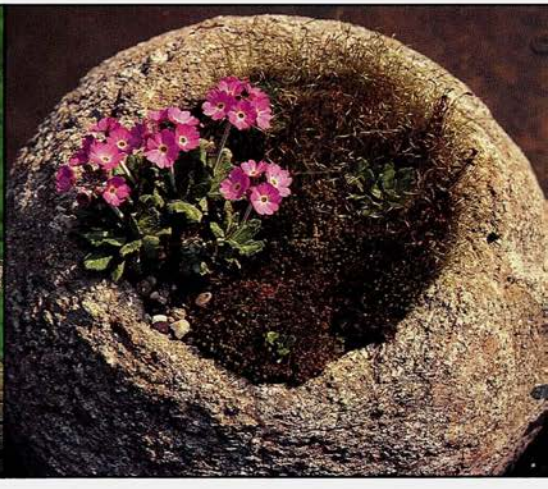
Trough of Colorado plants, including *Erigeron pinnatisectus* Waid Vanderpoel

Trough with silver saxifrages
in Murfitt garden, Victoria, British Columbia Rex Murfitt

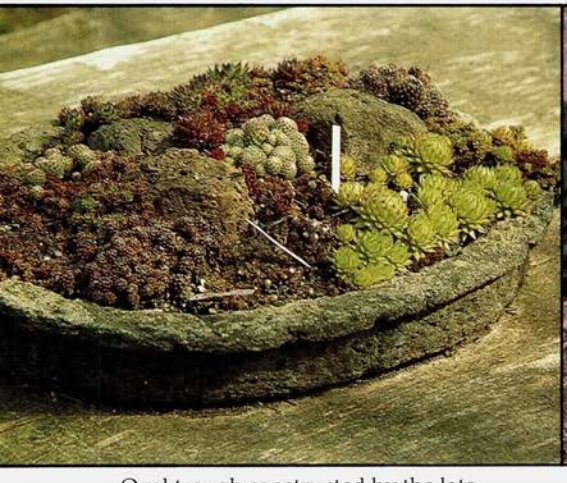
Monoculture trough of sempervivums in Jane Platt garden. Photo, G. Kelaidis

Small free-form trough with *Erigeron pinnatisectus* and *E. simplex*. Photo, Waid Vanderpoel

*Aquilegia , Chamaecyparis obtusa* 'Nana'. Photo, Mike Slater



Partly submerged trough with *Primula*. Photo, Waid Vanderpoel

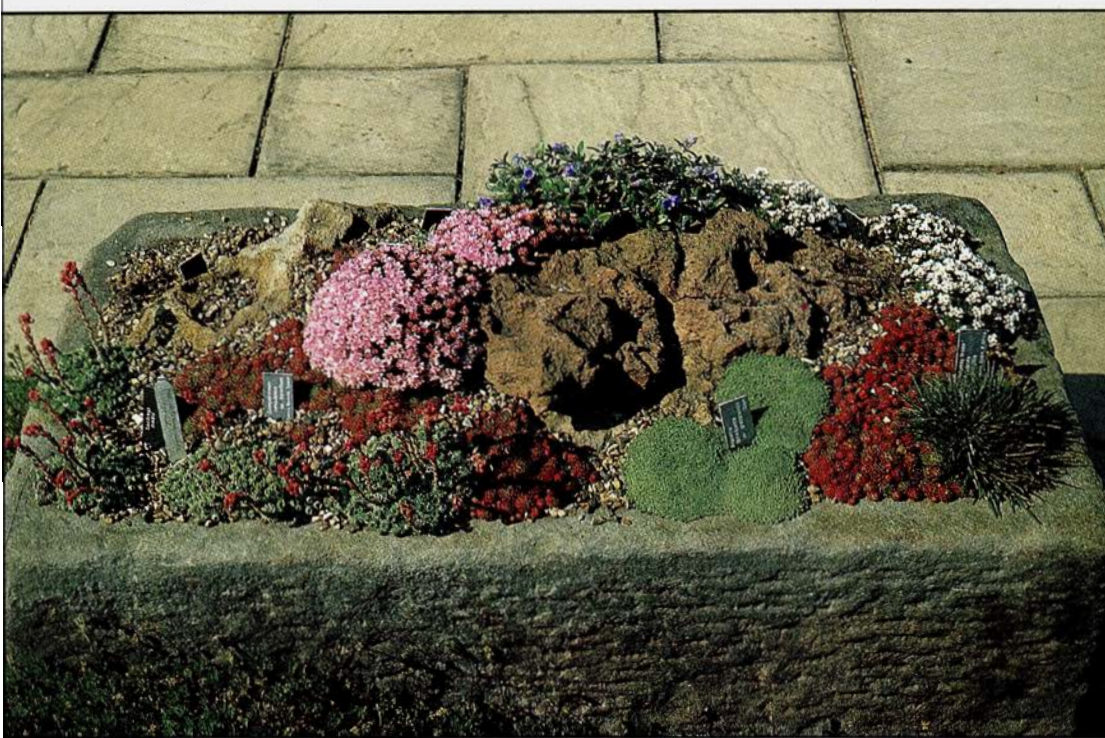


Oval trough constructed by the late Bob Putnam. Photo, G. Kelaidis

Free-form trough by Tom Vanderpoel with silver saxifrages, primulas. Photo, Waid Vanderpoel

Trough with slate in garden of Drs. Alan and Hilary Hills, Scotland — Ann Bartlett

Trough featuring Spanish plants at Royal Botanic Garden, Edinburgh, Scotland, 1981 — Panayoti Kelaidis



Trough with plants of Alps, Vanderpoel garden. photos, Waid Vanderpoel

Trough with plants of Pyrenees, Vanderpoel garden, Barrington, Illinois.
Note that soil in center of trough is lifted vertically by rock placement.

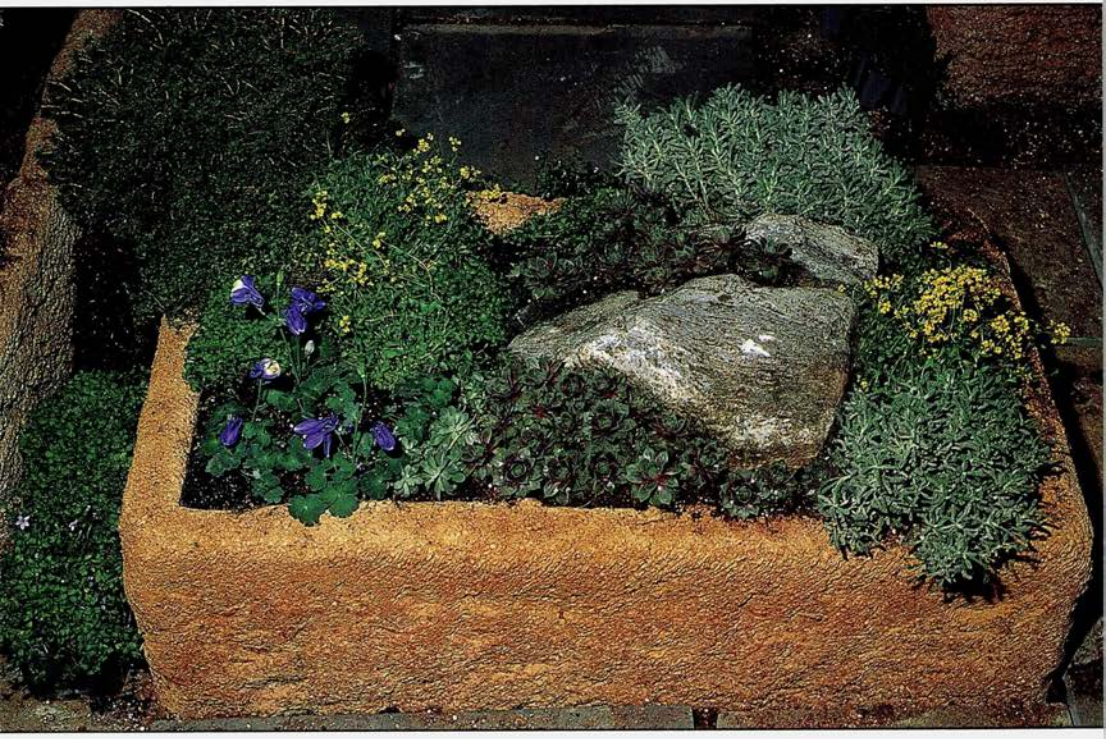
Trough with plants of Alps, Vanderpoel garden, May, 1985.

Trough with plants of Alps, Vanderpoel garden, autumn, 1983.

Planting troughs for Philadelphia Flower Show exhibit, Philadelphia, Pennsylvania

Michael Slater

Jane Grushow



# Care of Troughs

## *by Anita Kistler*

My troughs give me so much pleasure! First comes the fun of researching appropriate plants, proper soil mix, correct exposure, and finally, watering needs. Then, planting! Even with all this care, revision is called for. Some plants have romped and almost smothered their wee companions. And plants do die—not many, thankfully.

