NORTH AMERICAN ROCK GARDEN SOCIETY

The Rock Garden

QUARTERLY

SUMMER 2018

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All illustrations are by the authors of articles unless otherwise stated.

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Hans Hansen grew up on a dairy farm in southwestern Minnesota and has always been extremely passionate about plants, especially perennials and bulbs. Hans has a degree from the University of Minnesota in environmental horticulture. Since 2009 Hans has been at Walters Gardens in Zeeland, Michigan, as director of new plant development where he manages many breeding programs including hellebores, baptisias, hostas, hardy hibiscus and mangaves. His home garden in Zeeland is a city lot crammed with an assortment of zone 6 perennials, bulbs, and shrubs.

Wolfram Kircher is a professor at Anhalt University in Bernberg, Germany where he works as a professor for planting design in Landscape Architecture. Amongst other research topics he run trials with planted filter areas for natural swimming pools, including a percolated rock garden. He has also built several rock gardens on his own property.. He is one of the authors of *How to Build a Natural Swimming Pool: The Complete Guide to Healthy Swimming at Home*.

Yoko Arakawa has over 25 years' experience working as a horticulturalist. Raised in Japan, she discovered her interest in plants at an early age while growing up on a farm. She worked for 25 years at Longwood Gardens, in Pennsylvania, doing greenhouse growing with a special emphasis on chrysanthemum, including the "1,000 blooms Chrysanthemum" and other display crops. Her other passions include alpine plants, worldwide mountain climbing, and photography. In the spring of 2017, Yoko relocated to Seattle, Washington, where she can easily access mountains to climb and observe the alpine plants that she enjoys so much.

Lisa Bartlett is the Garden Manager for Smith-Gilbert Gardens, in Kennesaw, Georgia. She is responsible for maintaining the over 4,000-species collection of plants. The collection ranges from rare herbaceous perennials to rare and unusual trees including one of the largest collections of bonsai in the Southeast. She created the award-winning Butterfly Exhibit at Smith-Gilbert Gardens in 2017. Lisa hasn't always been in horticulture, before following her passion for plants she was a talent agent for stand-up comedians; Jeff Foxworthy was one of her clients.

Mike Smedley is Vice President and Chief Deposit Officer of Bank of the San Juans, a community bank with 20 branches across Colorado. When not at work, he's obsessing over plants, gardening, and rocks at his Durango, Colorado, home. A self-taught expert on bulbs, Mike grows 10,000 botanical tulips and crocus in his front lawn, just for shock value. He is a featured speaker at garden clubs, bulb sales and any other gathering desperate for horticultural entertainment. He writes a weekly humor column for the *Durango Herald*, where he was news editor in the late '80s. His gardening fixation is tolerated, if not enabled, by his wife, Amy, an artist and college professor.

Bob Nold was dragged kicking and screaming to Denver in April 1961. There was snow on the ground. He took that as a bad sign. It was. His garden is located at the western edge of the Denver metro area, in the rain shadow of Mount Evans; the garden receives, on average, 10 inches of precipitation a year. He eventually came to terms with this and now grows mostly bulbs, a few dryland plants, and the odd conifer. He is the author of *Penstemons* (1999), *Columbines* (2003), and *High and Dry* (2007).

Front cover: *Haberlea rhodopensis* and *Asplenium trichomanes* in Zdeněk Zvolánek's garden. Photo by Panayoti Kelaidis

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From the Editor

Rock gardening can be defined in many different ways. It can be thought of as the narrowly focused art of growing true alpine plants and using rocks to recreate naturalistic scenes of mountain tops. Or it can be bigger, broader, and more inclusive. I'll confess that my interest, and the definition of rock gardening I use when trying to choose articles for the *Quarterly*, is a broad one. I think of rock gardening as a style inspired by alpine plants, and mountainous, rocky terrains, but that then takes that inspiration and runs with it in every possible direction, moving beyond the traditional rock gardening forms to explore and create new ways of growing plants and using rocks.

With that big tent view of rock gardening in mind, I'm very happy about this issue of the *Quarterly* because I feel like it reaches out in all directions to showcase many different approaches to growing little plants and using rocks. This issue starts out with Panayoti Keladis taking us on a tour of Zdeněk Zvolánek's garden. Zdeněk is a great innovator of rock gardening, a true visionary and champion of many of the styles of rock gardens that are popular today. From there, we move to other, very different styles and approaches – damp rock gardens with water flowing through them, horizontal rock gardens growing in the spaces between paving stones, and a new crevice garden being built in Georgia, where the climate may not be conducive to many true alpine plants, but rock gardening is still very possible.

In addition to these articles about gardens, this issue also covers a wide range of different plants, from the alpine flora of northern Peru, to growing *Astragalus*, to a behind-the-scenes look at an entirely new group of plants, the hybrid genus *Mangave* by Hans Hansen, the man who has willed these plants into existence through his innovative breeding program.

It is an exciting range of articles, and I hope it will inspire us all to look at the art of rock gardening in a bigger, more expansive way.

The Crevice Master

Panayoti Kelaidis

ALTHOUGH MANY INDIVIDUALS have helped forge the Czech rock garden renaissance, none has been more visible in both creating and proselytizing the Czech crevice garden style, as well as exploring for seed, than Zdeněk Zvolánek. He has been dubbed "Zed Zed" in Britain by those intimidated by the Slavic pronunciation of his distinctive name. By whatever name, few more charismatic figures have appeared in the art of rock gardening since the equally charismatic and even more eccentric Reginald Farrer flourished a century ago.

I was fortunate to have first contacted Zdeněk in the mid-1970s when we began exchanging letters and seeds. We first met face to face in Britain in 1981 where we both attended the International Rock Plant Conference in Nottingham and hung out together at that event. That is when Zdeněk informed me he'd be visiting me in September of 1983. Judy Glattstein of the Connecticut chapter of NARGS helped make that visit a reality: she and I both persuaded our respective chapters to cover the cost of his trip as a speaker and Zdeněk and I subsequently spent two weeks exploring for plants and seed throughout the Colorado Rockies and Utah steppe. For many years afterward, his letters were signed with a flourish: "Desert RAT."

Zdeněk returned to North America regularly since that time while his partner Joyce Carruthers was alive. Zdeněk and Joyce were partners in life and work, and commuted annually between the Czech Republic in spring, Turkey in summer, and Joyce's home bases in Wales and British Columbia at other times of the year: an enviable lifestyle! My relationship entered a new phase when Zdeněk and Joyce spent several weeks constructing an ambitious crevice garden at the Mount

Goliath visitor center for Denver Botanic Gardens in 1998. They subsequently returned in July, 2010, to keynote the North American Rock Garden Society's Annual General Meeting in Salida, Colorado. Not long thereafter, Joyce died in a tragic traffic accident, and Zdeněk's visits have lessened, although he's planning to revisit the North American West this summer with his new companion, Zdena.

Troughs in Zdenek's garden.

Zdeněk has become a regular lecturer throughout Europe and has built numerous ambitious rock gardens in England (including a large crevice garden at the Royal Horticultural Society's garden at Wisley). He's also built many gardens across Europe in Denmark and Germany, as well as continuing to be a leader at home in the local societies of the Czech Republic. He also edits the *International Rock Garden Journal* with Ian and Maggie Young: a spectacular online magazine produced under the auspices of the Scottish Rock Garden Club.

I have watched Zdeněk's remarkable productivity with amazement, hoping to find an opportunity to view the "Czech phenomenon" firsthand in his homeland itself. In the spring of 2017, I finally had my chance when Vojtěch Holubec and Zdeněk extended an invitation to me to participate in the Third International Rock Garden Conference at Pruhonice, Czech Republic, amid a vast park in an outstanding venue for conferences not far from Prague.

Attendees of the rock garden conference in Zdeněk's garden.

Previous pages: The view from the top of Zdeněk's garden.
Above: Looking up the cliff garden with masses of pink *Aethionema grandiflora*.

My week-long sojourn in the Czech Republic exceeded my fondest expectations. Of course, the magical setting near a castle at Pruhonice did not hurt, nor the unblemished sunny spring weather. The companionship of well over 100 keen rock gardeners from all over the world and stimulating presentations enhanced the experience. But the centerpiece was certainly the opportunity to visit nearly a dozen spectacular private gardens during the week, and the few hours spent at Karlik, the village where Zdeněk's private garden is found, stand out for a variety of reasons.

The steep hill where much of Zed Zed's garden is perched was in peak bloom during our visit. There are small rock gardens along the road in front of his house, but the real extravaganza is in the back of the house—a seemingly sheer cliff perhaps sixty feet tall, and a terrace above with yet more cliffs rising beyond. The cliff is limestone: a large outcrop of the Karst formation that underlies much of the Prague region—a perfect medium for growing lime-loving alpines in cooler aspects. Western American xerophytes thrive on the hotter aspects, as do a wealth of Mediterranean bulbs and buns. Fortunately, in real life, the path climbing the cliff is not as intimidating as photographs imply! The timid will be relieved to know there are extensive level beds on the terraces. You're not required to use ropes and pitons on your visit although I do believe Zdeněk has used them to plant and weed some of the steeper bits in the past.

The garden has beautiful views of the Czech countryside.

The crystalline day with scudding clouds in the azure skies combined with the rolling Czech countryside stretching beyond provided a fantastic backdrop. The contrast of distant views, the dozens of intimate vignettes and the crowds of enthusiastic visitors stretched along the pathways made for an unforgettable visit. Hopefully, the small subset of pictures selected to illustrate this tribute to Zdeněk the gardener and the man will give a taste of his lifetime's achievement on this cliff-like garden.

A few things ought to be mentioned: Zdeněk commenced work on this garden as a youngster. Karlik was his parent's country home he would visit on weekends once he'd launched his career as an architect and lived in Prague with his wife. He was never around for great lengths of time, so any plants he put here had to fare on their own after they'd been planted. Even now that Zdeněk lives "full time" in Karlik, he spends a great deal of time away on tours and plant exploration—the garden is designed to coast on without his constant attention.

Visitors enjoy the garden and landscape.

Left: *Erinacea pungens*. Right: *Eriogonum caespitosum*.

There are bona fide alpines tucked into cooler microclimates—primulas, various gesneriads, saxifrages, and androsaces—that demand shadier, moister conditions to grow in Karlik. But most of the highly exposed, sunny hillside is planted to lower elevation alpines and steppe plants that can withstand the extended warm, dry spells that occur every summer here. A robust mat of *Eriogonum caespitosum*, for instance—as good as any I've seen in the intermountain west! Lewisias galore and many penstemons made me feel right at home as a U.S. westerner.

He has encouraged many of these to spread and self-sow, to help cover the extensive cliffs and broad slopes: a tiny crevice garden of only miniature alpine gems would be untenable on a garden of this size and scope. Nevertheless, there are still many little gems that find their nooks and crannies throughout.

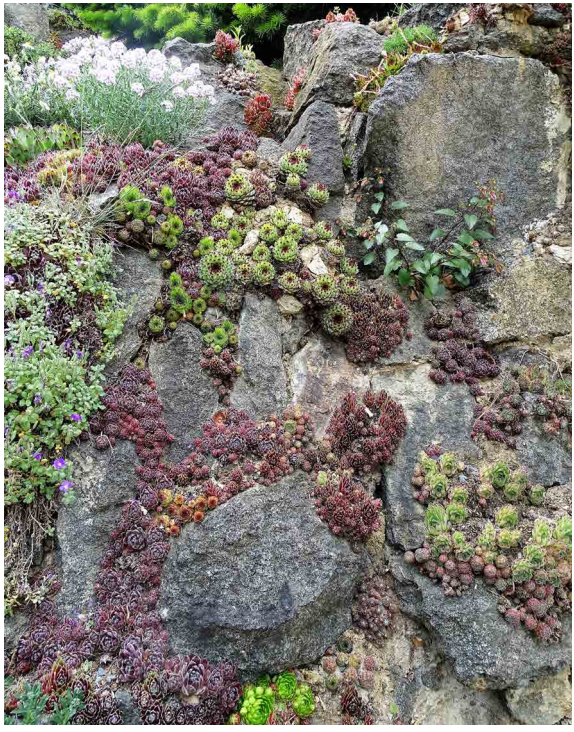
Left: *Ramonda nathaliae*. Right: Albino *Lewisia cotyledon*.

A rich medley of thriving plants.

An eloquent take-home I learned from visiting Karlik was to grow as much in your garden as will take your conditions naturally. There is a vast assortment of rock garden plants to draw from, and all of our gardens can provide conditions for a great many of these to grow easily--not needing a lot of coddling. To specialize in what likes your climate and grows best with your soil, your exposure, your conditions—this is what is likely to produce the most gratifying results for you in your garden and for your garden visitors.

Zdeněk's garden is quite enormous—and if he had not followed this path of practical plant selection, it would be overwhelming to maintain. Instead, he can focus his energy on combining plants in the most attractive ways, and all manner of subtle, elegant decoration throughout.

Sempervivums and sedums are usually regarded as "too easy" for sophisticated gardeners, but Zdeněk has used these and other "common" plants to great effect, provided intricate interest on otherwise stark rock faces, knitting shattered rock into a meaningful pattern.



A sempervivum tapestry.

Gray mats of *Pterocephalus pinardii* are both beautiful and low maintenance.

He has used a wide variety of mat-forming plants like *Pterocephalus pinardii* and a wealth of tiny dianthus to cover expanses of ground, as well as dwarf woody shrubs like genista and daphne which love his conditions. These meadow-like expanses of dense plantings have kept down weeds—I don't recall seeing a single weed during my visit! For those of us who grow most of our alpines in the ground rather than alpine houses, this rich and varied garden is a vindication. Traveling as he does, there's no way Zdeněk could take care of a large collection of plants in pots. But growing in the ground and on rocks, they coast on cheerfully.

Remember that all these pictures are a tiny fraction I took that magical May day in Karlik. And if you consider that an incredible array of flowers preceded our visit for months, and would continue through the summer season, this is an action-packed garden! I hope to visit again in other seasons of its bloom. I can't think of another private garden combining so many elements as artistically!

The Czech revolution in rock gardening that's taken place over the last half-century has touched everyone who attempts to grow alpines in rock gardens. Crevice gardens have cropped up in troughs, in practically every major public rock garden, and in more and more private gardens. This is occurring as gardeners seek to emulate the fantastic images published of gardens such as Ota Vlasak's near Prague, or the Prague rock garden club's famous rock garden show around the Church of St John on the Rock in that ancient city. More and more rock gardeners have made a pilgrimage to the Czech Republic and Slovakia to see the ambitious crevice gardens there—and three international rock garden conference have been staged thus far in that country. In addition to innovative garden design, a dozen or more Czechs have fanned across Eurasia annually collecting an extraordinary range of continental alpines and steppe plants new to cultivation. And Zdeněk, more than anyone, can take credit for shepherding our art onto rich new pastures. We salute you, Master!