### Location

The first problem is choosing the permanent location of your big troughs. Once a large trough has been planted, it is much too heavy to move. My large troughs with dryland Western American plant material are located in full sun with ample air circulation. Troughs with woodland plants are on benches under a Norway maple where there is filtered light and air movement. Other troughs get morning sun, but noontime protection.

### Watering

Weather is the factor that determines watering need. In winter, I enjoy the big troughs from the warmth of my house, and they receive no water from me. The smaller, movable troughs are lined up in the sun in my plastic "alpine house." If they are dry and unfrozen, they get watered. In the growing season, watering is determined by the needs of the plants. Western American drylanders, such as *Lesquerella* and *Physaria*, only get sprinkled. Always remember that troughs are containers, so you are their only source of water during droughts or while they are under cover.

Be sure to locate troughs where they are easily reached by a hose. I use a rose nozzle on the hose, and there is no spotting of foliage or bloom if carefully done.

### Fertilizing

Your trough is planted and thriving, and you are enjoying it. The soil mix had all sorts of nutrients when the trough was planted two or more years ago. These nutrients have by now leached out with seasonal rains and waterings. Fertilizer is needed—a low-nitrogen fertilizer. You do not want plants to grow lushly out

of character, but only to flourish. For ease of application, I use Osmocote 10-10-10, a slow-release, pelletized fertilizer. I am sure spring would be the best time to distribute it, but seeds, cuttings, and seedlings all need attention then, so September is my time. I apply one tablespoon for deep troughs (27" by 18" by 7" deep), less for a smaller trough. The large Western dryland trough also gets less.

Invasive Plants

Even researching the plant's habit does not guarantee that it will behave as the book states. Do not let a burgeoning plant remain. Remove it, along with as much old soil mix as possible.

Soil Mix

My mix for eastern Pennsylvania is much different than that used in Issaquah, Washington. If your plants thrive, do *not* change your mix. Mine is one part sieved top soil, one part compost (from my maple trees), and one part Gran-I-Grit (starter size) or comparable product. This is a nourishing, fast-draining mix.

Deaths

Even the best growers will admit to plant losses, usually of the rarest plants. Back to the books, or scan your collection for replacements. If nothing is available, consult those wonderful catalogs of rock plant nurseries. And I repeat, remove as much old soil as possible with the dead plant. When you put in a new plant, you can add freshly mixed soil.

Control

Conifers in troughs need judicious pruning. Little pines are candled by pinching the new growth back by three-fourths. Do not use scissors.

Deciduous trees can be clipped to the desired shape. A good example is *Betula nana*. When clipped, it makes a nice, compact unit. Clip azaleas or rhododendrons by July 4, or you will lose next year's blooms. *Chamaecyparis* also needs an occasional pinch to keep in shape.

I have one shallow trough with only an inch and a half of soil mix that has been planted for 15 years with no replacement of plants. The center part is elevated, and a *Picea abies* grows there. It thrives, putting out new shoots less than a quarter-inch a year, so compact at 10". A seedling from the same batch of trees is growing in the rock garden at 30" with loose branching. About a half-teaspoon of Osmocote keeps the four species of *Campanula* that share the trough blooming prolifically and the *Picea* happy.

Lastly, I am upset when a choice plant dies, but I then have an opportunity to choose a new plant. There is always a choice here of more than 250 pots of seedlings. They, too, deserve a home in one of my 35 troughs.

*Anita Kistler is an expert gardener, grower, and shower of plants. She gardens in West Chester, Pennsylvania.*

# Tips on Troughs

## *by Rex Murfitt*

Soil Mixture

Over the years I have modified my soil mixture from the lean, mean alpine mix so often recommended to one with a little more body in it. This is achieved by increasing the amount of organic matter by 50% by the addition of leaf mold to peatmoss and by reducing the amount of topsoil.

I delete sand in favor of gravel, often referred to as grit. I prefer grit screened from my coarse sand mixed equally with purchased poultry grit. Such a blend provides a range of particle sizes that are important in the air and water relationships within the soil. This coupled with the extra organic matter increases the moisture holding capacity of the soil.

Top-dressing

Again, I prefer screenings from coarse sand. The exact size of the grit is not as critical as removing all the fine particles by screening over wire mesh similar to window screening. It is easy to pick out large or otherwise unsuitable pieces at the same time. Apply the mulch as heavily as possible on the surface of the trough, and let it remain loose, so there are no stable areas where liverwort and moss can get a foothold. Top-dressing does not prevent weed seeds from germinating, but, on the other hand, it does encourage self-sowing of choice alpines on the surface of the trough. It is advisable to avoid uniform-sized or colorful dressings, such as those lovely golden stucco stones or glaring white marble. Stay with the mid-gray colors similar to the aggregates of your local concrete.

Stone for Troughs

I re-use, whenever required, several pieces of very light pumice collected years ago somewhere in the West by Boyd Kline. The rocks are all roughly the size of two loosely clenched fists and a lovely, ochre-yellow color. All are extremely porous, which the roots love. Furthermore, the color blends well with the gray shades of the concrete. Tufa is an ideal material and somewhat easier to obtain. Be sure that you get the soft, porous variety rather than the hard, glassy kind. Recently, I landscaped a trough using a stratified, slate-like rock of local origin, placing it on edge, as in the pictures we see from Czechoslovakia. I admit I based my design on a beauti-

ful trough I saw at Wisley. Interesting effects can be created by using stones of varying thickness and depth.

Landscaping a Trough

Since the rocks are the backbone of the landscape, it is vital that they be exploited to the utmost, particularly if your supply is limited, and the rocks are not as big as you would prefer. Group them together rather than scattering them over the surface, so that you make a statement rather than risk a flat, uninteresting scene.

Select three rocks, one large and two smaller, and play with them until they form a pleasing group. Arrange them in a generally triangular pattern with the larger one set a few inches in from one corner of the trough. Leave about an inch of planting space between the rocks.

Flat pieces of stone can be made attractive by layering them together as bread in a sandwich. Soil and rock fragments plus plants are packed in the space where the filling of the sandwich would be, creating ideal conditions for drabas and saxifrages. Then, standing the entire stack on edge, bury the bottom third or half in the soil of the trough.

Needless to say, large pieces of nicely shaped tufa are the easiest with which to work; often one piece will be enough for a whole trough. If you feel that you have limited your planting space because there is so much rock in the trough, drill into the tufa on the top or on the sides. Such holes provide ideal homes for many a choice plant.

Trees and Shrubs

Deciduous and evergreen trees and shrubs are major elements in your design and must be considered at the same time as the rocks. Do not be afraid to use a fairly large specimen, preferably pot-grown. Plant such woody plants as close to the side of the container as possible and never in the very center—remember art class! Besides looking better, this also permits the branches to hang over the side of the container where they won't smother precious planting space. Put trees as close to the major rockwork as the rootball will allow. If all is correct, rocks and miniature shrubs will set each other off nicely; if not, you will quickly recognize that the scale is off and change something

Tree roots soon grow and fill the trough and compete with other plants for nutrients. While most alpine plants don't seem bothered by this, it is very difficult to get sufficient water into the soil during dry weather. Guard against this by watering in several applications rather than one large dose.

Placing the Plants

When you are satisfied with the rocks, trees, and shrubs, it is time to consider the remaining plants. First, in what location will the trough be placed? Will it be sunny, shady, windy? Select plants that will be compatible with the growing conditions. If you are lucky enough to have choices, it is fun to design special purpose gardens. Think of one planted with *Gaultheria, Soldanella,* and dwarf mossy saxifrages. I am fortunate to have a trough filled solely with *Gentiana sino-ornata*. For special plants, special soils can be created, and I have even made small lath shades for some.

Do not feel that you must use only rare and difficult varieties in your troughs. One of my favorite containers is planted with lots of tufa, a nicely shaped pot-grown grafted pine (name not known) and sempervivums. True, the sempervivums were selected for bright color, small stature, and degree of hairiness. It gives me pleasure to

point out to frustrated visitors that it is easy to succeed with such a planting scheme.

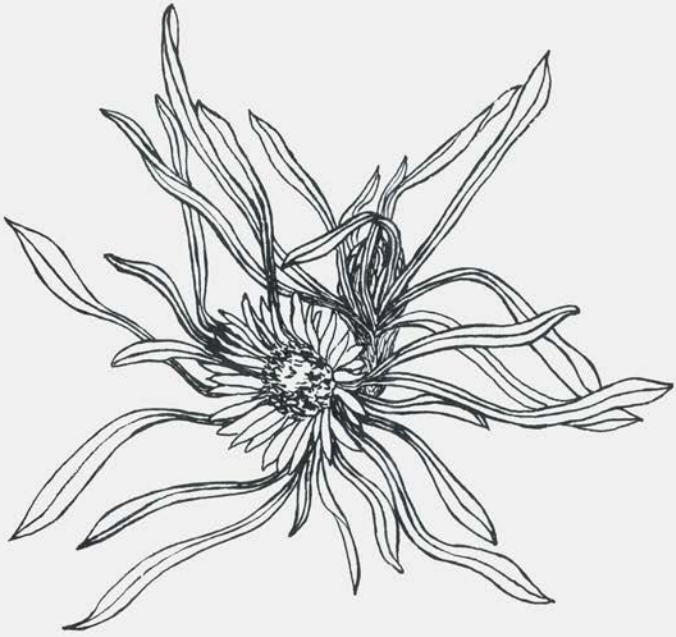
Take care not to crowd the plants by planting too many. It is a temptation to plant for immediate effect, but later you will be faced with having to remove plants, and some choice plants do not like being moved. If you want to fill the space right now, it is wise to plant such things as small sempervivums and sedums or even encrusted saxifrages, which do not mind disturbance.

Plant tiny and cushion-forming alpines in the higher crevices, clump-forming types at the base of the miniature cliffs, and the creeping kinds on the lower elevations where they cannot overrun smaller plants but are free to creep to the sides, hopefully to overhang the edge.

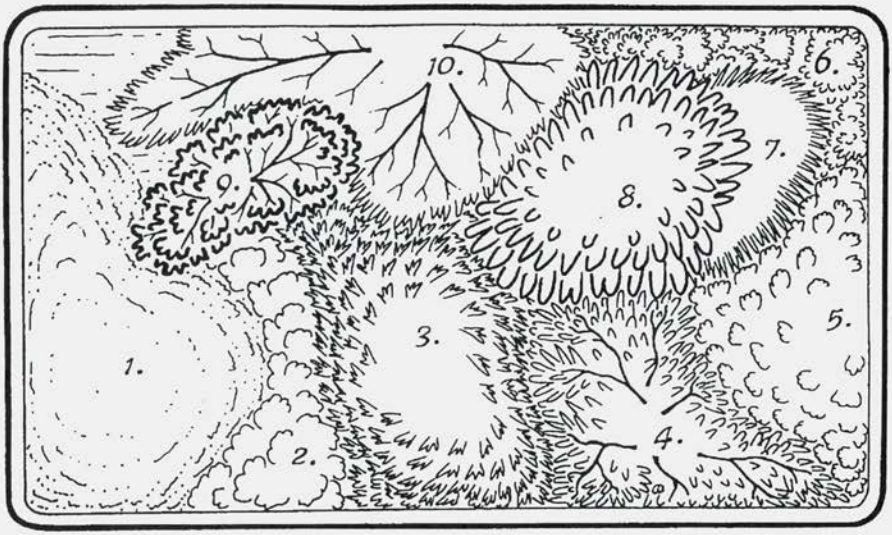
Mistakes are easily made. Do not plant the carpeting raoulias wherever you live, for even if they do not last through the winter, they will take over a trough during the growing season. The same can be said for cute little *Oxalis*, filmy *Parahebe*, *Paronychia*, even sweet little *Campanula cochlearifolia*. *Dryas octopetala*, including the dwarf form, should be used with extreme caution. Phloxes make good fillers, but even the *P. douglasii* forms will get too big eventually. Use them until they do, and then move them to the garden.

*Rex Murfitt worked as a nurseryman at W.E.Th. Ingwersen's Birch Farm Alpine Plant Nursery. His interest in troughs was rekindled while manager at Stonecrop Nurseries in Cold Spring, New York. He now has 15 troughs in his garden in Victoria, British Columbia.*

Rebecca Day-Skowron



*Townsendia exscapa*




Wallace Wood
San Francisco

SIZE: Length 14" Width 14" Height 8" outside, 7" inside

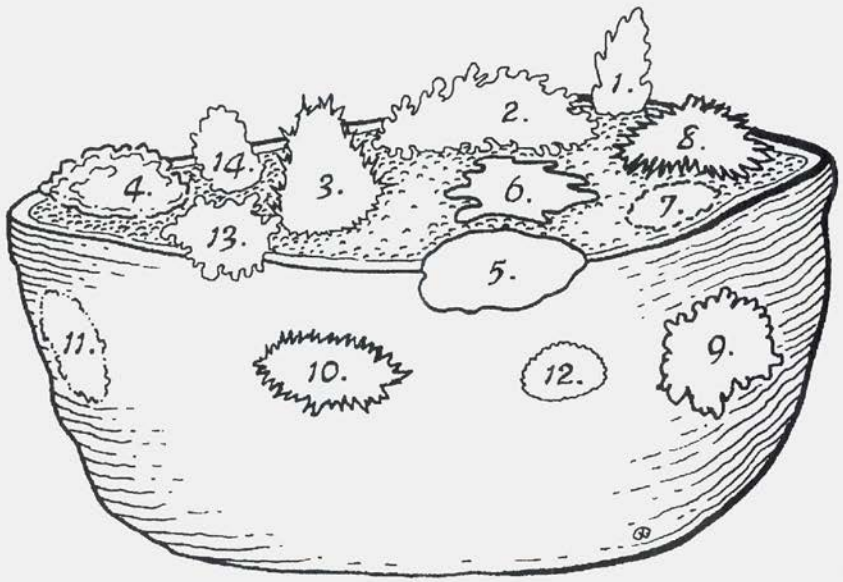
EXPOSURE: Full sun

SOIL MIX: Peat, sand, gravel in equal parts

TOP DRESSING: Cracked granite 1/8" to 1/4"

—Used for display and to promote sales of alpine-type plants at Strybing Arboretum plant sales. Constructed 1985. Plant 7 is over plant 8, making a long spring-to-summer blooming units. See ARGS *Bulletin Vol. 48(2)* for drawing of wooden container.

1. *Scleranthus biflorus*
2. *Erodium chamaedryoides* 'Roseum'
3. *Azorella trifurcata* (*Bolax*)
4. *Jasminum parkeri*
5. *Androsace sarmentosa* var. 'Chumbyi'
6. *Hypericum empetrifolium* 'Prostatum'
7. *Armeria juniperifolia* 'Bevan's Variety'
8. *Rhodohypoxis baurii* 'Tetra Rose'
9. *Chamaecyparis pisifera* 'Plumosa Nana Aurea'
10. *Pieris japonica* 'Pygmaea'




Wayne Kittredge
Massachussetts

SIZE: Length 23" Width 19" Height 12"

EXPOSURE: Full sun

SOIL MIX: Leaf mold, manure, clay sod (rotted), vermiculite, perlite, grit

TOP DRESSING: 3" deep coarse grit and gravel

COMMENTS: Crevices in the sides of the trough extend through to interior soil, so that the lip of the trough provides an overhang that protects from moisture on the foliage.

1. *Gentiana* sp., 12" tall, June flowers
2. *Potentilla nitida*
3. *Carlina acanthifolia*
4. *Viola variegata*
5. *Ajania xylorrhiza*
6. *Verbascum acaule*
7. *Paronychia chionea*
8. *Dianthus* sp.
9. *Arabis bryoides*
10. *Dianthus* sp.
11. *Arenaria* sp., chartreuse foliage
12. *Draba polytricha*
13. *Potentilla nevadensis*
14. *Penstemon angustifolius*

# People

## Thirty-Six Years Ago
*by Sally Walker*

The year was 1958. I was an employee of W.E.Th. Ingwersen Ltd. Every second Monday in spring I rode in the van driven by Paul Ingwersen to the Royal Horticultural Hall in Vincent Square, London.

We would bring up some rocks from the basement, stored there from the previous show, and build a rock garden on a table. Pans of flowering plants brought from the alpine house at Ingwersen's nursery were buried up to their rims in peat. The "sunny" side of the garden was covered with a layer of stone chippings, and the "shady" side with moss. The shows were open for two days (Tuesday and Wednesday) to members of the Royal Horticultural Society, then to the general public. Everything was dismantled on Wednesday evening and returned to the nursery (except that the rocks went back to the basement). The gardens were created to show potential customers the plants that were available, and we were there to take orders for them.

On Tuesday, April 1, a small, elderly man accompanied by his wife came to the exhibit. *Primula hyacinthina* was on exhibit, and he asked me where it was native. It was part of my job to be able to answer questions of this sort, but I was surprised, as I recognized the questioner to be Frank Kingdon Ward. I felt sure he must know more about the plant than I did. I mentioned to him that he had written me a letter from the Assam Hills two years previously when I was a student at Waterperry Horticultural School. He invited me to have afternoon tea with him in the basement of the Royal Horticultural Society Hall, and I accepted. After it was over, he said we would do this again at the next show in two weeks time. However, this was not to be, as he died on April 8.