Penstemon fruticosus albus backed by clouds of feathery *Pulsatilla* seed heads

Mad About *Mangave*

Hans Hansen

MANGAVES ARE AN intergeneric hybrid between a *Manfreda* and an *Agave*. My introduction to this fascinating group of plants goes back to the mid-1990s. At that time I was Director of Research and Development at Shady Oaks Nursery in Waseca, Minnesota. I was managing a tissue culture lab, my primary crop was hostas, and I worked closely with hosta hybridizers helping them introduce their new selections into the wholesale market. One of the hybridizers was Tony Avent of Plant Delights Nursery in Raleigh, North Carolina. He had several *Agave* hybrids and forms of species he was trying to build up numbers of to put into his catalog. After twisting my arm and telling me they were hosta's closest relative I agreed and began working on propagating them. *Manfreda* 'Chocolate Chip' soon followed as well as a number of variegated forms of *Agave*.

The first known *Mangave* hybrid was identified by Carl Shoenfeld of Yucca Do Nursery in Hempstead, Texas. In the late 1990s, Carl was botanizing in Mexico and collected seed from a plant he called *Manfreda undulata* (possibly *Manfreda variegata*). When the seeds germinated at the nursery, two of the seedlings had incredible vigor compared to the rest of the batch. The two plants were grown to maturity and developed into three-foot (1 m) wide clumps of broad, thick leaves with such intense burgundy spotting as to appear almost a solid burgundy color. During a visit to Yucca Do Nursery, Tony Avent saw the seedlings and suggested that a nearby *Agave celsii* must have crossed with the parent *Manfreda* in the wild. Tony and Carl coined the name *Mangave* to designate the hybrid, making it the first documented hybrid between *Agave* and *Manfreda*. The best of the two seedlings was given a cultivar name of 'Macho Mocha' and sent to Shady Oaks to be tissue cultured. It was introduced into the retail trade by Plant Delights Nursery and Yucca Do Nursery in 2004.

The first documented *Mangave* hybrid blooming at Yucca Do Nursery.

During its propagation I isolated two variegated forms, 'Expresso' having a wide creamy white margin, and 'Cappuccino' – the reverse variegation pattern with a dramatic creamy-white center. The hardiness of these is about zone 8-10. When the plant flowers the scape reaches up to eight feet (2.4 m) in height with dark red flowers at the top of the scape.

In 2009 I moved to western Michigan to work at Walters Gardens, the nation's leading grower of wholesale perennials. As Director of New Plant Development, I had the opportunity to spend most of my working hours hybridizing perennials. My interest in *Agave* and *Manfreda* increased; by now I had grown several forms of *Manfreda virginiana* in both of my gardens, including forms with remarkable red coloration. I acquired as many *Manfreda* as I could find, as well as *Mangave* 'Bloodspot', the second known *Mangave* hybrid with *Agave macroacantha* as the pollen parent. The benefit of breeding with *Manfreda* was the rapid growth rate, dependable annual flowering, and the red-spotted pigment that was easily transferred to their offspring if selections of *Manfreda* that had the most dramatic spotting and leaf coloration were used as parents. In some species, the red pigment was so dark as to appear nearly chocolate brown. Over the next several years I reached out to friends with *Agave* collections when my *Manfreda* and *Mangave* came into flower. They were generous with sharing *Agave* pollen, and I was able to make many viable crosses.

Hans Hansen creating new *Mangave* hybrids.

The first *Mangave* introduction from my work was 'Pineapple Express', a cross from 2011 between *Mangave* 'Jaguar' and *Mangave* 'Bloodspot' (a Japanese hybrid between

an unknown *Manfreda* and *Agave macroacantha*). This rapid-growing hybrid forms an upright symmetrical clump of fleshy dark green leaves covered with pronounced dark burgundy spots. Very tiny harmless spines line the leaf margins. The overall effect from a distance with the upright form and habit really does resemble the top of a pineapple. Its hardiness is zone 8-11

Two other releases from 2011 work that hit the market later were 'Bad Hair Day' and 'Man of Steel'. 'Bad Hair Day' is a hybrid between *Manfreda maculosa* and *Agave geminiflora* (the twin-flowered agave). It is a personal favorite of mine for the profusion of long, narrow, rubbery leaves that look amazing in face containers. This selection remains vegetative for a very long time (six years to flower from seed). In the ground, the plant seems to have less uniform symmetry – throwing a few unruly leaves and begging for a suitable name. Direct sunlight turns the foliage from dark green to nearly burgundy with the profusion of tiny spots. A seven-foot (2 m) flower stem is covered with over 100 rose-colored flowers produced in pairs, just like the *Agave* pollen parent. Unlike the rest of the introductions, the original rosette does not seem to die after flowering (like the *Agave* parent), nor does it seem to offset. *Mangave* 'Bad Hair Day' seems to be one of the hardiest releases to date, overwintering several years in Raleigh, North Carolina, (Zone 7b). The size in the garden is about 12 inches (30 cm) by 30 inches (75 cm).

'Man of Steel' has thick, narrow steel blue foliage that picks up a bronze patina in full sun. This cross involves *Agave striata*, and it has a strong resemblance to its pollen parent. Terminal spines change from flexible when young to strong at maturity. A slower growing selection, the original seedling has not yet flowered to date (seven years). With *A. striata* in the background, it should have some hardiness, I'm guessing Zone 8-11. Plant size is 12 inches (30 cm) tall by 20 inches (50 cm) wide. One of the benefits of a slower growth rate and maturity is that the original rosette stays attractive longer before flowering.

Mangave 'Moonglow'.

2012 was a busy year for making *Mangave* crosses. Some of the introductions from that year include 'Lavender Lady', 'Mission to Mars', 'Silver Fox', 'Purple People Eater', 'Moonglow' and 'Inkblot'.

'Moonglow' and 'Inkblot' are sister seedlings from the cross between *Mangave* 'Bloodspot' and a *Manfreda*. This backcross between a *Mangave* to a *Manfreda* produced rapidly growing plants with a more flattened growth habit and succulent leaves. They also have a quicker life cycle, flowering in less than three years from tissue culture in the greenhouse. 'Moonglow' has the flatter habit of the two, with succulent leaves that are a blend of silver and very dark purple. Very benign spines line the leaf margins of the 6-inch (15 cm) by 24-inch (60 cm) plants. Both selections are quite tender (Zone 9-11) Because of the predominately *Manfreda* bloodline these siblings have no spines or lethal teeth.

'Inkblot' has an arching habit where the foliage radiates downward from the center of the plant. Plum-colored spots nearly cover the leaves with smoky-gray patterns appearing between spots. Like its sister seedling, 7-foot (2 m) flower spikes with leaf bracts tower above the foliage and bear dozens of maroon flowers. Basal offsets usually appear a year before flowering to regenerate the plant. The in-ground size is 8 inches (20 cm) tall by 20 inches (50 cm) wide.

Mangave 'Lavender Lady'.

'Lavender Lady', a hybrid between a *Mangave* and *Agave attenuata* (the foxtail agave), is one of the most architectural introductions. The plant forms a solitary clump of ovate, dusty-purple leaves. Minute white spines lining the leaf margins set off the lavender-purple leaf color, while the small terminal spine is cinnamon brown. Slow to reach maturity, this flowered five years from seed producing a long elephant trunk-like spike that cascaded down from the top third, covered in hundreds of yellow flowers. This is one of the most tender varieties.

Leaves burn with a few degrees of frost. It is best showcased in a container in zones with any degree of freezing. Plant size is 12 inches (30 cm) tall by 20 inches (50 cm) wide. It is a personal favorite, very *Agave*-looking, although without spines. Its lavender cast is among the most distinct of the hybrids.

Mangave 'Silver Fox'.

'Silver Fox' was from a cross between a *Mangave* and *Agave gypsophila*. This stunning plant has frosted silvery-gray foliage with a bluish-purple underlay caused by the myriad of tiny spots. Plants form a symmetrical arching mound, the leaves slightly folded have a gently undulating wave courtesy of the pollen parent. Well defined marginal teeth add character. Seven-foot (2 m) flower scapes produced dozens of yellow flowers at maturity. If the stems are allowed to stay on the plant after flowering, small aerial plantlets develop along the stem. This flowered five years from seed.

'Catch a Wave' combined the genetics of an unnamed *Mangave* seedling with *Agave gypsophila* and *Agave colorata*. The free-form architectural plant has thick blue leaves with a glaucous overlay. The concave, gently undulating margins are lined with thin white teeth. Full direct sun draws out plum-colored spotting. The dramatic plant will form a 20-inch (50 cm) by 30-inch (76 cm) clump over time, and 6-foot (1.8 m) flower stems bear mahogany flowers. Hardiness is from Zones 9-11. Because of the predominately *Agave* genetics in the cross, this hybrid looks very *Agave*-like. It has enough *Manfreda* heritage to have a nice growth rate and can achieve a large architectural agave-looking plant at a fraction of the time needed to raise an agave with similar form and size.

'Falling Waters' is one of the largest hybrids, 12 inches (30 cm) tall and over 30 inches (76 cm) wide. This *Manfreda* crossed with *Agave ovatifolia* (whale tongue agave) produces a large rosette comprised of glaucous blue-green folded leaves that gracefully arch downward. Large jagged marginal teeth add character. Its beautiful form is best showcased in a large container to allow its foliage to cascade gracefully, or may be used in the landscape in Zones 7b to 11. A sister seedling evaluated in North Carolina flowered in 5 years producing an eight-foot (2.4 m) flower stem with many yellow flowers.

'Spotty Dotty' marries the genes of a *Mangave* hybrid and *Agave bovicornuta* (the cow horn agave). One of the most vigorous of the introductions, 'Spotty Dotty' forms a 10 inch (25 cm) tall by 3 foot (90 cm) wide specimen. The lighter green leaves are heavily spotted with large red dots. Tiny spines line the leaf margins. Because of the tender *Agave* species parentage, hardiness is estimated to be Zones 9-11. This selection is a favorite because of the dramatic spotting, large size, and quick time to reach maturity.

As a rule, *Mangaves* tend to be incredibly fast growers compared to their pollen parents *Agave*. This makes them more economical and user-friendly from a nurseryman's point of view. In fact, some varieties are almost challenging to hold for any length of time in a cell pack in greenhouse conditions. This quick growth rate is reflected in the amount of time taken to reach maturity and flower. Agaves typically take between seven and 25 years depending on the species. The *Mangaves* can take between two and seven years, again depending on the genetics used. As my breeding program has evolved and more crosses come into flower and get worked back into the breeding program, plants are beginning to look more like *Agaves* with stronger teeth and firmer, less succulent leaves. The following are examples of hybrids with quite an agave-like structure and form.

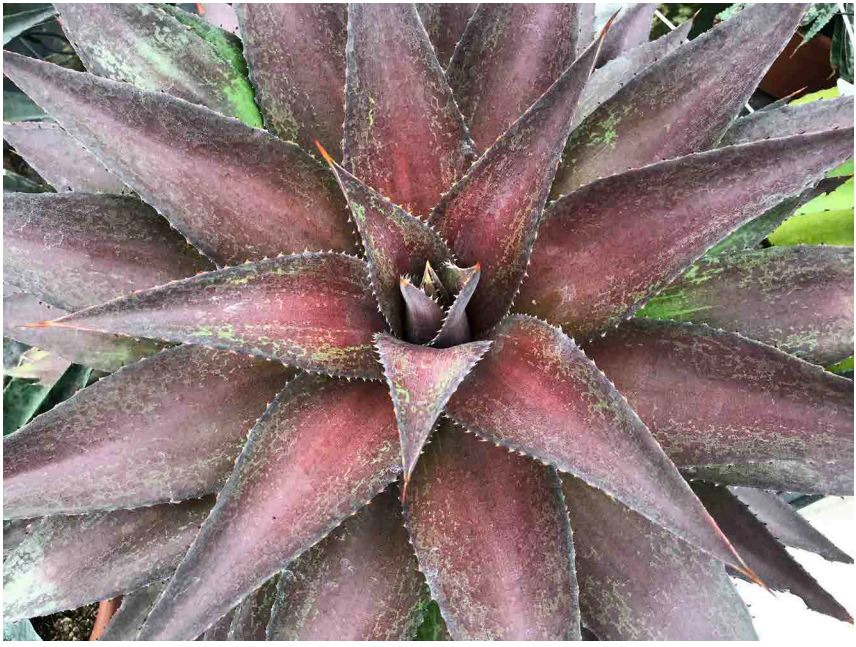
Mangave 'Racing Stripes'

'Racing Stripes' resembles *Agave lophantha* (the thorn crested agave). This cross of a *Mangave* and *Agave lophantha* 'Band Aid' features the hallmark central yellow band of *A. lophantha* with a faster growth rate and gently arching leaves. *Agave* 'Band Aid' was a clonal selection of the species with wider leaves and a slower tendency to offset. The rich dark green leaves make the central band pop, and serrated spines line the leaf margins of the compact 8-inch (20 cm) by 14-inch (35 cm) plant.

Mangave 'Tooth Fairy' is a cross between a *Mangave* and *Agave shawii*. This plant is comprised of a rosette of small thick, gray-blue leaves lined with very pronounced marginal and terminal spines that emerge yellow and age to cinnamon red before eventually maturing to mahogany brown. Like several agaves, this hybrid has a beautiful leaf pattern on the upper surface where the leaf pattern and spines are imprinted from the previous unfurling leaf. Exaggerated terminal red spines may reach 1.5 inches (3.8 cm). With *Agave shawii* and *A. macroacantha* in the background, this is quite frost sensitive. It has not yet flowered. Unlike my earlier work, this selection capitalizes on the quantity and number of terminal and marginal spines.

'Iron Man' combines a *Mangave* hybrid with *Agave montana* (the mountain Agave). It is large, 20 inches (50 cm) tall by 36 inches (90 cm) wide. The wide dark green leaves and arched leaf tips are reminiscent of *Agave salmiana* var. *ferox* with the upper surface leaf imprinting. 'Iron Man' is hardy to Zone 8-11.

'Mission to Mars' is one of the largest mangaves, both in leaf length and width and clump size, reaching 2 feet (60 cm) by 4 feet (120 cm). The parent *Mangave* was a Plant Delights Nursery hybrid of *Manfreda jaliscana* and *Agave* x *pseudoferox* crossed with *Agave shawii*. 'Mission to Mars' has 2-foot (60cm) long leaves that are slightly folded, arching and



Mangave 'Redwing'

covered with so many intense ruby spots the leaves appear red from a distance. The effect is magnified in full sun. A great landscape specimen where hardy (Zones 8-11), it quickly will fill a large container for patio use as well. Moderate to reach adulthood, flowering occurred in four years here.

'Redwing' (*Manfreda* sp. x *Agave shawii*) shows the most red pigment to date. Under full sun conditions, the leaves are carnation red. The large symmetrical rosette is comprised of short wedge-shaped leaves that are among the most beautiful of any *Mangave*. This selection has yet to flower.

In the course of working with mangaves, I found a sport with a yellow variegation pattern in a tissue culture batch of 'Jaguar'. After growing it on for several years it became one of the most incredible mangaves I've seen. The yellow leaf margins turned nearly orange in full sun. Fleshy leaves with an absence of spines make this ideal for containers or landscaping. It is hardy in Zones 8-10. Flower stems are nine feet (2.7 m) or taller on established plants. Its arching habit and size make it ideal for elevated containers and urns where its details can be appreciated up close.

Over the course of time, I think things eventually go full circle. Long before I began working with *Agave* and *Mangave*, and even before I met Tony Avent, I was hybridizing hostas, primarily for variegated foliage.

The flower structure, length of bloom time (both flowers are receptive for pollen for about one day) are surprisingly similar. Eventually, I got a break and began developing breeding lines for variegation. Like hostas, the variegation in *Mangave* is only transmitted maternally, and the resulting seedlings must be aged until the variegation pattern is stabilized. Personally, I think variegated *Mangave* are the most dramatic, as I have always had a weakness for variegated foliage. The first release from my variegated breeding lines was *Mangave* 'Navajo Princess', using the variegated breeding line of *Manfreda maculosa* with *Agave montana*. This selection has dark green leaves with a clean white margin. Like many hostas, a lighter green area appears where the margin and leaf center overlap. The red spotting on the leaf center appears pinker on the white margins especially under stress or high light. With the high elevation Mexican species of *Agave* as a parent, hardiness should be about Zones 7b-11.

Eventually, my goal is to work towards hardier selections. I've had difficulty getting pollen of some of the hardiest *Agave* as their growth rate is slower than many tender types, and the Rocky Mountain forms dislike the humidity of the southeastern states. Hardiness also is often directly related to winter moisture more so than temperature. I've had seedlings from the same cross overwinter outside with protection from heavy wet snow while sister seedlings perish planted several feet away unprotected. Some plants have died back from winter wet and cold above ground but re-emerged weaker.

Of all the breeding projects I've been privileged to be a part of, the *Mangave* project has been the most rewarding for me. Seeing the genetic diversity of leaf shape, architectural form, growth rate, and red and purple coloration has been fascinating. Their quick life cycle has allowed me to make several generations of crosses. One would have to live many more years to accomplish the same breeding lines with *Agave*.

From a gardener's point of view, *Mangave* are impressive in the landscape. They do for sun what hostas can do in the shade. The imposing size and leaf form and structure lend them as specimens in the landscape. Their summer moisture requirements are comparable to many other perennials. I love combining them in groups of three or five in my conifer beds, as specimens in the rock garden, or focal points along the sidewalk in front of my house. Fine textured plants like grasses (*Sporobolus*, *Festuca*, *Stipa*) look great with them, as well as ground-cover sedums. Tall cacti like cane cholla provide height and backdrop. *Mangave* are quite collectible, and numerous gardeners have assembled excellent collections and showcased them in ceramic glazed pots on patios – a perfect way to display collections and allow gardeners to bring them indoors in climates out of their hardiness zones.

Mangave mingling with conifers and perennials in Han's Michigan garden.

Damp Rock Gardens

Wolfram Kircher

ROCK GARDENS USUALLY remind us of dry plant communities rather than plants for moist or even wet sites. However, though the stone surfaces dry out quickly, they also reduce the substrate's evaporation enormously. Just under the upper stone layers and in deep crevices there are often permanently moist or even damp conditions that can be recreated in a damp rock garden.

This natural rock formation along the shore of Lake Engstlensee in the Swiss Alps is a picturesque example of a natural damp rock garden.

Natural Examples

Particularly in the mountains, rocky shores of lakes or streams are populated by diverse, partly dwarf plants, such as marsh marigold (*Caltha palustris*), various primulas or ferns. Along running water, the nutrient supply is better than in still water, since absorbed ions are continuously replenished by the water movement, and different plants are found around moving or still water. For example, globe flowers (*Trollius europaeus*) thrive best in wet meadows with some underground water percolation, while cotton grass (*Eriophorum angustifolium*) thrives with less water movement.

Other moisture demanding alpines originate in oligotrophic (low nutrient) bogs, fens, hillside springs, waterfalls, and on fine screes which have permanent moisture at a shallow depth.

Soldanella alpina blooms between remnants of the melting snow in soggy soil.

Rocky sites with extended snow cover allow only a few weeks of active growth, constantly watered by melting snow. In the garden, plants from these areas, such as *Soldanella* or dwarf willows (*Salix reticulata, S. alpina*, etc.) must be kept permanently moist and planted where they are not exposed to intense summer heat.

Deceptive Physiognomy: Grey Leaves on Wet Feet

At high altitudes, there are many plants that grow on rocky sites and have leaves with dense, silvery hairs or a wax layer. We often interpret this as an adaptation to dryness, but such traits can also serve as a protection against high ultraviolet radiation, strong winds or sudden fluctuations of temperature. Many *Leontopodium* species, for instance, need permanent moisture in spite of their greyish garment and will rapidly wilt in

The silvery rosettes of *Celmisia semicordata* suggest a dry site, but they grow in the damp grassland of the Garvie Mountains in Southern New Zealand.

dry conditions. Plants colored silver, greyish-blue or even brown-red are very common in the flora of the southern hemisphere. Well known examples are sedges from New Zealand such as *Carex buchananii, C. comans* or *C. testacea*. Numerous *Celmisia* species even grow in bogs. In the South African Drakensberg mountains *Crassula setulosa* subsp. *setulosa* thrives on rocks which are periodically overrun with water in summer. In cultivation, however, they need protection from moisture in winter, as do *Rhodohypoxis, Hesperantha, Helichrysum, Eucomis* and *Gladiolus* species.

In the South African summer, the rock faces at Mont-Aux-Sources in the humid northern Drakensberg mountains are overrun with water. Here we find the succulent *Crassula setulosa* subsp. *setulosa*.

Streams and Waterfalls in Rock gardens

Facing the topic "damp rock gardens" most readers will think of streams and small waterfalls within rock gardens. Along narrow streams, only small growing species can be planted to ensure an unhindered water flow and avoid completely obscuring the stonework. Suitable examples are primulas of the farinosa section, such as *Primula rosea* or *P. frondosa*. Both are relatively long-lived, unlike *P. farinosa* and many other species from this section. The rare Lake Constance forget-me-not (*Myosotis rehsteiner*) is also best located at a stream, even if periodically inundated. In spite of its tiny growth, it needs good nutrient levels, which are supplied by running water. Small growing fen grasses, such as *Carex viridula, Schoenus ferrugineus* or *Trichophorum alpinum* are only rarely traded, though they would work well along rock garden streams.

At the mouth of this stream only few plants were placed in the water, so that they do not hide the stone setting; the shore line, however, melts into dense vegetation.

In the water itself, *Nymphaea tetragona* is suitable if a permanent water level of four to eight inches (10 to 20 cm) and slow water flow can be guaranteed. It prefers cool sites in summer, and can survive only mild winters. But even if it is killed by harsh winter frost, it often populates shallow water features over years because it produces fertile fruits and seeds germinate readily in spring. So does *Baldellia ranunculoides* which stays small and compact, unlike most other submersed hydrophytes which grow too rampantly for small garden streams.

Stone-crevice ferns can visually enhance a waterfall. *Asplenium trichomanes* stays compact and propagates only a little by its spores. In contrast, the hart's tongue fern (*Asplenium scolopendrium*) can become bothersome through busy self-seeding, even conquering apparently dry rock garden areas.

Asplenium scolopendrium has settled behind this waterfall by way of its fine spores.

The smallest hardy water lily, *Nymphaea tetragona*

Overlapping Habitats: Ponds within Rock Gardens

Adjacent to small ponds, which are framed by stone settings, you can grow wetland plants. Here rather tall species from wet alpine meadows, such as globeflowers (*Trollius spp.*), primroses (*Primula*, candelabra section) or even *Ligularia* are suitable. Usually, the edge of the pond liner protrudes a little above the soil surface as a capillary barrier to prevent water from being drawn out of the pond into the garden substrate. Along this capillary barrier plants must be selected carefully since the substrate can immediately change from soggy to dry. Some plants can thrive under both conditions, such as *Allium suaveolens, A. schoenoprasum* (chive), *A. angulosum, Liatris spicata, Zigadenus* (*Anticlea*) *elegans, Caltha palustris* and some orchids (i.e., *Dactylorhiza* hybrids) can conceal the capillary border effectively.

There are also some plants that resemble wetland vegetation though they come from dry sites. Such ideal companions along the capillary border outside of the water body include *Iris sintenisii* or *I. illyrica, Carex montana*, compact *Geranium*, *Heuchera* cultivars or dwarf hostas.

Damp Trough Gardens

In small gardens, on balconies or patios, miniature rockeries in troughs are popular. Adequately sealed troughs can become miniature bogs and fens. Put some pots upside down along the trough's bottom and cover with substrate to a level an inch or two above the pots. For alpines the substrate should be mineral, but bog and fen plants can grow in peat or wood fiber substrate. The inserted pots work as hidden water reservoirs to keep the system damp long-term.

Androsace studiosorum 'Alba' and *Antennaria dioica* 'Alex Duguid' on the crown of a rock garden water filter.

Rock Gardens as a Filter for Natural Swimming Pools

The water in contemporary natural swimming ponds is often equipped with a quickly percolated filter body, which should not be planted. The purification of the circulation water is performed by a biofilm, which grows on the surfaces of the filter substrate grains. Plant roots could disturb the water percolation through the filter body and thus reduce the biofilm's effectiveness.

If enough space exists, a slow or intermittently percolated filter zone can be sufficient for water purification. In such a "slow filter" not much biofilm will grow to absorb nutrients, so it should be combined with a densely planted underwater zone. Also, the slow filter's surface itself should be planted since the roots can prevent clogging, which is no problem in quickly percolated systems.

Through trials and pilot projects at Anhalt University in Bernburg (Sachsen-Anhalt, Germany) as well as in a private garden such filters were constructed as percolated rock gardens with a diverse alpine planting. Two possible applications are presented here.

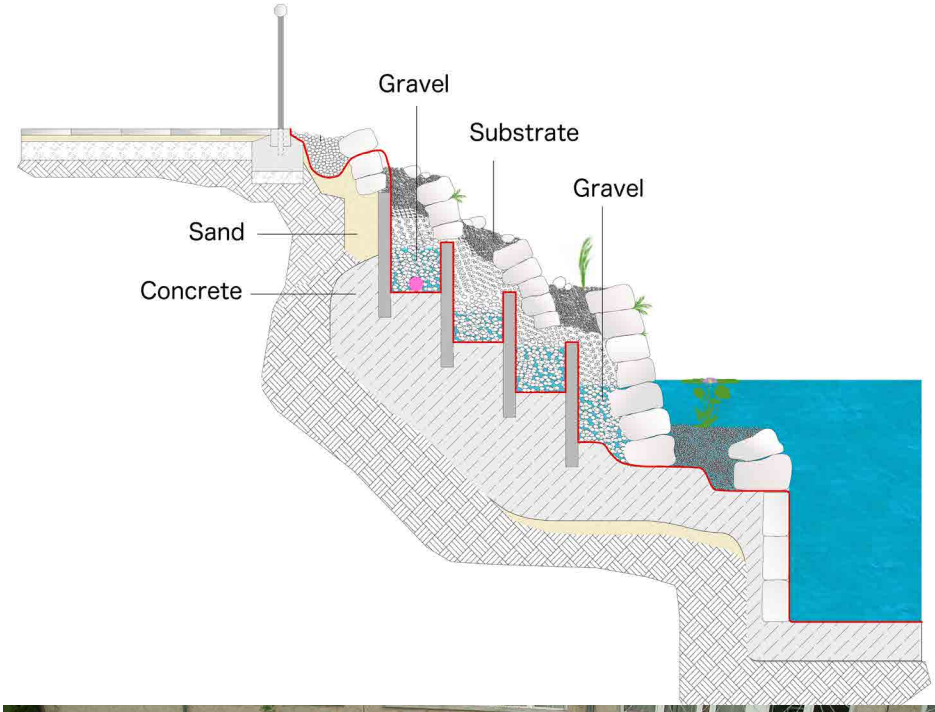


Diagram (top) and construction (bottom) of type 1 rock garden water filter.

Completed rock garden water filter, designed by Zdeněk Zvolánek.

Rock Garden Filter Type 1: With Backwater Storage

With a permanent water percolation, a nutrient absorbing biofilm can develop in the filter. To construct this type of filter, a liner was placed tightly above the four terraced basins and covered with a protective membrane. The inlet pipe runs through the upper basin. Each basin was filled up with filter substrate. Once constructed, a rhyolite stone rock garden was built over the filter. The parallel position of the stone flags merges into a crevice garden, which frames the artificial mound. This was designed by the Czech rock garden expert Zdeněk Zvolánek.

Dodecatheon meadia (left), *Leontopodium alpinum* (center) and *Allium cernuum* with *Saxifraga aizoides* growing on the completed rock garden filter.

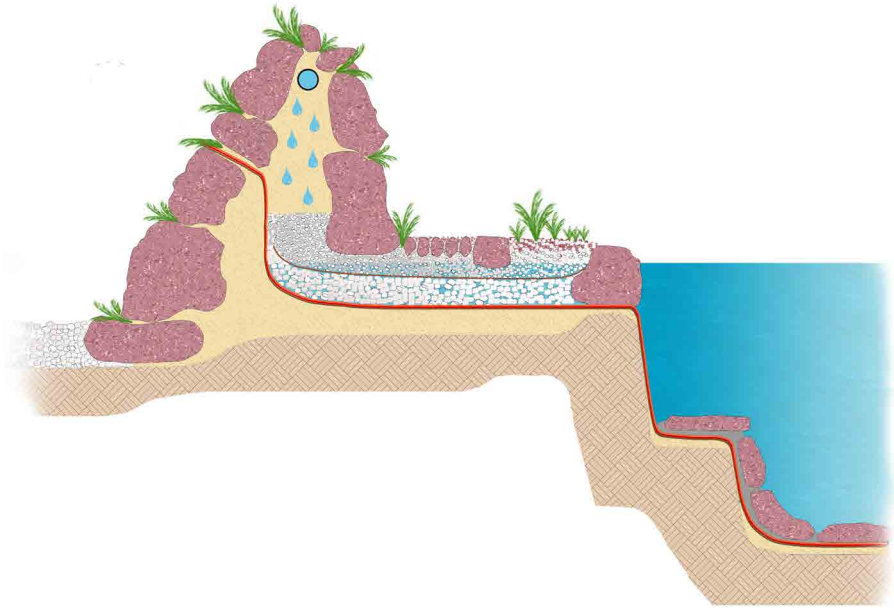


Diagram of (top) and completed (bottom) type 3 rock garden water filter.