Now, thirty-six years later, I hope growers appreciate the origins of some of their plants. Anyone not familiar with Frank Kingdon Ward and his life's work is advised to read some of his books. Two of them, *Mystery Rivers of Tibet* (1923) and *Plant Hunting in Tibet* (1930) have recently been republished by Timber Press. Another one I particularly enjoyed re-reading is *Pilgrimage for Plants*, published in 1960, in which different genera are dealt with in each chapter. Among the plants Ward introduced are *Meconopsis betonicifolia, Lilium mackliniae* (named for his wife), and *Rhododendron leucaspis.*

*Sally Walker later moved to Arizona and has herself been a collector and introducer of plants for 25 years. Her business is Southwestern Native Seeds, Box 50503, Tucson, AZ 85703.*

# Gardens

## The Brockengarten
*by Wolfram Richter*

As the Twentieth Century draws to a close, the politics of the world are changing from confrontation to comprehension of former enemies. The smallest botanic garden in Germany, long caught between the political millstones of the East and the West, is benefiting directly. This garden has a checkered, 100-year-long history.

Where is the Brockengarten? At the heart of Germany, in a small mountainous area called the Harz, only 2000 square kilometers in extent. The summit, the Brocken, reaches 1142 m. This is the land of German mythology and of the German Romantic movement, traditionally a mining region, a center of research for German universities, and not the least famous for its forests, hills and valleys—a beautiful region for hiking. George Bancroft hiked in this region when he studied in Göttingen from 1818-1820. In 1945 the US Army fought here, gaining the summit on April 17, 1945.

It was in 1890 that Albert Peter, Professor of Botany and Director of the Botanic Garden in Göttingen, established an experimental garden for alpines, useful plants, and native plants of this area on the summit. Since then, this small garden, the first institution of its kind for scientific research, has added to the attractions of the mountain. During the vagaries of German history, the garden has always had to struggle for its existence. Money and politics have been the obstacles, but there have always been idealistic and dedicated people who have again and again saved the garden at the last minute. In unofficial ways, botanists and horticulturists from both the University of Göttingen in the Federal Republic of Germany (West!) and the University of Halle in German Democratic Republic (East!) worked together against the determination of the communist authorities.

In 1945 responsibility for the garden was given over to the University of Halle. Until August 13, 1961, the garden remained in excellent condition. After the building of the Berlin Wall, the Brocken area was out-of-bounds for all but military and secret service personnel. For all of that, endemic plants and alpines grew on without care, and quite a few of them even spread or self-sowed. This was a pleasant surprise to responsible parties from both Göttingen and Halle when they met at the garden on the 100th anniversary of its founding, on June 8, 1990. In re-united Germany, both universities will have responsibility for the garden, along with the administration of the National Park of the Harz, just now established.

A symbol of the survival ability of plants far away from their native homes and of the successful endeavors of horticulturists is *Tsuga mertensiana*, the native mountain hemlock of North America. An individual tree planted here in 1890 or 1891 has outlasted all the good and the bad times without coming to harm.

Please come to visit this miniature garden, to see the former frontier line

between NATO and the Warsaw Pact and this natural borderline of plant life. The Iron Curtain will rust with time and one day be invisible while the plants will endure all.

*Wolfram Richter has written a well-illustrated book about the history of the Brocken, ISBN #3-923605-04-8, available from Piepersche Druckerei und Verlag GmbH, Osteröder Str. 3, D-3392 Clausthal-Zellerfeld, Germany. Mr. Richter's address is Technical Leader of the New Botanic Garden of the University, Grisebachstr. 1a, D-3400 Göttingen, Germany.*

# Propagation

## Tips on Propagating Some Unusual Plants

As a plantsman, I like to grow, exhibit, and propagate unusual plants, yet as a nurseryman, I have to produce as many plants as possible in order to make a profit. Combining these two goals can make life very interesting. If I have only one plant of a rare species, then I consider that I have a duty to propagate and distribute it, if only to keep it in cultivation. From the profit angle, I may as well produce as many plants as possible at the same time.

### Underground Shoot Cuttings

Many of my stock plants are also show plants, and occasionally there is a clash of interests between keeping a plant up to exhibition standards and propagating it for sale. In some cases, satisfactory cuttings can be taken from the edge of the plant. In others, such as *Campanula piperi*, *C. zoysii*, *C. shetleri*, and *C.* 'Joe Elliott', underground growth with roots attached can be used as cutting material.

### Early Tip Cuttings

Many other plants are not so easy to propagate. Take, for example, that lovely shrubby viola from the Sierra de Cazorla in Spain, *Viola cazorlensis*. Thin stems with tiny leaves rise up about 4" and are topped with huge, pink-purple, long-spurred flowers. Although my plant has set seed on two occasions, there has never been any germination. Propagation, therefore, has had to be carried out vegetatively. All cuttings root very easily in sand and grow on well when taken as early as possible after growth commences in the spring. This enables new plants to have a long growing season and make a good root system before they go dormant. If you miss the first growth and take cuttings later in the year, they will root and grow, but you will be disappointed the following spring when nothing emerges, the roots having died off in winter. Taking cuttings from the

first growth produces a bonus, encouraging the plant to break out from the base bearing far more flowering stems, resulting in a much showier exhibition plant.

Another case in which taking early cuttings improves flowering of the stock plant is the Mexican phloxes. When I obtained my first cultivar, *Phlox mesoleuca* 'Mary Maslin', the only method of propagation recommended was root cuttings. However, I tried cuttings in sand from the first growth with great success, and the plant flowered profusely later. Now, all my Mexican phloxes are increased by that method. I do find that accidental root cuttings help with this group of plants. Where pots of stock plants are stood on damp sand during the season, sometimes green shoots appear out of the sand as the plants root down from the bottom of the pot and produce lateral shoots. These are gently removed from the sand and potted up.

Crown-and-Root Division

I have had one plant of *Lewisia stebbinsii* for ten years (grown from ARGS seed sown in 1982). It has flowered well for me the last five years but has never set seed. How could I increase my stock? Seed from various exchanges, although listed as *L. stebbinsii.*, usually turned out to be *Lewisia longipetala*. This year I tried a different but simple method that I had been using successfully in propagating good forms of *Lewisia rediviva*. In *L. rediviva*, I cut off the growing point in early spring and then wait a year for new growing points to emerge from the caudex rim. The caudex and root are then sliced lengthwise. Each piece with a growing point is treated with rooting powder or fungicide and inserted as a cutting. Once rooted, they can be potted up. My plant of *L. stebbinsii* had made quite a wide, carrot-like caudex with still only two shoots after a decade. In the autumn as these shoots started to grow, I took a deep breath and a sharp knife and cut the caudex and root lengthwise. I treated the resultant raw root with hormone powder and potted up both pieces. They are now growing well. Although these plants are the same clone and possibly will still not set viable seed, I will not have any fears of dividing them again in the future.

Rhizome cuttings

A new *Corydalis* is on the scene, *Corydalis flexuosa*, from China, one of those plants that is a nurseryman's dream. It has beautiful blue flowers, grows at terrific speed, and is propagated easily. Although it is normally grown in a leafy soil, put it into a sandy compost for propagation purposes. The plant appears to grow twelve months of the year, but it does slow down around July, at which time it can be either dug up or knocked out of its pot to uncover the horizontal rhizomes. Break these into small pieces and pot them up. Growth will soon restart, and in no time fresh fernlike foliage will appear above the surface, to flower next year.

Cuttings or Whole Seed Capsule

A New Zealand forget-me-not, *Myosotis uniflora*, forms a lovely dome with stemless, yellow flowers. It is reasonably straightforward in cultivation, as long as it is grown in very gritty compost. Sometimes this plant is shy to flower or to set seed. When it does, the job of prying nutlets out of the calyxes hidden in the foliage can be very frustrating. Several years ago, with no seed available, I thought "nothing ventured, nothing gained" and took twelve cuttings, inserting

them into sand. Although it was June, every one rooted, and by the following spring they were of a salable size. I contacted my New Zealand pen pal with this information, and she replied that this hadn't been tried at her local alpine nursery, in spite of its being a native plant and very much sought after. It had been assumed that cuttings would not take. Joe Cartman, in his book *Growing New Zealand Alpine Plants*, said that this plant was easy to propagate, but it appears that seed, when available, had been the usual method. The ironic thing this year is that I sowed a number of seed capsules whole, as I could not retrieve any seed from my plant. Germination has been like mustard and cress. Each calyx must have held three or four seeds, and the surface of a 6" pot is thick with seedlings. Potted on early, these grow on over the winter to form salable plants by late spring.

The Carrot Shoot Trick

No doubt many of you grow *Erigeron aureus* 'Canary Bird', but any seed that you sow from it will not produce dozens of "Canary Birds." This plant does not provide much cutting material each year, either. I was given a hint from another nurseryman: in early spring, when growth is starting, take a sharp knife and be ruthless. Cut straight across, just at the top of the caudex—try it on a carrot first. After a few weeks, new growth will start from the edge of the caudex. A great many more shoots will appear than were previously growing and, when long enough, they can be used for cuttings.