Rock Garden Filter Type 2: Sand Filter without Backwater Storage

This construction type is suitable as pre-filter of the refilling water of natural swimming pools. Of course, it also can be combined with a garden pond or a simple basin. To construct this type, a naturalistic crevice garden was built using rough rhyolite stone flags arranged in a steep, slightly diagonal setting, which clad a percolated sand core. Controlled by a time switch, about 20 gallons (80 liters) of water per hour run through a drip pipe along the ridge. The water percolates through the sand core, passes the gravel under the pavement and enters the natural pool. This keeps the water level almost constant.

A diversity of moisture-demanding alpines thrive perfectly on such percolated systems. In the continental influenced dry climate of Bernburg with less than 20 inches (500 mm) rainfall per year, in a typical rock garden stemless gentians (*Gentiana* Acaulis Group) are not vital and bloom poorly. But on the rock garden filters, they grow lush and vigorous, flower heavily in spring and rebloom in autumn.

Gentiana 'Vierlanden' thrives on the rock garden filter, growing here between *Antennaria sp.* and *Arabis bryoides*.

Somewhat troublesome is the spontaneous occurrence of ferns. Even in the gaps of the south side *Gymnocarpium dryopteris* and *Asplenium scolopendrium* sprout blithely though never being intentionally planted. Of course, this is a nice problem to have.

This style of rock garden need not be naturalistic. A planted dry stone wall, made from Italian tufa, frames this natural swimming pool near Nürnberg, Germany. It is kept moist through a drip pipe, which runs along the wall crown.

The table on the following page lists plants which have been proven suitable on the percolated rock gardens. The table lists numerous species which usually are not recommended for damp sites but have proven as suitable on percolated rock gardens in a purely mineral substrate and on permanently moving water. Lime-intolerant species, such as *Wulfenia* spp. or *Polygala chamaebuxus* may show iron deficiency symptoms even if the water has only a moderate carbonate content (hard water). Feeding the plants a solution of Fe-EDDHA (Basafer® or another chelated soluation) two or three times during the growing period provides relief. Many alpines require more nitrogen than expected, even dwarf growing ones. Pouring a low dose solution of urea can help and keep the plants appropriately green.

Editor's note: Many of the principles and ideas in this article come from and are further expanded in Wolfram's book How to Build a Natural Swimming Pool: The Complete Guide to Healthy Swimming at Home.

Taxon	Type 1	Type 2	Light	Notes
Alchemilla faeroensis var. *pumila*		x	○◖●	Smallest lady's mantle
Allium beesianum		x	○◖	Blue early summer bloomer
Allium cyaneum		x	○◖	Blue autumn bloomer
Andromeda polifolia 'Nikko'	**x**		○◖	Evergreen dwarf shrub
Androsace villosa		x	○◖	Compact growth
Antennaria dioica		x	○	Shallow, evergreen mats
Arabis bryoides		x	○◖	Compact growth
Arnica montana		x	○◖	Chalk free, robust garden forms
Asplenium scolopendrium		x	◖●	Chalk loving, evergreen, can spread
Asplenium trichomanes		x	◖●	Compact evergreen fern
Athrixia fontana		x	○◖	Evergreen, flowers like small daisies
Calluna vulgaris 'Foxi'		x	○◖	Dwarf form, intolerant of lime.
Caltha palustris var. *alba* & *C. p.* 'Multiplex'	x	x	○◖	Compact forms of marsh marigold
Carex baldensis		x	○◖	Chalk loving, bright white flower heads
Carex viridula	x	x	○◖	Very compact, star-like flower heads
Dactylorhiza hybrids	x	x	○◖	Propagate well by seeds
Dodecatheon meadia	x	x	○◖	Leaves die back after blooming
Dryas octopetala var. *tenella*		x	○	Shallow mats, white flowers
Gentiana Acaulis Group		x	○◖	Dense mats, many well blooming cultivars
Glumicalyx flanaganii		x	○◖	Low cushions, nodding inflorescences
Iris setosa subsp. *canadensis*	x		○◖	Compact iris, blue flowers
Leontopodium stracheyi		x	○◖	Long lived edelweiss
Parnassia palustris	x		○◖	Autumn bloomer in white
Physoplexis comosa		x	○◖●	Slow grower, protect from slugs
Pinguicula grandiflora	x		○◖	Vigorous butterwort species
Pleione limprichtii		x	◖●	Chalk free, dry in winter
Polygala chamaebuxus var. *grandiflora*		x	○◖	Evergreen cushions
Primula auricula		x	○◖	Yellow flowers, drier conditions
Primula clusiana		x	◖●	Not long lived
Primula frondosa	x	x	○◖	Longer lived than *P. farinosa*
Primula rosea	x		○◖	Also suitable along streams
Rhodohypoxis milloides		x	○◖	Keep dry in winter
Salix reticulata		x	○◖	Creeping willow, nice leaf patterns
Saxifraga cortusifolia var. *fortunei*		x	◖●	Blooms late autumn
Saxifraga oppositifolia 'Theoden'		x	◖	For cool sites, robust cultivar
Saxifraga aizoides	x		○◖	Cushions, short lived
Schoenus ferrugineus	x	x	○◖	Compact grass, chalk loving, brown heads
Sisyrinchium angustifolium	x		○◖	Grasslike leaves, violet blooms
Trichophorum alpinum	x		○	White wooly heads
Wulfenia carinthiaca		x	◖●	Chalk free, evergreen rosettes, blue flowers

Plants of Northern Peru, Part 1

Yoko Arakawa

DRIVING UP THE winding, unpaved gravel road to the Huascarán National Park entrance, in front of our eyes was a deeply curved U-shaped rock wall that looked like a big window opening straight up 3000 ft (1,000 m). Once we arrived, we saw beautiful milky-turquoise colored glacier lakes in front of us with snow-capped mountains as a distant backdrop. The rock walls were covered with hundreds of thousands of bromeliads like a natural grand green wall. We were 12,500 ft (3,800 m) high in the Andes.

Northern Peru is often passed over by botanists and people interested in horticulture in favor of Chile and Argentina. I think this is because many areas are very remote and at high altitude, and it is not an easy destination for botanists to do fieldwork and research. There are also many legal restrictions on working in the area and each time it is more difficult to get permission or authorization. The area has been reserved for strong backpackers and climbers from across the world, while most tourists visit southern Peru, mainly the Machu Picchu area. My first visit in this region was in 2000 on a climbing-focused trip, but I was fascinated by the exotic beauty of the plants and flowers I saw and struck by the spectacular mountain scenery.

I had been to northern Peru four times before in the dry season and finally decided to try to visit in other seasons to enjoy the rich, diverse varieties of plants. There is only one book I've been able to find on the area in English; most others are in Spanish and with a limited range of species, as many plants have not been published yet. I was hesitant to write an article without identifying all these plants, but I really want to share these beautiful plants and stories of northern Peru with other plant enthusiasts.

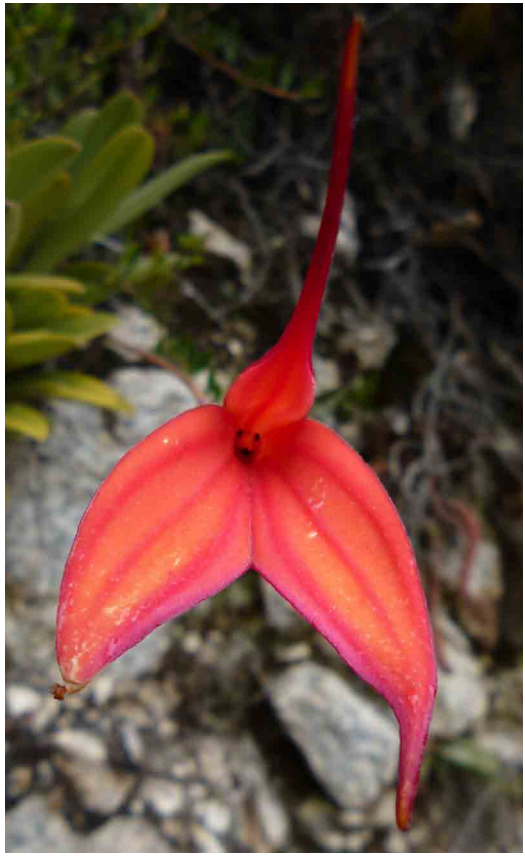
My January 2015 trip started in Lima at the National Agrarian University of La Molina. There I met with the botanist Juan José Alegría, and graduate student Melody Zarria. Juan José showed me some specimens from Huascarán National Park in his collection. Melody accompanied me on this trip as interpreter and guide. Melody and I explored for nine days visiting six locations in the Áncash area in January, in the middle of the rainy season. We stayed at Huaraz (10,000 ft, 3,052 m) as our base town and made day trips by taxi to different valleys for botanizing. The mountain town of Huaraz is located 250 miles (404 km) north of Lima. To get to Huaraz, it takes about eight hours by bus driving over the 13,120 ft (4,000 m) pass. The areas we visited were in the region known as the Cordillera Blanca, the White Mountain Range in the Áncash region.

The Cordillera Blanca section of the Andes forms part of the continental divide that runs from north to south. The water from the western valleys flows to the Pacific Ocean, and water from the eastern valleys runs through the Amazon to the Atlantic Ocean. The

Opposite: *Gentianella weberbaueri* at Punta Union Pass.

area is best known for Huascarán National Park and Huascarán Sur which, at 21,831 ft (6,654 m), is the highest point of Peru. Huascarán National Park occupies the major part of the Cordillera Blanca, which is the world's highest tropical range because its latitude is only 8-10 degrees south of the equator. We made day trips to the valleys of Parón, Llanganuco, Ulta, Ishinca, Llaca, and to the Pastoruri Glacier area. In my second botanical trip in July 2015, I invited my friends George and Sam to join the trip. We botanized in the Cordillera Negra region, northwest of Huaraz and trekked and camped for four days along the popular Santa Cruz trekking route, which featured spectacular mountain views and very rich alpine flora. George will talk about this trip in part two of our article, coming soon.

The climate of Cordillera Blanca has two seasons. From mid-November to April is the rainy season, when the days are cooler with rain and nights are warmer than the dry season. Warm moist air from the Amazon basin blows westward causing afternoon rain and snow. In my January visit, mornings were mostly clear with rain starting in the late morning or afternoon, often with a storm in the evening. The plants are covered with snow at about 15,100-15,700 ft (4,600-4,800 m) and above. May to October brings the dry season when the days are warm and sunny and nights are clear but cold. The temperatures often drop below freezing, especially at high altitude. The plants we are going to feature are in the Andean zone from 11,483-16,400 ft (3,500-5,000 m). Amazingly, this range includes subtropical cloud rainforest in addition to sub-alpine to alpine zones.



Masdevallia amabilis showing the "smiley face" in the center of the bloom. Photo by Melody Zarria

In our January trip, we saw many of the plants that flower in the rainy season, most notably an abundance of orchids. There are many orchids in the high-altitude cloud forest area in Llanganuco Valley. In the dry season, most orchids are not flowering. One just looked like brown tangled wires in the dry season, but was an *Epidendrum*. One of my favorite orchids is the showy scarlet *Masdevallia amabilis* that grows on rock cliffs or on boulders along the streams and in open fields. I saw this orchid along the Santa Cruz Trail between Llamac Corral and Taullipampa (12,300-13,800 ft, 3750-4200 m) along the river edges and in Llanganuco near the lakes at about 11,800-12,800 feet (3,600-3,900 m). This orchid is seen all year, even in dry season. It has a unique triangular red flower hanging down like a three-pointed star.

I had hiked the same places on past visits but I noticed fewer plant populations, especially on the Santa Cruz trekking trail along the creek. Along the trail, most of the *Masdevallia* were gone and I saw plants only on the other side of the creek where it is not easy to access. I am sure people are collecting this showy orchid and it is very sad to see the plants disappearing from their native habitat. My great guide, Melody, has the astute eyes of a plantswoman and pointed out the "smiley face" in the center of the one orchid flower. It made me smile when I found it.

Yellow-flowered *Stelis* sp.

In the rainy season, the area around The Llanganuco lakes is an orchid lover's paradise. There are many species of tiny orchids. We saw *Stelis* aff. *oblongifolia* with a dark chocolate colored flower and *Stelis* aff. *flexuosa* with creamy-yellow petals with reddish-brown centers. Another *Stelis* species was colored an interesting translucent lemon yellow with the bottom two petals fused together. These flowers are small, about ¼ of an inch (5 mm) long, with over a dozen flowers held on racemose inflorescences (arranged like clusters of grapes) on 4-5 inch (10-13

cm) tall flower spikes. I had to get close to take photos of these tiny flowers. There were massive populations in the understory and lightly shaded fields, and they were beautiful flowering in large groups. I was so happy to see orchid flowers instead of the leaves and dead looking plants I saw on my dry season trips.

Another small orchid, *Pleurothallis* sp., was blooming by the hundreds on a wet cliff. The small flowers were hanging down and swinging in the breeze, making a clear photo a challenge to capture. A large, showy yellow orchid, *Cyrtochilum* (syn. *Odontoglossum*) *aureum*, grew to about two feet (60 cm) tall and flowered on a rock cliff next to a *Puya*.

There were some terrestrial orchids as well. One I am very fond of is *Aa matthewsii*. The Latin name is a tongue twister and not easy to say, but such an easy one to memorize. We have seen this flowering in January and sometimes a few are even blooming in July, though most are already at the ripened seed stage or a dried out brown in the dry season. It is about 8-12 inches (15-25 cm) high with tiny white flowers packed around a single spike. When I see it through a macro lens, it looks like many Halloween ghosts facing out from the stem. It grows in moraines and rocky soils in open fields at about 12,500-15,00 ft (3,800-4,600 m). We even saw it in an open spot in a woodland area. In the dry season, it was a rosette of leaves blending in, as it flowers mostly in the rainy season. We saw it in Llanganuco, Ishinca Valley and Pastoruri Glacier area.

Aa matthewsii.

Altensteinia longispicata grows 2-3 feet (1 m) tall in the understory in shady spots. It has dense hairs on the upper white petals and yellow tips in the center of each bloom. We saw it in the upper part of Ishinca Valley.

Have you eaten an orchid? When we were in a village we saw teenaged girls eating something green. We asked them to show it to us, and they were chewing the green pseudobulbs of orchids. They were about 3-4 inches (8-10 cm) long and juicy looking, but we could not identify them without a flower. I tried chewing some, but it didn't have much flavor.

Bromeliads growing on a *Polylepis* tree.

The Peruvian Andes hold a great diversity of plant communities, in a multitude of microclimates across different altitudes. In the lake area of Huascarán National Park, there is a mix of trees and shrubs with some open field dominated by grasses. Near the lake, we saw many bromeliads like *Tillandsia rubella, T. fendleri, T. walteri, Puya* spp., and *Pitcairnia pungens*. In this area, the forest is made up of *Polylepis* spp., *Vallea stipularis*, *Baccharis* spp. and *Gynoxys* spp. with bromeliads growing on the *Polylepis* and other trees. In the sunlight, the bracts of the bromeliads light up bright red. It looks so unusual, with more than a dozen colorful bromeliads on one tree like giant red flowers. *Berberis lutea* makes up the understory along with some smaller plant species such as *Peperomia microphylla, P. hartwegiana*, and *Villadia reniformis*. *Gynoxys* sp. is the most common tree in the area and has yellow daisy flowers. *Vallea stipularis* grows from Venezuela to Bolivia and has hanging cherry-like flowers with dark pink petals with little fringes on the edges. This is one of few reddish colored flowering trees in the area.

Vallea stipularis.

In the open fields, we saw a bright pink tubular flower, *Agalinis lanceolata*. It is about 2 inches (3-4 cm) long and hairy outside with darker pink dots inside the throat. The foliage is short, thick needles. *Clinopodium speciosum* has red tubular flowers for hummingbirds and small leaves with a strong minty smell. *Diplostephium azureum* has 3-5 ft (1 – 1.5 m) tall woody stems and light blue, aster-like flowers. Other daisies we saw were *Bidens andicola* and *Dorobaea laciniata*, which grew mostly in sunny locations.

Agalinis lanceolata.

After botanizing the lake areas, we drove up the hairpin curves of a dirt road. We saw the green-flowered *Halenia umbellata* and the parasitic plants *Bartsia diffusa* with yellow flowers and *Bartsia tomentosa* with pink flowers. One of the genera that is shared with North and South America is *Castilleja*, and the species we saw has very intense orange-red bracts and is 4-6 inches (10-15 cm) high. *Gaultheria glomerata* has many pink bell-shaped flowers with a pretty bright pink calyx. In open, flat areas, we saw the groundcover-like *Lachemilla orbiculata*. It has tiny, about 1 inch (2-3 cm), foliage and grows in a dense mat. It was often cloudy, so there was not much view most of the day. When we went up about 14,740 ft (4,500 m) we reached the snow line where there were no plants to see.

One of the highlights of this region is *Polylepis*, the highest-growing tree in the world. At high altitudes, it is very slow growing, and some are several hundred years old. The bark is orange colored, flaky and very attractive, especially when backlit by low sunlight. Historically, local people cut down the trees and used them as firewood. Now the trees are protected, and villagers do not harvest them. Some are shrub shaped, and some are more tree-like. They flower in the rainy season with tiny 0.1-0.15 inch (3-4 mm) flowers hanging down like tassels.

A very old *Polylepis* tree.

There are reportedly five species of *Polylepis* in Huascarán National Park. The most common one is *Polylepis sericea* which will grow to over 20 ft (6 m). *P. weberbaueri* has very dense whitish hairs on the foliage and grows into a short, mounded shrub. Another very attractive one we saw, *Polylepis sp.*, had orange and cinnamon colored hairs around the stems and on the backs of the foliage. These trees occur at about 14,700 ft (4,500 m) or sometimes higher. As the elevation gets higher, trees become more shrubby but still reach 7-10 ft (2-3 m) tall.

Polylepis sericea in flower.

When we were exploring and hunting for special plants, there were several plants we really had to be careful not to touch because of their spines or sharp thorns. *Nasa ranunculifolia* subsp. *cymbopetala* is about 12-15 inches (30-40 cm) tall and has 2-inch (5 cm) long orange flowers with black stinging hairs. It is sometimes seen around 12,800 ft (3,900 m) but also grows in dry areas at about 15,400 ft (4,700 m). *Caiophora*, a vining member of the Loasaceae, was growing at lower elevations. We saw it in a village and the flowers were 1-1.5 inches (4-5 cm) long and bell-shaped. These plants are like a nettle and very painful if you touch any part of them. Of course, there are some Andean true nettles too, like *Urtica echinata* or *Urtica flabellata*. One we saw was at about 15,400 ft (4,700 m) in elevation in the Pastoruri Glacier area; it is a small mounded alpine form and was half covered with snow. It looked so soft at first glance, but the stinging hairs are very painful.

Especially when I was crouching down taking photographs, I had to be very careful no nettles were behind of me, as they are extremely painful, even

Utrica echinata is covered with stinging hairs.

through my trekking pants. We also had to be careful of *Aciachne acicularis* and *A. pulvinata*. These two species live together and are difficult to tell apart. When we were walking at high altitude in thin air, we often wanted to stop and to sit down on a nice soft surface. These plants look like a soft, welcoming cushion, but they are not! If you happen to step on one, the many sharp needles stick to your boot's sole.

Aciachne species have vicious spines.

Ishinca Valley is another area with a very rich flora. The road goes up through open fields of grasses typical of Andean meadows. In this area of low scrub and open fields, we saw many attractive plants. *Orthrosanthus occissapungus* is a skinny plant growing to about 2-3 ft (1 m) tall with six-petaled white flowers. Right from the trailhead we saw the white, bell-shaped, about 2-inch (5 cm) diameter flower of a *Clematis* and at the side of the trail there were hundreds of *Arcytophyllum* aff. *setosum*. *Hypericum laricifolium* was showing off yellow flowers with typical drought-tolerant, thick, needle-like foliage.

Arcytophyllum aff. *setosum*.

Brachyotum naudinii has a thick reddish calyx and deep inky purple flowers hanging down with closed petals (see back cover).

At the upper part of this wonderful trail are large *Polylepis* forests. We saw small plants of *Baccharis alpina*, *Lobelia tenera* with one or two small flowers on each slender stem, *Astragalus uniflorus* growing flat, and *Hypseocharis bilobata* with white flowers and bright red anthers looking like the head of a match. There were so many treasures to see that we didn't move very fast!

Astragalus uniflorus (left) and *Hypseocharis bilobata* (right).

After we botanized in five different valleys and had acclimatized to the elevation, we visited the Pastoruri Glacier, about 43 miles (70 km) south of Huaraz. The glacier covers about 3.1 square miles (8 square km) but is receding fast. I have been five times in the past; it is clear to see that the glacier line is receding farther back each time. The glacier is a very popular tourist destination and is very busy with local and international visitors during the dry season. Near the entrance, at around 13,780 ft (4200m), is a large population of *Puya raimondii*. There is an archaeological site nearby with huge overhanging rocks with ancient drawings. Just above this cave, I found white-flowered *Saxifraga magellanica*. This is one of very few species of saxifrage in South America, growing from Peru through Patagonia. It grows in wet cracks, and is about 1-3 inches (2-7cm) tall. *Calceolaria* sp. was growing next to the rock cracks, but in a drier area. The foliage was pea-like, dense, and thickly covered with soft hairs. The small flowers were yellow.

The open grass fields in the area are known as Puna in the Quechua language. This is typical of the zone above the tree line in Peruvian Andes. *Jarava ichu* is a common grass and grows mixed with *Calamagrostis*, *Festuca*, and *Poa* species. The *Jarava* grass leaf tips are very sharp, and you cannot walk without long pants in the Puna meadow. In dry areas, *Chuquiraga* grows with short, thick

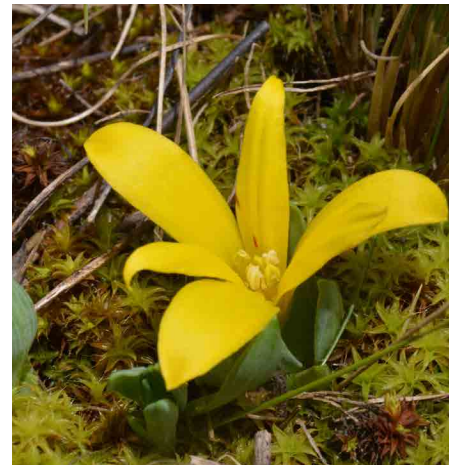
Saxifraga magellanica.

triangular leaves with sharp thorns and with upright orange flowers. The flower is a 1-inch (2-3 cm) long paintbrush. The plants are 2-4 feet (60-120 cm) tall. After the flowering, the orange paintbrush turns into a whitish fluffy seedhead.

Plants aren't the only thing to be found in Peru's grasslands

In the wet season, water runs down the slopes and many plants are flowering. I was so excited seeing many tiny flowers along the roadside in the Pastoruri Glacier area. *Ranunculus cymbalaria* is about one inch (2.5 cm) tall with shining yellow petals in the running creek. The area is soft, like a bog and it was difficult to take pictures because I could not focus and steady my camera by lying down. *Lysipomia sphagnophila* subsp. *acuta* is twice the size of a coin and grew nestled flat against wet rocks. We saw a common Andean gentian, *Gentiana sedifolia,* showing single, small flowers that close up quickly when it gets cloudy. *Lysipomia laciniata* is a cute little plant, only about the size of a quarter. In the drier area in the grassland at about 14,760 ft (4500 m) the single yellow flowers of *Alstroemeria pygmaea* bloom. The stemless, yellow flowers with red dots on petals always cheer me up. Driving up to almost 16,400 ft (5,000 m) near the glacier, we saw several different species or varieties of *Castilleja*, including a tiny, less than one-inch (2.5 cm) tall *Castilleja* flowering in wet areas.

One of my favorite plants, *Senecio canescens*, was flowering in July at around 15,750 ft (4800 m). This plant has very thick soft white-haired leaves and grows only at very high altitude. When I was climbing far to the south in the Cordillera Huayhuash mountain range, I saw it at almost 16,400 ft (5,000 m). There are not many other plants growing at such high elevation, but this giant-headed, hanging flower was



Alstroemeria pygmaea

proudly blooming. Sadly, because this is a medicinal plant known as Wila-Wila, local people collect and sell it, so the populations are much reduced, especially in areas of easy access. In 2000, I saw many *S. canescens* with massive leaves growing near white-haired cactuses along the roadside. In 2005, the cactuses were still there, but the *Senecio* were all gone.

Senecio canescens blooming through snow.

Once you get up into the alpine areas, another of my favorite flowers is *Nototriche*. It has light blue five-petaled flowers just above soil level. There are about 60 species in Peru, 12 species in Áncash, and it is very difficult to identify them. We saw three species, but not have confidently identified any yet. One had hairless foliage and occurred in moist sites, another with thick hairy foliage was growing much higher, and the other had an alpine form, growing very high in the Punta Union Pass (15,600 ft, 4750 m), on the Santa Cruz Trail, and at the high camp on Chopicarqui. When I was coming down from the Pastoruri Glacier, this was the first flower I saw below the glacier line. It opens when the sun is out and closes in the evening or cloudy weather. The tiny, rounded, sky blue petals are very beautiful.

Another Andean endemic plant genus is *Paranephelius*. It looks like a dwarf dandelion and blooms just at the surface of the soil. This is a true alpine plant form. In Parón we saw over a couple of dozen *Paranephelius uniflorus* flowering together, and it was very pretty. In the Pastoruri Glacier area we saw *Paranephelius ovatus* and other *Paranephelius* species. Similar, but more dandelion-like, is *Hypochaeris*

Three species of *Nototriche*.

taraxacoides, with white flowers, and *Hypochaeris eriolaena*, with yellow flowers. If you lie down and look at *Hypochaeris eriolaena* from the side, you can see that it has brown hairs at the base of the flower like a little fur scarf.

Solanum hispidum.

I have been a greenhouse grower, and am always looking for plants I might be able to grow. *Solanum hispidum* is shrub-like, growing to 4-5 ft (120-160cm) tall with almost 1-inch (5cm) diameter blue flowers followed by yellow fruits. We also saw a white-flowered form. The large, 8-12 inch (20-30 cm) long foliage has fuzzy cinnamon colored hairs and is very attractive. This plant grows at around 11,480-13,120 ft (3,500-4,000m) on dry rocky slopes. I collected seeds and tried to grow it into a standard shaped topiary crop at work. In the greenhouse, the cinnamon color was not as strong as what I saw in situ because of lack of ultraviolet light. It ended up being a whitefly magnet, and I could not finish the crop.

In Llaca Valley around 12,470 ft (3,800 m), *Nicotiana thyrsiflora* was growing to about 8 ft (2.4 m) tall with hundreds of lime green flowers on the stem. These flowers are quite spectacular and might be good to add height to a garden design.

Nicotiana thyrsiflora.

Unknown species of *Gentianella* (left) and *Gentianella weberbaueri* (right).

There are many species of *Gentianella* in Peru. They are difficult to identify. We saw a light sky blue-flowered one that is about 8-10 inches (20-25 cm) tall and a soft pink-flowered one the was 4-6 inches (10-15 cm) tall. One of the showiest is *Gentianella weberbaueri*, a Peruvian endemic, which has scarlet red flowers and grows about 1.5-2 feet (40-60 cm) tall. This plant is candelabra shaped in bloom and has trumpet-like, hanging tubular flowers. The foliage is thick and smooth like a succulent. This would be a pretty display plant if we could get seeds and overcome the challenges of growing it. We saw some of it in Llaca Valley, Punta Union Pass, and Portachuelo Llanganuco Pass at an elevation of 15,640 ft (4,767m). Mostly it grows in open grass fields, but on at Punta Union, it was growing on the side of steep rocky cliffs.

Siphocampylus tupaeformis grows about 4-5 feet (120-150 cm) tall and has orange-red tubular 1.5-2 inch (4-5 cm) long flowers in a single raceme. It grows in grassland at about 11,480-12,470 ft (3,500-3,800m). I saw one plant that was grazed by animals resulting in many side shoots and many flowers. If this plant were pinched a couple of times, it might make nice shrubby potted plants for display. I wish we could go on a plant and seed collecting trip soon and introduce these to horticulture.

If you would like to visit northern Peru, I recommend you start with the Llanganuco area of Huascaran National Park and Pastoruri Glacier. Both are easy to access by hired car but are at a high altitude. Be sure to take your time and acclimatize first before going up and botanizing. If you like to hike, visit Ishinca Valley for day trips and the Santa Cruz Trail for trekking. Both are good places to see an excellent variety of plants and flowers. I'm sure you'll enjoy a trip to northern Peru!

I send my great appreciation to Juan José Alegría, and Melody Zarria who helped us both during our trips and afterward.