What Works with *Convolvulus*?

These are just a few suggestions that may enable you to increase your stock of unusual plants. I pray that no nurserymen are now reaching for the telephone to contact their lawyers, considering that I have let out trade secrets.

Now can someone can give *me* advice? *Convolvulus boissieri*, another Spanish species, is a wonderful, silver, mat forming plant with large, almost stemless, white, funnel-shaped flowers. I have tried over many years to produce from cuttings an adequate number of plants to sell, taking cuttings in spring. All have died off. I have tried bottom heat with no success. Cuttings taken in autumn have rooted after nine months, but with only 25% success. Can anyone improve on this? I would love to make it available in larger quantities.

—Graham Nicholls

Graham Nicholls has a nursery, Graham's Hardy Plants, in Timsbury, England. He will be a speaker at the Annual Meeting in Asheville, North Carolina.

# Notes on Nomenclature

[Editor's Note: The following notes were received in a letter from John Watson. Watson made many expeditions to South America in the 1970s, most with Martyn Cheese, exploring alpine areas on behalf of rock gardeners for the first time. He then wrote an extensive series of articles for the Alpine Garden Society. Lately he has researched the South American flora on behalf of AGS, assuming responsibility for the South American entries in the new AGS *Enclyclopaedia of Alpines*.

Watson's comments on names that appeared in the *Bulletin of the American Rock Garden Society* Volume 51(4) 1993 follow. Botanical names are in a constant state of flux, especially where the flora of an area is not thoroughly known, so changes in the names of South American alpines are to be expected. Additionally, it is very difficult to make accurate identifications without complete floras available. In making the following comments available, no criticism of the authors of previous articles is implied, nor is it to be thought that any negligence was present concerning identification. Adventurers on new terrain simply do not have all the resources needed to definitively identify plants—nor is the following likely to be the final word. We applaud those who dare stick out their necks on nomenclature to share these plants with us.]

PHOTOGRAPHS:

p. 257 as *Ourisia coccinea*. Either *O. ruelloides* or *O. poeppigii* (syn. *O. racemosa*), almost certainly the former, to judge by the apparently broad teeth of the calyx.

p. 258 as *Viola "sacaulus"*. . Should be *V. sacculus*, so named because the bloated little spur resembles a sack.

p. 259 as *Oxalis microphylla*. Now reduced to a synonym of *O. erythrorhiza*.

p. 260 as "*Junella* " sp., *Junellia wilczekii*.

p. 277 as *Viola bangii*. A synonym for *V. nivalis*, which the plant in the photograph definitely appears to be, unlike the one depicted by Robert Rolfe in the *Quarterly Bulletin of the Alpine Garden Society*. Robert's answers more to *V. pygmaea* than any other, a species only "officially" recorded from south Peru and Bolivia.

p. 277 as *Viola* species. *V. parvifolia*. Very exciting! I only have an old botanical description from a station farther north in Ecuador (Antisana) which does not even describe the shape of the flowers. These are merely noted as yellow, not bicolored.

p. 278 as *Ephedra americana. E. rupestris.* There is much confusion between these two species, and indeed *E. rupestris* was once given the status of a mere variety. However, *E. rupestris* is *far* dwarfer than even the most altitude-stunted *E. americana* and has very short internodes (as per the plant in the photo), which will distinguish it even from heavily grazed examples of *E. americana.*

p. 280 as *Krapfia lecheri.* It is perfectly acceptable to choose to call this *Ranunculus lecheri.* It has this alternative identity, unlike a couple of other species described as *Krapfia.* The plant accords perfectly well with descriptions—except that it is supposed to be covered in shaggy hair!
p. 280 as *Ranunculus* sp. *Ranunculus (Krapfia) gusmannii* var. *weberbaueri* (not to be confused with *Ranunculus weberbaueri).* Fits the botanical diagnosis to a tee.

pp. 282-283. Robert Rolfe investigated the genus *Nototriche.* He might be able to offer opinions—if wanted! So far I have scarcely touched this wonderful group due to shortage of time, and any few I do know are confined to that half of the genus's range south of Lima.

p. 284 as *Laretia compacta. Laretia acaulis* is a comparatively large-(yellow-)-flowered and -leaved, hard-cushioned species confined to the central temperate cordilleras, mainly of Chile. It does, however, have a southern dead ringer in *Azorella patagonica.* Another cushion *Laretia* species, pink-flowered, sticky-leaved, foetid, and from the desert north, is mentioned in some literature, though most authorities only accept just the one species. The plant in the photo is *Azorella compacta* (syn. *A. columnaris),* commonly known by its popular name of *Yareta* or *Llareta.*

p. 301 as Brassicaceae species. This one has eluded me so far. I would dearly like to pin it down, and there are various promising potential genera such as *Draba, Eudema,* and *Weberbauera,* but nothing I have noted down for any of them corresponds to that spendid mound. The main trouble is that it appears to be completely glabrous, and my only possibilities are all hairy!

p. 302 as *Malvastrum weberbaueri.* Small alpine rosette species formerly of the genus *Malvastrum* have been transferred by a respected specialist authority to a new genus, *Acaulimalva.*
p. 302 as *Malvastrum* species. The nearest candidate would appear to be the rather variable *Acaulimalva engleriana* except that it does not have hairy upper surfaces to the leaves; but then, neither do any others in the genus which remotely resemble the plant depicted!

p. 303 as *Liabum bullatum? Paranephelius bullatus.* Exactly as for the previous, the seven small alpine rosette species formerly in the medium-sized genus *Liabum* have been returned to their original genus, *Paranephelius.*
p. 303 as Composite species (*Liabum*?). Without doubt the other plant on the page is classical *P. bullatus.* However there seems little doubt that this is also a *Paranephelius,* and what is more, it appears to have the same underlying bullate surface. The trouble is there is absolutely NO *Paranephelius* species (or subspecies, etc.) described with a felted upper leaf surface. The monographers do

say, however, apropos comparison between two other species, that indumentum on the upper surface of the leaf is an utterly unreliable character in defining species!!! Maybe they would revise their opinion on seeing this one.
p. 304 as *Werneria* species. *Werneria humilis* var. *rosea*, according to the detailed monograph on the genus. Cajas is even its type and only recorded station. However, the monograph does not specifically refer to the distinctively much larger size of the variety, so far as I can recall.

TEXT:

p. 244 as cf. *Raoulia eximia*. There is an exciting genus of only two (recorded) species called *Raouliopsis*, which is so close to the *Raoulia eximia* types that if it were not (mainly) for the enormous distribution gap, they would be included in that same New Zealand genus. The problem is they have so far only been recorded from a limited area the north Colombian Andes. The other possibility lies in a genus of equally choice cushion composites called *Mniodes*, which certainly occurs in Peru.

p. 248 as *Gaultheria* species. Hardly any doubt at all that this is *G. coccinea*.

p. 249 as *Symphostemon album*. Peter Goldblatt and colleagues have re-instituted the genus *Olsynium* (type *O. douglasii*, syn. *Sisyrinchium douglasii*). They have added to this all the pink-flowered, rush-leaved ex-sisyrinchiums of the Andes (formerly *Chamelym junceum*, etc. ), plus some or all of each of the small allied Iridaceous genera *Chamelym*, *Ona*, and *Phaiophleps*, at least from those they have so far been able to investigate. The genus *Symphostemon* has become obsolete, its members all recognized before Goldblatt as *Phaiophleps* (*P. biflora*, etc.). Interestingly, *Phaiophleps alba* (*Symphostemon album*) was one of the species Goldblatt et al. were unable to investigate, so it presently hovers in limbo. Depending on its foliage, root and seed characters, it should either be assigned to *Sisyrinchium* or *Olsynium*. If indeed the plant in question is this, it would be fascinating to see a photo, if one exists. Its type location is Yauli, 4400 m.

p. 251 as *Calceolaria darwinii*. A synonym, now *C. uniflora*.

p. 252 as *Loasa acanthifolia*. *Caiophora prietea*.
p. 252 as *Alstroemeria aurantiaca*. This was reduced to a synonym by Bayer in her recent monograph, replaced by *A. aurea*, but I am not sure whether this still stands. I have a suspicion *A. aurantiaca* MAY have been re-instated, or possibly the complex has been divided into more than one species.

p. 253 as *Calandrinia "rupestre"*. *C. rupestris* has (rather unsatisfactorily) become a synonym of *C. caespitosa*.
p. 253 as *Schizanthus gilliesii*. My past wrong naming is almost certainly responsible for the confusion that exists around these alpine species! *S. gilliesii is* a synonym for *S. grahamii*, which this plant almost certainly will be.
p. 253 as *Chloraea chrysantha*. The description leaves little doubt that this is *C. alpina*. *C. chrysantha* is a tall non-alpine species with only medium-sized flowers.
p. 253 as *Oxalis geminata*. Synonym for *O. squamata*, the currently accepted epithet.