The New Crevice Garden at Smith-Gilbert Gardens

Lisa Bartlett

SMITH-GILBERT GARDENS is a roughly 16 acre public garden located in the historic southern town of Kennesaw, Georgia. It is humid and it is hot. Macaroni and cheese is considered a vegetable here. We have only one kind of tea and it's sweet. Most Southerners idea of a rock garden is Stone Mountain (the largest exposed piece of granite in the world) and its laser show. Not exactly the sort of place one thinks of when one thinks of alpine gardens. Crevice gardening started with Czech rock gardeners, in Europe, where the climate is better suited to most rock garden plants. Crevice gardening is really starting to gain traction in the States and we are excited to be a part of this growing trend, but when I told our volunteers we were 'fixen' to turn the old rock garden into a crevice garden they looked at me the way a dog looks at a ceiling fan. "What exactly is a crevice garden?" they asked. I said, "It's rock gardening, only edgier. Literally."

We had just been awarded a grant from the Stanley Smith Horticultural Trust and, though substantial, I was still concerned where the stone would come from. Then I paid a visit to Tony Avent in North Carolina. His garden has always been an inspiration to me, and I have

The first delivery of what used to be the sidewalk around City Hall in Kennesaw, Georgia. Eventually, 14 tons of trash concrete were delivered and installed.

always said to Tony that of all the gardens out there, his is my favorite. So when I saw Tony's crevice garden made from recycled concrete I knew that was exactly what I wanted to do. I picked his brain and formulated a plan. Now where on earth was I going to get that much trash concrete?

Not since Sherman came through and burned Atlanta during the Civil War in 1864 has there been so much rebuilding and new construction in Georgia. We are owned by the City of Kennesaw and they are revitalizing the downtown and replacing the existing sidewalks around the courthouse. Being owned by the city has its perks. They could provide all the 'trash' concrete I needed. In the South, when life gives you lemons, you put it in your tea to cut the sugar…but in this case, life gave us concrete! By using trash concrete once slated for the landfill we were able to keep over 14 tons out of the waste stream.

Now mind you, I love natural rock, in fact I have always said I am the perfect woman: when I tell you I want a really big rock, I mean I want a really big moss-covered rock. However, using "urbanite" (our fancy word for concrete) in the crevice garden, made me think of what Dolly Parton always said, "I'm not offended by dumb blonde jokes because I know that I'm not dumb. I also know I'm not blonde." It's not real stone but it is stone, and it works smashingly.

The original rock garden before being turned into a crevice garden.

The original rock garden was installed well over 20 years ago and was in a good bit of shade. All that changed when, in one of our severe winter ice storms, a large old hickory came crashing down. Losing that tree opened the once shady rock garden into almost full sun. Along with more sun came more heat and more weeds. The area that was once a source of enjoyment and beauty became overgrown and unmanageable. The old rock garden had big granite boulders that a local quarry had donated to the original owners of the property and, while dramatic, they were poorly placed and looked as though someone had simply backed their pickup truck full of rocks and dumped them. Some of the boulders were so large we had to incorporated them into the crevice garden design. I was concerned at first that the granite boulders wouldn't work with the linear lines of the concrete; however, by creating boulder islands surrounded by the concrete lines, it broke it up and added depth to the whole garden. I have always loved working with plants in a design but what I really love is planting and arranging stone.

One of the first and best things we did was removing as much of the weeds as possible. We hand pulled the weeds (we do not use herbicides or pesticides in the garden) and laid down thick patches of newspaper to prevent future weeds from germinating. We could have tilled the soil, but I feel it destroys the integrity of the soil by making it too powdery. I was also afraid that if tilled, it would allow too much settling of the concrete. Will we get weeds sprouting? Sure, but I like to think of it as job security.



An army of volunteers including those from the gardens (left), Citrix Coporation (center) and Master Gardeners (right) constructed the garden in record time.

All together, our own Horticultural Volunteers, The Cobb County Master Gardeners of Georgia, The Citrix Corporation and Georgia Power logged over 500 hours of volunteer work constructing the garden. In six weeks they created not only the first of its kind but the largest crevice garden in the deep South. Basically, they moved the equivalent of Stone Mountain, a truly Herculean effort. It wasn't easy for our volunteers, as you can imagine. Teaching them how to 'plant' the concrete was a challenge in itself. At first it was difficult for most to understand what a crevice garden was, let alone build one. The mere concept of planting concrete on its side threw many of them. We held classes and showed the volunteers how to do it but, at some point, you have to trust that they understand what you want them to do and that they have a grasp of what crevice garden looks like. There were several occasions we had to undo what they had done. It was a learning curve for all of us. I would have preferred the luxury of time, to be able to lay the concrete out in one area before moving on to the next; making sure it was just right. But time was something we just did not have as we had to wait on the concrete to be delivered. Due to the extremely wet fall, the City of Kennesaw fell behind on their revitalization project which meant our project had to wait as well. The crevice garden needed to be completely installed and planted by the end of November 2017 to fulfill the obligation to the grant. The City came through for us and the volunteers stepped up to make it happen, all in the nick of time.

Lisa Bartlett and Jared Brittan show volunteers how to "plant" urbanite.

For many parts of the U.S., providing excellent drainage can be a challenge. Ample rains in our southern winters keep soil moister than most alpine plants prefer. By providing crevices with just the right soil mix we are hopeful the plants that we have chosen will not only thrive but reproduce. For our soil medium we chose coarse river sand and gravel, mixing it in a ratio of 1 part sand to 3 parts gravel. We also installed a French drain at the top to help with runoff during heavy rains. One particularly heavy rain event dumped 4 inches (10 cm) in 20 minutes, leading to severe erosion that went right into our koi pond located at the bottom of the rock garden area.

Ozzie Johnson inspecting as the soil mix goes in.

Unable to get heavy machinery to where the crevice garden was being installed proved to be another challenge, as it meant we had to do everything by hand. From the broken up concrete to the planting mix to moving the existing large granite boulders, everything was dropped

Channeling their inner mountain goat, workers climb over the garden with kitty litter buckets to spread gravel mulch.

or rolled into place by some very strong backs. Kitty litter buckets became a hot commodity. We used them when we channeled our inner mountain goats as we walked along the tops of the concrete slabs to pour the mix in between the crevices. Because this garden had so much gray in it, from the slate in the pathways to the granite boulders, I chose a red gravel as mulch. This broke up all the gray and really set off the white of the concrete.

The completed, newly planted garden in November 2017.

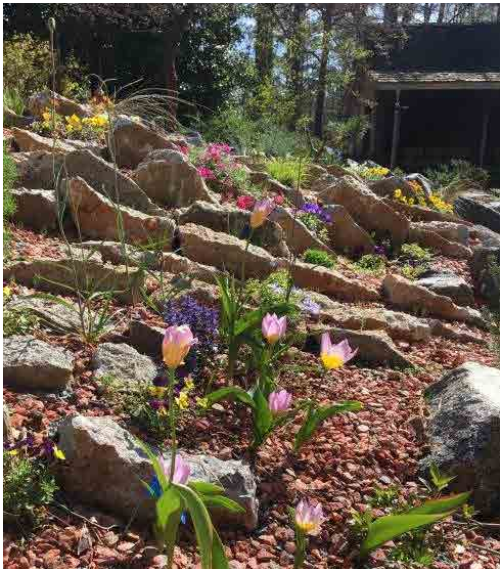
This was one of the most labor-intensive and ambitious projects we had ever tackled. To this day, I am amazed no one, not one single person sustained any injuries other than extremely sore bones at the end of day. However, this project was also one of the most rewarding

Renowned plantsman Ozzie Johnson was brought in early on as a consultant. He not only helped with the laying out of the concrete, together we researched the plant material we hoped would work. I also found Joseph Tychonievich's book, *Rock Gardening* immensely helpful. Knowing most alpine plants will not do well this far south, we chose to use dwarf plants that will grow to mimic true alpines but are better suited to our climate. Most of the plant material, except the conifers, were dormant. To give visitors something to look at other than concrete we added violas sprinkled throughout for winter interest. Think of it as alpine gardening with a southern twang. Most of our plant material came from Plant Delights Nursery, Arrowhead Alpines, High Country Gardens, and Ozzie Johnson.

Traditional rock garden plants mix with violas for a colorful display.

Before planting, we removed as much of the planting mix they were originally growing in as possible. Teaching the volunteers how to plant the plants in between the crevices proved much easier than teaching them how to plant the concrete.

Alpine plants are used to growing and adapting to the harsh conditions of high altitude. But I'm not sure if they are prepared for the harsh growing conditions of our southern latitude. We can be working in 80ºF (27ºC) and in shorts, and a couple of hours later it's 28 ºF (-2ºC), and we're in our parkas. Gardening in the South is not for the faint of heart. I have been called overly optimistic when it comes to growing plants, but even I know not all of them are going to survive. It's the optimist in me that keeps me pushing the boundaries and knowing that there are going to be survivors.



Spring in the new crevice garden.

One of the plants that I love, and where I feel we are pushing the boundaries of our

southern hospitality, are the dwarf daphnes. As of this spring, they look great and some even bloomed but it remains to be seen what influence our hot and humid summers will have on them. I remain cautiously optimistic.

With a grant from The American Conifer Society, we were able to revitalize a part of the crevice garden with new material and we also transplanted some of the dwarf conifers from our established collection to the new garden. With those grant funds we purchased some unusual and hard to find conifers from Appeldoorn Nursery in Bostic, North Carolina.

My goal for this new garden is to become an example for local and not-so-local rock gardening enthusiasts. This is going to be a fun garden to watch grow and evolve. I hope that it inspires generations for years to come. The new Crevice Garden is one of many reasons to visit Smith-Gilbert Gardens. Whether you are a lover of plants and nature or a lover of art and history, this garden has something to offer everyone.

The old rock garden (top) and the transformation into crevice garden (bottom).

The Horizontal Rock Garden

Mike Smedley

IN THE GARDEN, as in life, things seldom go according to plan.

Such was the case on a partly cloudy Saturday afternoon in July 2008. My wife, Amy, jokes that it was the weekend we went out to buy a new ankle brace but came home with an old house.

You can blame it on a garden that wasn't there. In fact, there was very little there on the spacious corner lot in Durango, Colorado. A motley amalgamation of bindweed-infested grasses formed a formidable green moat around the small Victorian house. Much-abused trees flanked its front corners: a deer-pruned arborvitae on one and drought-stressed willow on the other. Not only was that willow weeping in form but also in function, as aphid honeydew misted anything beneath its dolorous canopy. In the backyard, a coppiced and cankerous cherry tree looked as if it could simultaneously qualify for disability and survivor benefits.

A few old-school shrubs – forlorn forsythia, neglected lilac and a spiraea of dubious heritage – were scattered hither and thither. Meanwhile, two random yellow currants proved that passing birds served as the yard's at-large horticultural designers.

What did thrive, between a stop sign and utility pole, was a stand of native rabbitbrush baked by the harsh sun and looking like it just didn't give a damn.

In other words, the property was perfect.

Durango occupies a peculiar geography. Post a map of Colorado on the wall and Durango would be the thumbtack near the lower left corner.

In a glaciated river valley at 6,512 feet (1984 m), it's where mountains meet desert. Sometimes that geological how-de-do can be a cordial handshake. Typically, though, it's an abrupt and jarring collision, like two surly drunks bumping into each other and spilling their drinks at a cocktail party.

Drive 50 miles (80 km) north of Durango, and you'll be ensconced in alpine tundra, where visitors experience shortness of breath at 11,000 feet (3350 m). Sometimes, that's all anyone experiences above timberline, as noted some 68 years ago in the *Bulletin of the American Rock Garden Society*, the precursor to this journal.

In the May-June 1950 edition, Dr. C. R. Worth of Groton, New York, reported: "In the southwestern part of the state, the highway from Ouray to Durango climbs well into the alpine zone, but is very definitely not a road for nervous drivers. Good and rare plants are

The garden before (top) and after (bottom).

reported. However, when I have been in the region, rains have been almost incessant, and I have not been tempted to do much exploring, nor have I turned up anything of note."

Too bad the good doctor didn't travel south of Durango, where precipitation can be as spare as the landscape. The ash-grey badlands of northern New Mexico will also take your breath away, but not due to elevation. The high desert's stark, eroded beauty, a mile and a half (2.4 km) lower than the peaks on the far northern horizon, seems an impossible counterpoint to the San Juan Mountains.

You'd think it would be easy to be the proud owner of a nearly blank-slate property surrounded by natural rock-garden inspiration. But first, Amy and I had a few chores to do around the house, namely gutting it. Everything went into Dumpsters: all the drywall and plaster, 11 layers of linoleum, Eisenhower-era electrical wiring and plumbing that went uphill. We ripped it down to the studs.

Good news, homeowners! You get to remodel the house over the next couple of years. Bad news, gardeners! You will run out of time, money and energy. Given this harsh reality, what does any obsessive plant-slinger do? Get something, anything, into the ground if only to mark your new territory.

Thus, in the narrow south-facing side yard of the yet-to-be-imagined horizontal rock garden, two skinny Scots pines (*Pinus sylvestris* 'Fastigiata') and a columnar blue spruce (*Picea pungens* 'Fastigiata') were procured and summarily kerplunked.

Winter arrived early, requiring a shift in landscaping priorities for the following summer. The 100-foot (30 m), fenced-in barrens on the opposite side of the house (we called it "the Prison Yard") needed rocks. Lots of rocks.

Not having paved surfaces is a problem in snow country. The protracted mud season called "springtime" provides weeks-long opportunities to ruin every pair of shoes you own. And so it was at our

The mud of spring (left) necessitated the transformation of this part of the garden.

yard's new low spot, now directly in front of our new side entrance. Each night, break-your-neck ice formed across the surface. By afternoon, the melted muck could rival the La Brea Tar Pits. The solution was five tons of tawny Great Basin flagstone, professionally installed as a tightly fitted pathway and side courtyard. While not technically a "rock garden," the area became a garden. And it had rocks. Close enough.

A large kitchen window looks out over the space, and evergreens were a must – because Durango only gets a paltry 110 frost-free days per year. The drooping arms of a Norway spruce (*Picea abies* 'Pendula') and weeping blue atlas cedar (*Cedrus atlantica* 'Glauca Pendula') accentuate the upright form of a curl-leaf mountain mahogany (*Cercocarpus ledifolius*) and white-frosted needles of a Horstmann's Silberlocke Korean fir (*Abies koreana* 'Horstmann's Silberlocke').

At their feet grow holly-like creeping Oregon grape (*Mahonia repens*) and a duo of hardy manzanitas: the common small-leaf kinnikinnick 'Massachusetts' (*Arctostaphylos uva-ursi* 'Massachusetts') and a western native hybrid 'Ponchito' (*Arctostaphylos* x *coloradoensis* 'Ponchito'). A Hillside Creeper Scots pine (*Pinus sylvestris* 'Hillside Creeper') and the red-cone-tipped Pusch Norway spruce (*Picea abies* 'Pusch') provide texture. At the fence line, two Pacific Northwest arborvitaes (*Thuja* spp.) have no business growing but somehow endure the abuse of southwest Colorado's winter sun. In the meantime, a pencil-thin Woodward juniper (*Juniperus scopulorum* 'Woodward') provides a grey-green exclamation point.

Late spring offers great latitude for clashing colors, and so the orange-chartreuse of Angelina stonecrop (*Sedum rupestre*) dukes it out with turquoise-magenta of Firewitch dianthus (*Dianthus gratianopolitanus*). Meanwhile, only a snob would pooh-pooh the buttery yellow and fresh green striped foliage of variegated iris (*Iris pallida* 'Aurea Variegata'), topped with blue flowers that smell exactly like grape soda.

Taming the edges of flagstone, sturdy ground covers thrive, including tiny-leaf Wyoming native McClintock pussytoes (*Antennaria parvifolia*), wooly thyme (*Thymus pseudolanuginosus*) and its aptly named cousin juniper-leaf thyme (*Thymus neiceffii*).

Brightly colored plants gleefully clash in spring.

Nearby, glossy evergreen spreads of Turkish veronica (*Veronica liwanensis*) spill forth. Farther on, in a protected nook, a dainty fleabane holds its own; the rare *Erigeron scopulinus*, sold at select rock garden nurseries, is a demure wildling found only in scattered spots in mountainous northern Arizona.

Imagine the thrill for this rock gardener on the inaugural visit to the North Rim of the Grand Canyon a few years ago. Amidst the regal majesty of the Cape Royal Trail, an inconspicuous patch of *Erigeron scopulinus* toughed it out on decomposed Kaibab limestone, a treasure growing in plain sight. In my Durango garden, I can revisit that remote outpost with a mere downward glance.

A flagstone project, like Thanksgiving dinner, offers tremendous leftovers. So the horizontal rock garden began with remnants, castaways, and culls from the previous installation, supplemented by large new slabs of greyish Rio Grande flagstone. It also relied heavily on motivation and brilliance of two notable champions of technique and setting.

The ever-undaunted Lauren Springer Ogden devoted a chapter to flagstone gardening in her classic and treasured book *Passionate Gardening*, co-authored by Rob Proctor (2000, Fulcrum Publishing). I reread the "Gardening Between Flagstone" chapter countless times over the years, practically memorizing Lauren's plant list and dreaming of a time when I could be, as she perfectly described it, "performing a bit of hopscotch" to avoid trampling a tapestry of mat- and mound-forming gems. *Passionate Gardening* is the timeless book that kindled my gardening obsession at the start of the millennium.

The space between pavers can be a prime gardening location.

Meanwhile, the indefatigable Marcia Tatroe took horizontal rock gardening to an extreme. She and her husband, Randy (longtime president of the NARGS Rocky Mountains chapter), smothered their lawn with flagstone and created an astonishing horticultural showcase. In her must-read *Cutting Edge Gardening in the Intermountain West* (2007, Johnson Books), Marcia wryly recounts the initial stages of the project in which a sea of flagstone smothered dead or dying turf: "It was at this point that one of my son's friends commented that our creation had all of the charm of a 'direct nuclear hit'."

If you don't own these two indispensable books, please add them to your library. They motivate, inform, and amuse with each reading. Both signed copies are two possessions I'd rush into a burning house to rescue.

A properly constructed flagstone path or patio typically needs a solid base. Below grade, six inches (15 cm) of dampened, compacted crusher fines (also called rock dust) form a concrete-like but draining layer. Two inches (5 cm) of sand come next. Then well trimmed flagstone is set and leveled. It makes for a handsome hardscape and a foil for surrounding flora. But a planting bed it's not.

If one desires the exuberance of a horizontal rock garden, place flagstone directly on the ground. This admonition should prompt horrified gasps in some areas of the country, except in the Mountain Time zone.

Here in the Rockies, we deal with ludicrous extremes. Droughts end with torrential rains. Snow arrives in feet, not inches. A day's temperature swings 50ºF (28ºC), and no one notices or cares. Then there's hail the size of canned hams. (Not really, but it certainly seems like it.)

What we don't have is frost heave, the seasonal convulsions so typical to the Midwest or Northeast. In the Intermountain West, gardeners can easily set flagstone in soil.

The grunt work is straightforward. First, stage slabs across the yard, much like a butler would set out clothing on a bed. (Does anyone have a butler?) Select the rocks that look like they would make the best fit and temporarily set them in situ. Then make adjustments. It's basically solving an extraordinarily heavy puzzle.

Solving a very heavy puzzle.

With a trowel, draw around the border of each flagstone slab. Lift the rock and put it aside. Then scoop out or add soil so the reset slabs are an inch above grade. This offers a retaining rim for the eventual post-planting gravel mulch. Jostle the flagstone back and forth to settle. Backfill to eliminate air pockets or scrape off more soil if the slab sits too high or wobbles. Check your progress with a long construction level or a piece of scrap lumber with a smaller level taped to it.

Planting between the flagstones.

I kept most flagstone gaps to about three inches (7.6 cm). It's not because there's some sort of standard spacing; it's because plants come in 2.5-inch (6.3 cm) black pots. Size doesn't really matter after a year anyway. Most plants, ground covers in particular, will fill in. Besides, consistency is overrated and "symmetry is for the weak," as a snarky designer friend once observed.

Larger gaps will look better on the margins of your path. Indeed, an occasional dessert-plate-size opening can be home to a bold tuft of ornamental grass such as Blonde Ambition blue grama (*Bouteloua gracilis* 'Blonde Ambition') or smallish mounding shrub such as Kannah Creek buckwheat, (*Eriogonum umbellatum* var. *aureum* 'Psdowns').

Two items make rockwork easier. A sturdy dolly should be your trusty sidekick for moving flagstone around. Meanwhile, for those so inclined, a boombox blaring Stravinsky's "The Rite of Spring" or a Mahler symphony can inspire the installer as well as repel curious onlookers.

Rock garden plant descriptions resemble the name of an imaginary shyster law firm: "Challenging, Rare, Expensive & Fussy." These plants certainly deserve a place, but not where foot traffic poses a threat. The best choices for a horizontal rock garden are low-growing ground covers that are as beautiful as they are vigorous. With the exception of succulents, ground covers can take a bit of perambulatory pounding.

Be forewarned, once established and emboldened by a cool root run, these plants can embark on an invasion, enveloping flagstone inch

by inch. A late-winter haircut keeps them in check. I hadn't planned on that part, once again proving that things seldom go according to plan.

Plants ready to thrive (or die) in the garden.

Groundcover stalwarts for the horizontal rock garden include most members of the veronica and thyme tribes. Sky-blue spring flowering Turkish veronica (*Veronica liwanensis*) is an amazingly tough character and the perfect companion for a prized patch of golden-edged red Schrenkii tulips (*Tulipa schrenkii*), also an Anatolia native that dates back to 1600, which puts it front and center for the Tulipomania bubble-burst to come. As a bonus, Turkish veronica's persistent glossy leaves turn a rusty red with the kiss of autumn frost.

Also an evergreen spreader from Turkey, thyme-leaf speedwell (*Veronica oltensis*) thrives on abuse, offering a bright spring display of azure-blue flowers. Meanwhile, wooly speedwell (*Veronica pectinata*) as the name states, provides a green-grey carpet of evergreen foliage featuring tiny white-eyed cerulean flowers. It, too, forms a resilient, drought-tolerant mat across flagstones.

It was the best of thymes and the worst of thymes. Topping the list is the juniper-leaf variety, *Thymus neiceffii*, with its vernal explosion of shockingly pink flowers. Out of bloom, it's just as attractive, with needle-like foliage resembling (surprise!) mini junipers. Keep in mind that this thyme will need a bit more moisture and appreciates a little shade in areas with summertime incineration. Tiny Elfin thyme (*Thymus serpyllum* 'Elfin') can have a big impact. It's an easy-to-grow sun-lover with wee lavender-pink flowers over incredibly small rounded gray-green leaves.

Meanwhile, a wolf in sheep's clothing, wooly thyme (*T. pseudolanuginosus*) can swallow flagstone in a season. It's an ideal plant for fast coverage, but keep the clippers handy when this wooly bully encroaches. I dispatch interloping stems from an area reserved for my diminutive jewels, a row of pinkish-white townsendias, early yellow-blooming buns of draba (*Draba rigida* v. *bryoides*), a patch of blue-violet *Penstemon davidsonii* var. *menziesii* and hardy euphorbia whose tag might still be in that pot in the garage where I banish labels to be organized "later."

An alpine form of silver nailwort totally nails it in the Southwest garden with a flat-as-a-tortilla habit. Silver nailwort's official name is a mouthful, *Paronychia kapela* subsp. *serpyllifolia*. The evergreen mat takes on a silver cast from profuse whitish seedheads in early summer. *Paronychia* comes from the Pyrenees Mountains of southern Europe.

The horizontal rock garden in spring.

On the opposite side of the world, South African natives provide bold textures and exotic colors for the horizontal rock garden. Though it can spread to 24 inches, vigorous *Cotula* 'Tiffindell Gold' should find a home to roam, perhaps on the side of your flagstone path or in a big gap. This plant, introduced by High Country Gardens, features bright evergreen feathery foliage, deep roots, and interesting golden button flowers held high on thin, four-inch stems. Like bossy thymes and veronicas, it can be kept in check with judicious pruning as needed. It can also tolerate light foot traffic.

Ice plants (*Delosperma*), on the other hand, cannot take so much as one errant step. But that doesn't mean squish-prone succulents don't deserve a place in the cracks of a pathway. Just plant them out of harm's way on the margins or flanks of large piece of flagstone with plenty of room.

The most outrageous delosperma offering is the recently introduced 'Fire Spinner', with triple-tone flowers of orange, red and lavender. Not for the timorous or meek, this Plant Select® winner looks impossibly vibrant. Other "good-doing" cold-hardy ice plants include scarlet 'Red Mountain Flame', the classic bright yellow *D. nubiginum,* salmon-pink 'Mesa Verde', or *D.* 'Kelaidis' named in honor of Panayoti Kelaidis. During a lunchtime visit here in late 2011, Panayoti confidently envisioned a verdant space and reassured that the lot offered huge potential, despite the fact that the "garden" (more like "embarrassing moonscape") was merely a theoretical concept stuck in a self-inflicted purgatory.

Grey is the new black, and McClintock pussytoes make a handsome pairing with ruddy Hens and Chicks (*Sempervivum* spp.), their cobweb cousins (*S. arachnoideum*) and lookalike denizens of the Central Asian steppes *Orostachys spinosa*. Though saxifrages resemble semps, they are impossible to grow here, given the alkaline clay soil. Instead, Scarlet monardella (*Monardella macrantha* 'Marian Sampson') defies the USDA hardiness zones and blooms bright red in dappled sunlight beneath the columnar evergreens.

Some rock gardeners have the magic touch with emerald green *Arenaria* 'Wallowa Mountain', a newish "desert moss" from Oregon. I am absent from that roll call. I must have killed an entire flat of the stuff, but a few survivors are slowly spreading across the flagstone. Afternoon shade seems to be the secret. That, and not roughing up the tiny-haired root balls as I do with most plants during their tough-love introduction to the garden.

Besides 'Fire Spinner' ice plant, two other specimens wow the crowds during a garden tour. The uninitiated don't know what to make of the reptilian foliage of *Bukiniczia cabulica*, other than to appreciate its weird mottling. Meanwhile, the fragrant mounding Alpine Blue Mint Bush (*Zizophora clinopodioides* 'Alpinum') attracts as many bees as it does jealous gardeners who want the tiny bush's small lavender-blue flowers and heavenly scent for a special, sunny niche. A tip o' the cap to Mike Kintgen of Denver Botanic Gardens for collecting seeds of this Moroccan treasure.

Rock gardens need a few upright plants, especially in a horizontal rock garden. At eight inches (20 cm) tall, blue bunches of 'Sea Urchin' fescue (*Festuca ovina* v. *glauca* 'Sea Urchin') practically towers over its mat-forming neighbors. Yellow dwarf iris (*Iris pumila*) establishes a dainty 4-inch (10-cm) grass-like verticality. Meanwhile, spreading clumps of small joint fir (*Ephedra regeliana*) brighten the path with scraggly upright evergreen twigs.

Now that the horizontal rock garden is in maintenance mode, the next challenge beckons, as another three tons of flagstone sit on pallets along the back fence. This summer, those slabs will be installed as a path bisecting a dark-rust, coffin-shaped boulder. I won the behemoth from my favorite nursery during a "Guess the Weight of This Rock" fund-raiser. My estimation was 16 ounces (450 grams) off the rock's 1,561-pound (700 kg) bulk. Rock gardeners really have an unfair advantage in these contests.

The new flagstone path will incorporate that lucky boulder skirting the perimeter of an established waterwise lawn of buffalo grass (*Buchloe dactyloides* 'Legacy'). The area practically begs for a xeric border of eriogonums, penstemons, artemesias or most anything successfully trialed at our marvelous Durango Botanical Society demonstration gardens that thrives between the nearby Animas River and our public library.

The plan calls for a calico mix of regional rock: smallish tan chunks of Great Basin flagstone complemented by large grey pieces of Rio Grande flagstone and all interspersed with their deep amber Sante Fe counterparts.

It's an excellent plan. I'm sure I'll be sticking to it. What could go wrong?

Planting Astragalus

Bob Nold

AFTER ABOUT THIRTY years of trying, it looks like I have been able to establish some astragalus in a trough. This may not be a big deal to you, with your yard-wide mats of astragalus everywhere in the garden, but for me, here, it is definitely something.

Astragalus chamaeleuce blooming happily in a trough.

Of course, I have grown astragalus in the past. *Astragalus tridactylicus* was here for years, as were some Turkish ones like *A. aureus* and A. *creticus* (not to mention cool relatives like *Ebenus depressa* and *E. laguroides*), but now they aren't, and since I had some seed left over from previous sowings I thought I would try one more time, but this time do something very different.

My usual means of attempting to get more astragalus is to sow the seed in pots, outdoors, in late autumn or early winter so that the cold would work its magic on the seed coat and there would be tiny little

astragali in the seed pots come April. This method works quite well and thanks to it I can rattle off a list of species of *Astragalus, Ebenus, Lupinus, Oxytropis* and other members of the pea family which I have grown in the garden. But not for very long.

I have a theory that these peas dislike being transplanted more than anything else in the world, and even when carefully grown in pots, the fine root hairs can be damaged in some way which may not lead to death after the first year, but will in the second or third year, just when everything seems wonderful.