p. 253 as *Mutisia linearifolia*. This has yellow flowers. The one with bright red flowers is *M. subulata*.
p. 253 as *Malvastrum humile*. Also now become a synonym—*Tarasa humilis*.

p. 255 as *Liabum* sp. Again, now *Paranephelius*.
p. 255 as *Alstroemeria pygmaea*. Some refer to this as *Shickendantzia pygmaea*, but there is disagreement among the authorities as to whether to maintain this separate monotypic genus.

p. 256 as *Valeriana rigida*. Some authorities separate off the genus *Phyllactis*, when this species becomes *P. rigida*.
p. 256 as *Viola "bungii"*(sic). See comment re. photo above.
p. 256 as *Gaultheria* species. Obviously the same, *G. coccinea*, as above.

p. 263 as *Bolax* spp. There are only two species in the genus *Bolax*, one confined to Fuegia and extreme S. Patagonia. The other, *B. gummifera*, does extend to northern Andean Patagonia. According to Moore, the Bariloche area is its most northerly station. It has relatively large rosettes, sticky, trifid leaves, and large, blackish-purple fruits.

p. 265 as *Oxalis microphylla*, *Ourisia coccinea*, and *Viola "sacaulus."* See previous comments above on all these.

The two Verbenaceae described from Peru are also very intriguing, and they do not seem to match anything I have read about from there in the Flora of Peru or other sources.

Excerpt from letter to the Editor

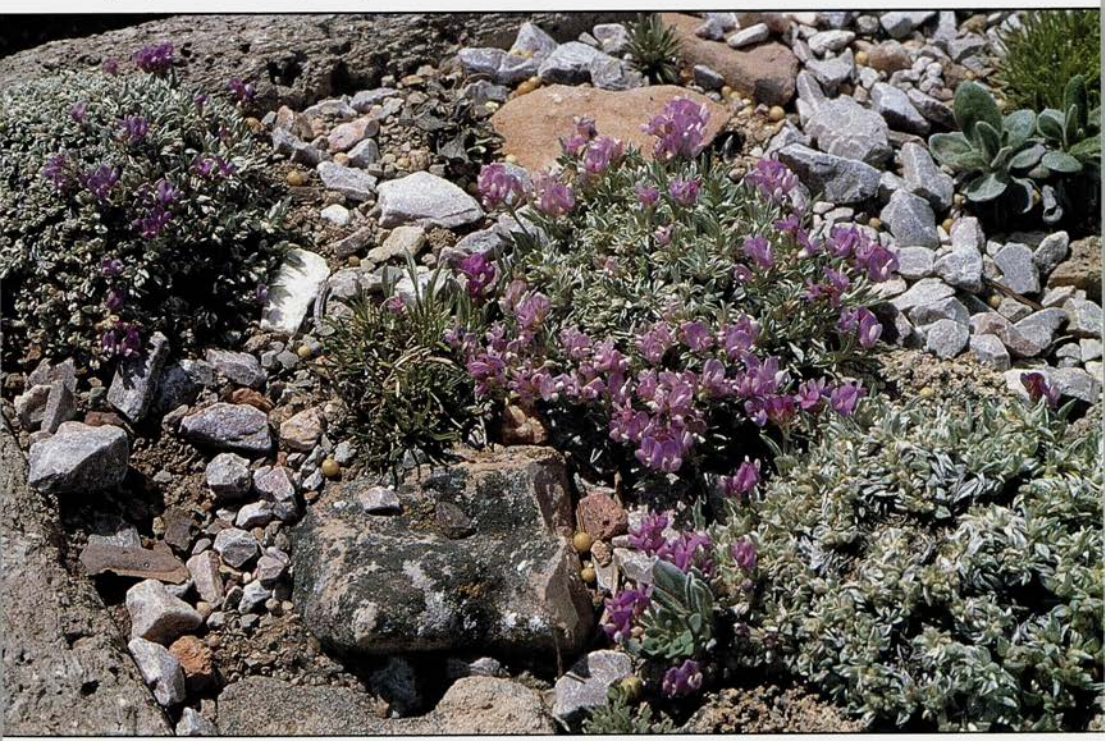
"Having been sequestered for months on end over the last four years or so now working up the Andean entries for the AGS *Enclyclopaedia of Alpines*, it was both timely and relevant as I have a good field knowledge of the temperate and Patagonian floras but am very frustrated in having to visualize most of the marvellous tropical and equatorial stuff in my imagination as we Brits have so little to go on apart from the flying visits made by the likes of Robert Rolfe and myself to Ecuador, Peru, Columbia, and Bolivia. It also served as a testing ground for my work on the tropical flora to see if it made sense when confronted with the real thing! Happily it did in the main. It has been a unique privilege to be paid at least something to sustain me whilst delving into this huge relatively unknown area of alpine plant botany, something I have never been able to do before for sheer lack of time and funds. I hope you will not consider it cheeky or arrogant of me to send you my observations based on this research.

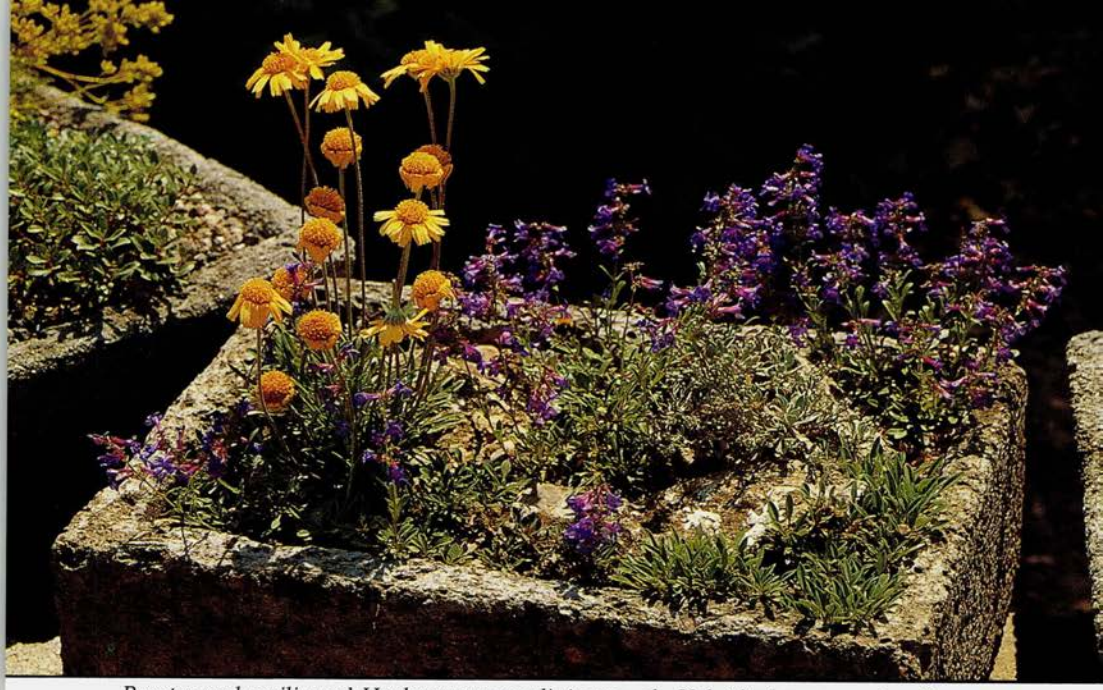
"Apropos, I shall use the photo of *Viola parvifolia* to amend and improve my entry for that species in the encyclopaedia, if (Chris) Grey-Wilson can fit it in in time. "

—John Watson

Plants of Pikes Peak, including *Mertensia alpina, Saxifraga flagellaris* in trough, Denver, Colorado

Eight-year-old *Astragalus spatulatus* in trough photos, Gwen Kelaidis





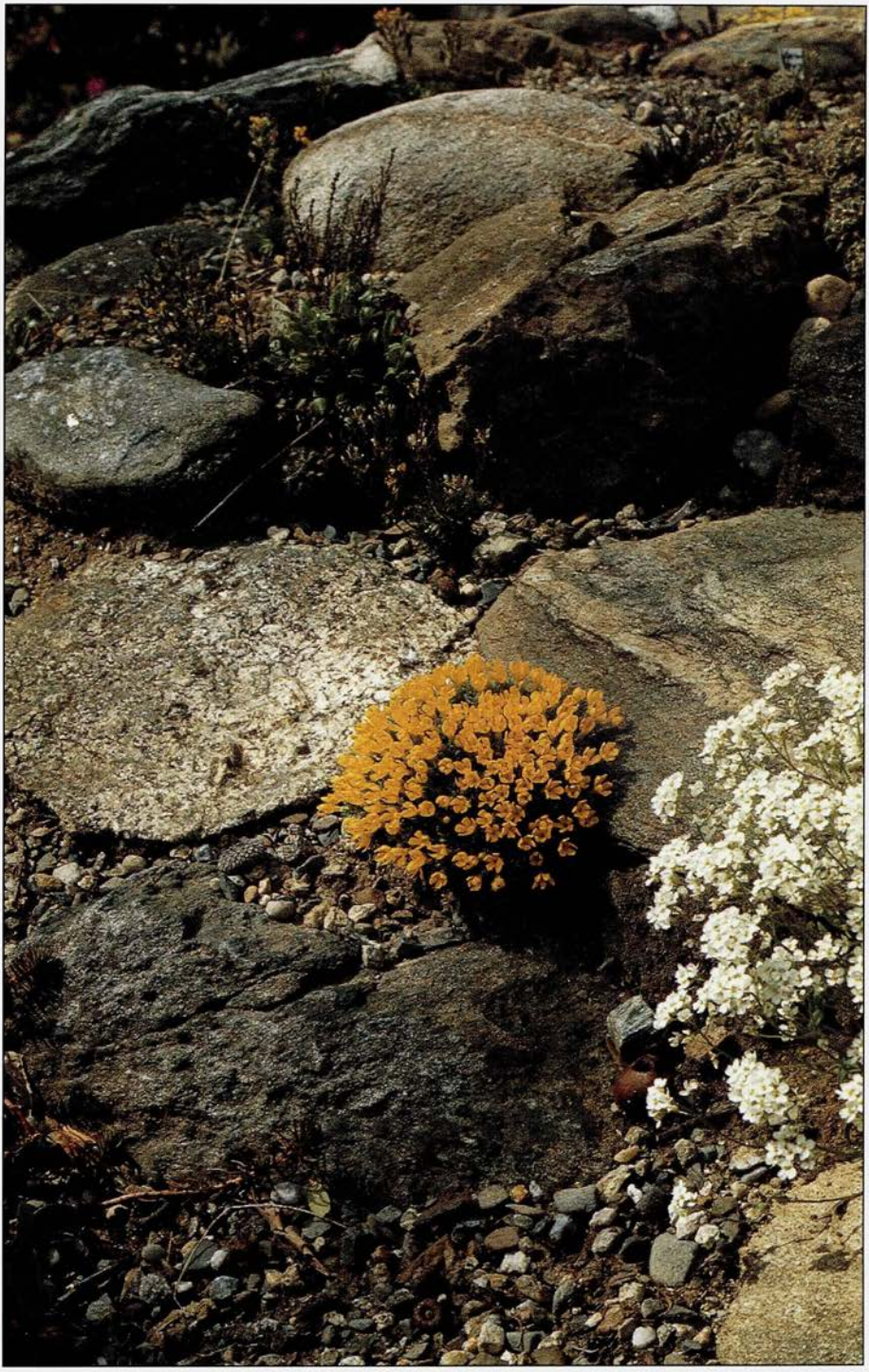
*Penstemon humilis* and *Haplopappus acaulis* in trough, Kelaidis home garden, Denver.

Trough with *Penstemon laricifolius, Phlox hoodii, Haplopappus acaulis*, Kelaidis home garden, Denver.

Plants of Manila, Utah including *Lesquerella alpina, Artemisia frigida*
Kelaidis home garden, Denver.

photos, Gwen Kelaidis

Plants of the Bighorns, including *Aquilegia jonesii, Senecio canus, Carex, Potentilla.*



James Jones

*Vitaliana primuliflora*

# Plant Portrait

*Vitaliana primuliflora*

The plants of the alpine reaches may serve as symbol and inspiration to rock gardeners, but few of them can be induced to grow, let alone flourish, in our gardens. Happily, there are exceptions, and one of the best of these is the beautiful and easy-going *Vitaliana primuliflora*. In one of nature's sweeter ironies, this plant also embodies just about everything else that we ask for in a rock garden plant: it assumes the perfect dome shape; it covers itself with lovely yellow flowers; it is easily propagated; and it comes not merely from alpine habitats, but from the Alps themselves!

This is clearly a species to be grown and extolled. Now, I don't know how widely it is grown, but certainly the extolling has been strangely subdued. Other than the most passing of comments, I found only one mention in the *Quarterly Bulletin of the Alpine Garden Society*, three in our own publication, and none at all in *The Rock Garden* of the Scottish Rock Garden Club. The Alpine Garden Society article referred, not surprisingly, to the success of the plant in a show, commenting on its variability at the same time. In the first ARGS article, in 1979, Roy Davidson provided most useful background information: it is a monotypic genus (alas, no equally desirable siblings to be tracked down) which occurs as five subspecies across mountainous Europe from Spain through the Pyrenees and Alps to the Apennines and Dolomites; subspecies *praetutiana* is the primary, if not the only, one grown in gardens and is indeed relatively floriferous. Subspecies *cinerea* is reported to have much larger flowers, and why hasn't anyone brought *that* into cultivation?

In 1980 Norman Deno reported, again conforming to expectations, that it did well in a sandbed. Finally, in 1989, describing a stroll through the Dolomites, Wally Alberts provided confirmation that, indeed, the plant exists in Nature.

I think it is time to make more of a fuss about this plant. First, a bit more background: *Vitaliana primuliflora* is a member of the Primulaceae, closely allied to *Androsace* and *Douglasia* (in which genus it was previously included). For a week or so in very early May it bears fragrant yellow flowers. Its basic form is a single-stemmed bun that in time builds into a dome almost as high as broad. And in not too long a time: a plant that was perhaps 3 cm across when I bought it grew to 13 cm in just three and a half years. Although the bun is apparently in complete contact with the ground, I have seen no evidence of layering.

In the period 1988-89 I purchased three plants from local gardeners and from a commercial nursery. The first two were placed in a raised bed whose soil was lean but not terribly sharply draining. The first lived for a year, bloomed and died; the second (ssp. *primuliflora*) didn't even last a year. The third was held over in a cold frame for the first winter and later planted in a crevice. It grew and prospered for four years until this last summer.

I am coming more and more to the conclusion that planting-out time is crucial for these slow-growing perennials. They should be large enough to have a root system that will take them through a bit of surface drought, and they should be planted early enough in spring that drought will be long in coming. My third plant was put in the open ground in April.

The crevice planting may have been more of a curse than a blessing. The rocks sloped in such a way that water could not flow in. The arid environment deprives the roots of water and provides a nice, dry soil for ants to play in. In any case, this last unusually hot and dry summer proved fatal. Rooted cuttings planted in raised beds came through the same summer perfectly well.

Seed of *Vitaliana* is sporadically offered in the exchanges; I've never tried it, though I'm feeling galvanized to do so now. However, cuttings work just fine if you simply want more plants, rather than the potential for variation. The bun is formed of well-defined individual rosettes that have just enough stem to be snipped off and securely inserted in a rooting medium. I use a sand and peat moss mix in a north-facing cold frame and do not apply rooting hormones. Cuttings taken in early July will be well rooted by the first of September, when they are potted up and kept in a cold frame that doesn't go too far below freezing (12°F or so). The smartest thing would probably be to then keep them in pots for another full year.

With many little plants on hand, I can now explore their use in the garden more extensively. I doubt if I'll come up with a better setting than that original crevice position, particularly accompanied as it was by the white sprays of *Schivereckia berteroides* (whose bane definitely *was* ants). If it's happier in a more level position, why, that's fine with me. I will most certainly continue to keep at least one in a pot, which evidently suits it very well. I plunge the pot in a sand bed, outside in summer and in a sunhouse in winter.

Please grow this plant. Please propagate and share it. And please, please, if you have diverse forms of subspecies, or if you browse in the wilds where they occur, do what you can to get them into wider cultivation.

—James L. Jones

# Books

*Bitterroot*, by Jerome S. DeSanto. 1993. LERE Press: Babb, Montana. ISBN 0-963-7889-0-6

Jerry DeSanto has known *Lewisia rediviva*, the bitterroot, for over 40 years, both as a wildflower and a research subject. He has found it in new places, even in the eastern environs of Glacier National Park, where the drainage is to Hudson's Bay! A retired national park ranger who served in both Yellowstone and Glacier, DeSanto has obviously relished this project as a composite of his zeal for historical research, plant hunting, and wildflower photography. He is also the author of a popular guide to the alpine wildflowers of the Waterton-

Glacier vicinity of the northern Rocky Mountains in Canada.

The slim, softbound *Bitterroot* volume is equally satisfactory as a quick read, a deep study for a rainy day, or a take along when anticipating being snowbound. The copious end notes to each of its seven sections (the first five devoted to bitterroot), along with maps, fine illustrations, an exhaustive biography, and equally detailed index, all add up to an easy retrieval system for relocating any item while eliminating the clutter and redundancy that commonly mar this sort of writing, quickly numbing the mind into a long winter's nap.

The sixth section consists of an ethnological report on the identities of the many "roots" used by Native Americans and which so helped sustain the Lewis and Clark expedition, but which were never named in the journals of that historic traverse of the continent. This subject, pursued by many researchers in the ensuing years, is neatly summed up. Particularly significant as food sources, it appears, were camas and cous, as well as several less well-known plants, while the bitterroot, which white men had barely sampled and not relished, has gotten all the hoopla. Writers of the time (and since) have over-sensationalized its ability to revive itself from an apparently lifeless state and overpraised its actual nutritional value while admiring its incomparably sumptuous blossoms, likened to cactus flowers but without the spines. Montanans democratically voted it their state floral emblem by a landslide in 1894.

The final section should settle for all time the precise location of Travellers Rest, the famous Bitterroot Valley encampment where Meriwether Lewis collected the plant which Pursh named in his honor: *Lewisia rediviva*. The site is now a National Historic Landmark, although the monument was erected along the present Highway 93 a mile or more to the east of that selected by DeSanto with the help of other Lewis and Clark devotees. Among the illustrations is a photograph of this collected specimen as it appears almost two centuries after its removal from Travellers Rest.

The author admits in his brief preface that he can be accused of what is said to be the exclusively American practice of including all the results of his research merely to prove it had been done, and as it has, we can move on, content that it has been so *well* done. This is a model of investigative reporting, proudly offered as a "Product of Montana"—totally conceived and produced there. As it will surely be a contender for book awards in its field, it is a reference source worthy of every naturalist's shelf.

To order, contact Jerry DeSanto, PO Box 91, Babb, Montana 59411. $13.00

—B. LeRoy Davidson

*Blooms of Bressingham Garden Plants: Choosing the Best Plants for Your Garden*, by Alan and Adrian Bloom. 1992. HarperCollins: London. $35.00 ISBN 0-00-412329-8

*Gardening with Perennials Month by Month*, Second Edition, revised and expanded, by Joseph Hudak. 1993. Timber Press: Portland, Oregon. $59.95. ISBN 0-88192-264-1

Functioning both as a home garden and as the basis of the nursery business for which it is renowned, Bressingham Garden is set on a property of some 220

acres in East Anglia, England, where Alan Bloom had by 1962 created 47 island beds covering five acres and containing some 5000 perennial species and varieties. In lieu of a traditional rock garden, he began in 1952 to build raised beds for alpines and other small plants. About 20 years after his father bought the place in 1946, Adrian Bloom began developing his own home gardens on a six-acre site within Bressingham, specializing in heathers and conifers, particularly dwarfs and slow-growing types.

Glossy, large-format volumes such as this one are often dismissed by serious gardeners before they make even a brief examination, because they automatically assume that all such lavish productions are coffee-table frivolities that at best show without telling. Too often they are right. The contribution of the full-page, full-color illustrations in *Blooms of Bressingham Garden Plants: Choosing the Best Hardy Plants for Your Garden,* however, which picture both intimate vignettes and expansive vistas of the Blooms' mature gardens, is educational and motivating, although they compose only a fraction of the book's content, which is essentially an encyclopedia of recommended plants grown at Bressingham, many of them the Blooms' own selections. The encyclopedia is composed of knowledgeably annotated alphabetical lists divided into separate directories of perennials, grasses and hardy ferns, alpines, conifers, heaths and heathers, and shrubs. Within the directories, the color illustrations, three to five on each well-designed page, show close-ups of some 750 plants, many of them, I suspect, not available in the United States. A third kind of exemplary illustration, to which I'll return, presents planting schemes in a clarifying way.

Each of the encyclopedia entries includes a line or two of general description, after which a brief verbal portrait is drawn of each cultivar. For instance, turning at random to *Omphalodes* in the section on alpines, one sees three species listed: *O. cappadocica, O. luciliae,* and *O. verna,* after a common name (Navelwort) has been noted. Introductory comments begin by saying that "these pretty, long-lived flowers have forget-me-not type flowers and lush, oval-shaped foliage." In turn, each variety merits further remarks, and the characteristics of named cultivars are stated. A code gives the month of expected flowering (F3-4) and zone adaptation (Z6-9).

British books are prey to misunderstanding the vagaries of the North American climate, so it is not surprising that zone adaptation information in the Blooms' book, despite advice from this side of the Atlantic, seems at times a bit shaky, especially when it comes to rating plants less cold hardy than experience suggests. (I bought my first plants of *O. verna,* for instance, in northern Connecticut and grow them in the shade in my Zone 4 Vermont garden almost too successfully, for although the Blooms caution that blue-eyed Mary can "spread quickly by means of stolons," neither they nor anyone else warned that they also self-seed prolifically where happy.) But this is a tiny cavil. There are many places where adaptation limits can be checked, outstanding among them Allen Armitage's marvelous 1989 *Herbaceous Perennial Plants,* first published by the University of Georgia and now issued by Timber Press. It is filled with every kind of useful plant information based on experience and horticultural expertise, with scaled line drawings in black and white. But the Blooms' book is of another sort, and in addition to casting a wider net, it has the advantage of being presented in a handsome volume with color-soaked visual aids.

The third type of illustration, similar to but different from a type sometimes

seen in nursery catalogues, is accomplished in *Blooms of Bressingham* in a manner new to me. Each category of the plant directory (perennials, grasses, etc.) ends with several edifying graphic visualizations of model beds—that is, three or four gardens utilizing recommended plants are depicted. The three models for alpines are "Alpines for a Sloping Site," "Alpines for a Small Raised Bed or Trough," and "Alpines for Edging and Paving." None of these is likely to tempt advanced NARGS gardeners, although the directories themselves include rarities enticing enough for specialists. Instead of the circles and amorphous blobs that usually characterize planting schemes, each entire garden, in flower, has been carefully drawn by an illustrator, Richard Bonson. His portrayal gives few details but rather suggests the effect that might be experienced by a visitor perhaps ten or twenty feet away from the bed. Then, for particulars, a close-up photograph of the blooming portion of each plant—what you might see from the distance of perhaps a foot or less—is placed alongside, with a line going straight to its painted counterpart. Each of these close-ups is numbered, coordinated with a list on the same page. Thus anyone unfamiliar with, say, *Dianthus* 'Garland' or *Berberis* x *stenophylla* 'Corallina Compacta' can get a fairly accurate idea of what they look like in flower, a distinct advantage also to anyone with less than perfect visual recall.

The Blooms are gardeners, plant collectors, and nurserymen who have personally grown every plant they include. Joseph Hudak, author of *Gardening with Perennials Month by Month* is a gardener, too, of course, but his profession is landscape architecture, and therefore he approaches plants from another angle. Hudak's descriptive lists of perennials, most of which he has grown or included in clients' gardens, are organized in a way that allows readers to plan a swathe of lavender and pinks on one side of the house in May, oranges and yellows in the perennial border in summer, or blues and purples as the dominant theme in the rockery throughout the growing season. He does this by subsuming his alphabetical entries to the month of bloom, preceding each month with color lists of perennials producing white, yellow, pink, etc. flowers. Thus, for example, one can see at a glance that the only red flowers in March (Hudak cautions readers that his time-of-bloom information is geared to his Zone 6 Massachusetts garden) appear on *Erica carnea* cultivars. You can then turn to the entry and also see one pictured in the color photographs (taken by Hudak) provided for each month. Here is some of what Hudak has to say about *E. carnea* after stating its size, zone adaptation, flowering span, natural color, and distribution: "The plant is often regarded solely as a dwarf shrub because of its woody stems and evergreen foliage, but it is included here for its common use in rock gardens and seashore gardens in many parts of the country. Widely but slowly creeping and trailing thin stems with whorls of half-inch evergreen leaves produce long-lasting terminal spikes of quarter-inch bell-shaped flowers. Best in full sun." A list of recommended cultivars follows, as well as brief comments on propagation.

The eight long lists Hudak adds at the end of his book, the earliest version of which was first published in 1976, constitute a lode of information, although your experience with some of the plants may differ from his. Lists include "Perennials Blooming for 6 Weeks or More," subdivided by month, with their sun or shade requirements noted. Among other lists useful to gardeners is "Perennials Accepting Deep Shade."

Both books have excellent indexes, which you will use to look things up when subverting their formats. Both should be welcome additions to gardeners' libraries.

—Cecile Shapiro

## *Errata*

Volume 52(1), p. 56. Matt Bishop keeps a *Hepatica* collection for the National Council for the Conservation of Plants and Gardens. He is keen on plant breeding and loves hellebores, *Agapanthus,* and *Galanthus.* He lives in Devon, England.

Vol. 52(1). The flowers of hellebores are technically considered to have petaloid sepals rather than petals.

Vol. 52(1). Drawing on p. 32 is by Jack Lambert.

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