The reason I have this theory is that every single *Astragalus, Oxytropis*, etc.,which I planted from pots has been dead for years.

Apparently planting like this works for other people. Claude A. Barr even said, "As small plants, before roots have become woody, they [astragalus] are usually amenable to transplanting." This was of course written in the days when you could pull over to the side of the road a hundred miles from nowhere, get a shovel out of the back of your Model A, dig up a few astragalus, and nobody would say anything. Still, it seems like bragging to me.

Nicking and soaking astragalus seeds results in nearly immediate germination.

Naturally, newly-planted astragalus need attention in the garden; things like watering and shooing away whatever bugs like to snack on young astragalus leaves, and then watering again. I wanted to try a different way.

Seeds of all members of the pea family are ridiculously easy to germinate simply by nicking the seed coat and soaking the seed in water overnight. Even forty-year-old seed of *Astragalus aretioides* will germinate within twenty-four hours using this method. It can take even less time than that.

So I started germinating the astragalus using the nick-and-soak method, then growing the little seedlings in pots, and planting out the seedlings when they had formed true leaves. All of the seedlings died. It then occurred to me that maybe the seedlings would be healthier and less prone to dying if they were handled as little as possible, and so I tried planting germinated seed directly into the trough, "after all danger of frost had passed" (i.e., in July).

That worked.

It was almost as if the seeds had germinated right there in the trough; there was nothing between the roots and the soil in the trough to cause trouble, and the roots were off to a great start growing the way they wanted to.

Planting freshly germinated Astragalus seedlings directly into a trough.

The method, which, since I developed it, I was going to call "the super-genius method of planting astragalus," even though that sounded a bit immodest, goes like this:

Nick the seed. There are plenty of ways to do this. My method involves using a very sharp knife quite possibly too close to my face, but that was before I got glasses which enabled me to see an astragalus seed sitting on the table. The only thing that needs to be done is making a nick in the seed coat to allow water to enter. Some seed coats are harder than others and may require extra ingenuity, and there are some weird astragalus relatives from Central Asia which have a seed coat around a seed coat, just to fool you, but ultimately all that is necessary is some kind of crack in the coat. When water enters, the seed will start to germinate.

Plant the seed. Once the root has emerged, the seed can be planted. What I did was make a little hole, similar to the ones antlions make, gently lay the seed on the slope of the hole (I used tweezers, holding the seed, not the root), and then covering the seed. It didn't seem to matter whether or not the cotyledons had emerged, or even if they had and were buried just a little too deeply.

I watered the seedlings once, during one of the driest summers we've had in the last decade, and now I have astragalus. Hopefully, they will be aware of the amount of agony, suffering, despair, and sheer brain-power involved in getting them established, and live for more than a few years.

A young *Astragalus chamaeleuce* not dying. Yet..

Bookshelf

Hypertufa Containers:

Creating and Planting an Alpine Trough Garden

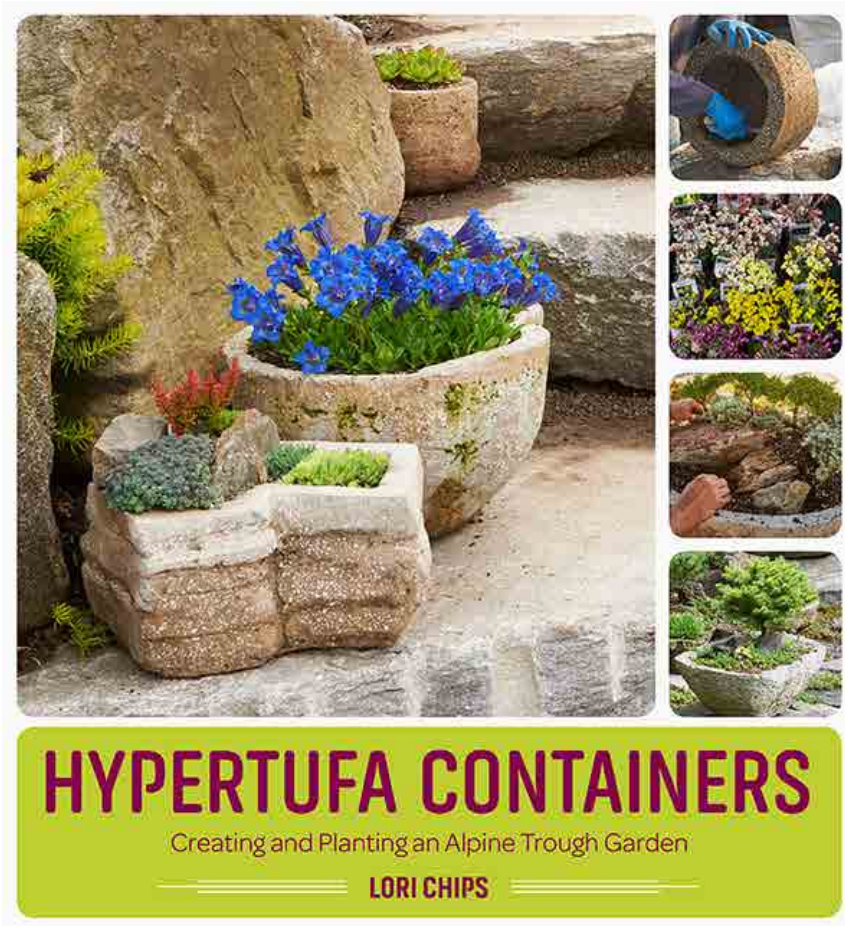
Lori Chips
2018, Timber Press
Scheduled for Release July 31, 2018
Available for pre-order now anywhere books are sold.

This book is a complete guide to every aspect of designing, making, and planting fascinating, creative hypertufa troughs. If you are a total novice, Lori's clear, detailed, engaging writing will take you through every step with confidence. I'm definitely going to be recommending and making a gift of this book to friends who aren't really gardeners but would enjoy making and planting a trough to display on their patio.

But if you are an old hand, I think you'll be thrilled with this book as well. I've made and planted some troughs in my day and thought I knew the process pretty thoroughly, and this book was still full of fascinating information and ideas. I not only learned a lot, but I also got excited again, seeing new techniques and design ideas that I want to give a try as soon as possible. This is perhaps the best feature of this book: Lori has managed to pull off the nearly impossible by writing a book that is for just about everyone, novices and experts alike.

After a brief chapter making the case for why troughs are so beautiful and essential in the garden, the next two chapters dive into every detail of mixing, shaping, and designing with hypertufa. One full chapter is devoted to using sand molds to make troughs. I was familiar with using sand to mold troughs, but Lori lays out numerous exciting, interesting techniques and designs I had never considered before, techniques far beyond the run-of-the-mill trough building workshop.

After a chapter on soil mixes for troughs, Lori dives into planting and placing troughs in the garden. One of the best features of this book is that in addition to being an accomplished gardener and expert trough builder, Lori is also a talented designer and has a gift for communicating how to choose what style of trough to build, putting together plant combinations for troughs, placing stone, and placing the troughs in the garden. I'll admit I'm far more confident in my ability to grow plants than to put them together in pleasing



combinations, and I greatly appreciate Lori's ideas and clear guidance in making troughs work aesthetically.

Despite the title of the book, Lori includes a chapter on genuine tufa rock that is fascinating, giving the details of how to plant directly in tufa either by drilling a hole or – in a technique that was new to me – splitting tufa and sandwiching it back together to create something like a tufa crevice that is very cool and I am anxious to try.

The book wraps up with some plant recommendations, and a final chapter called "Assorted Wisdoms" full of useful hints and tidbits gleaned from Lori's long experience.

There are many books that I've enjoyed reading, but *Hypertufa Containers* is one of those special books that won't just be sitting on the shelf, it is going to be out with me in the garden, no doubt getting splattered and stained with wet hypertufa.

Joseph Tychonievich

NORTH AMERICAN ROCK GARDEN SOCIETY

Bulletin Board

summer
2018

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President's Letter

For over 85 years, the North American Rock Garden Society has been on the forefront of introducing plants, places, and people to our members. Our traveling speakers program is renown, and our enhanced travel program has garnered new members, inspired old ones, and initiated extraordinary memories.

Right now, I need each of you to enable us to enhance our NARGS website experience for YOU and potential new members. You have spoken, and we have listened. We are fortunate that our webmaster, Elisabeth Zander, has volunteered to undertake this challenge.

The first step is a reformatted and easy to navigate front page. We DO have plans for more changes over time. These changes are long overdue and did I mention the superb plant photography sent in by many of you!

I am hopeful you will join with me in donating $25 to offset this essential website upgrade. If EACH member donates this modest amount, we can defray the costs. Of course, if you can afford to send more, it will be greatly appreciated. It is important to me that all of our members take ownership in our society and contribute to our continued efforts to provide you with a world-class Society; hence the modest request for funds. You may easily donate by going to the NARGS site, www.nargs.org, and click on "Donate" in the upper dark bar (you will need to log on). Or mailing a check or full credit card information to NARGS, POB 18604, Raleigh, NC 27619-8604 USA.

Our membership is now half of what it was just ten years ago. But I am encouraged by the core support we have received over the past year through our chapter requests for donations.

We continue to appreciate your support in various ways to NARGS and to your local chapter.

In the meantime, hope to see you soon,

Betty Anne Spar

bettyannespar@gmail.com

Upcoming NARGS Meetings for your Calendar

NARGS Study Weekend
"Rooted in Diversity"

Hosted by Delaware Valley Chapter

May 3 – 5, 2019

The Sheraton Great Valley in Frazer, a suburb of Philadelphia.

Contact: Jerry Rifkin (jerryr95@comcast.net)

NARGS Tours and Adventures

Gardens of Scotland

May 25 – June 3, 2019

Join Julia Corden (Manager of Scotland's Explorers Garden) on an exploration of outstanding public gardens, private rock gardens, and natural areas in Scotland. Tour details and registration information is posted on the NARGS website. The tour will be limited to 15 people. An optional pre-tour visit to the Chelsea Flower Show and Wisley is planned.

New Members

Welcome to all those who joined between February 9 and April 30, 2018

Aiken, Ellen, 819 14th St, Boulder, CO 80302-7619
Baker, Beth, 25344 Crystal Creek Dr, Eagle River, AK 99577-9614
Banks, Deborah, 255 White Hill Rd, Oneonta, NY 13820-9029
Conway, Gregory, 360 Covey Hill, Havelock, QC J0S 2C0, Canada
Eremich, Katya, 505 S. Eliot St, Denver, CO 80219-2921
Evans, Barbara, 67 Taverly Dr, Williamsville, NY 14221-1448
Favennec, Jean-Luc, 22 Rue de la Place, Brittany, 56300 Pontivy, France
Frankel, Samuel, 510 Eyre St, Buninyong, VIC 3357, Australia
Gedak, Scott, 416 23 Ave NW, Calgary, AB T2M 1S3, Canada
Gomez, Cristina, 216 Fall Creek Dr, Ithaca, NY 14850-2418
Goodman, Maria, 5235 E Fitzmaurice Dr, Prescott, AZ 86303-6559
Harris, Liz, UCF Herbarium (FTU), 1413 Tanner Ln, Winter Springs, FL 32708-3820
John, Tom, Sulphur Creek Farm, 5188 Old Hickory Blvd, Nashville, TN 37218-
Keating, Ryan, POB 772190, Steamboat Springs, CO 80477-2190
Knight, Martin, POB 942, Woodend, VIC 3442, Australia
Lamoreaux, Cathi, 3311 E 65th Ave, Spokane, WA 99223-7230
Lawhead, Jessica, 106 S University Blvd, Unit 19, Denver, CO 80209-3234
MacFadyen, Anthony, 14 Hawthorn Cres, Brampton, ON L6S 1B1, Canada
Meyer, William, 1611 Bruce Ave, Charlottesville, VA 22903-1311
Morrison, Jim, 1775 Oakview Dr, Stoughton, WI 53589-3356
Munson, Ann, 5304 Midmoor Rd, Monona, WI 53716-3049
Quatchak, David, 2430 Rochester Rd, Sewickley, PA 15143-8669
Ray, Arne, 28 Pinyon Pine Rd, Littleton, CO 80127-3507
Ryan, Mary, POB 623, Firestone, CO 80520-0623
Schilling, John, 270 S Washington St, Denver, CO 80209-2114
Siebach, Sarah, 5105 Kenneth Pike, Wintertur, DE 19735-1819
Smith, Scott, 4000 Lipan St, Denver, CO 80211-2550
Speth, David, N3569 Cth A East, Sheboygan Falls, WI 53085-2933
Spock, Gary, 8015 Walker St, Philadelphia, PA 19136-2721
Wannamaker, Melanie, 1312 Pacific Ave. S, Kelso, WA 98626-2121
Watkins, Derry, Special Plants, Greenways Ln, Cold Ashton, Chippenham, Wiltshire, SN14 8LA, United Kingdom
Webster, Trudie, 6604 McCall Dr, Longmont, CO 80503-9192
Wilk, William, 730 Muskingum Ave, Pacific Palisades, CA 90272-3446

Email Addresses

NARGS would like to have an email address for all its members, including libraries, botanical gardens, and university memberships. We do not share email addresses. And, if you move, don't forget to provide your new postal address to NARGS. Send email and postal addresses changes and updates to: nargs@nc.rr.com or mail to NARGS, POB 18604, Raleigh, NC 27619-8604

Election Results:

NARGS recording secretary, Joyce Hemingson, has announced the results of the recent election for directors of the society, managed by the company Association Voting. The results are as follows:

Mariel Tribby 183
Michael Guidi 167
Judy Zatsick 161
Jeffrey Hurtig 140

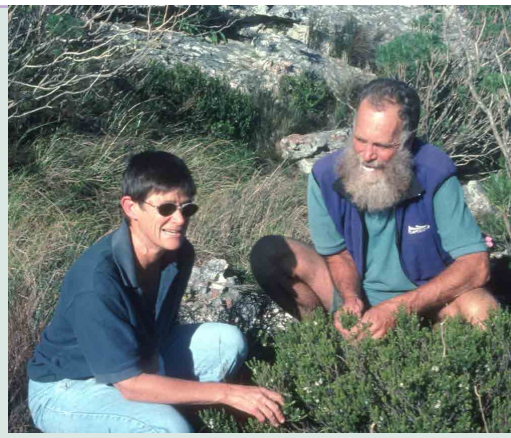
Thanks to the four candidates who ran and congratulations to the three highest vote recipients.

NARGS Traveling Speakers

The remaining traveling speaker events for 2018 are Marcia Tatroe (Colorado) and Vojtěch Holubec (Czech Republic) during the fall. See the NARGS Web site for dates and locations of Marcia's and Vojtěch's visits to local chapters, primarily in the U.S. Midwest and East Coast.

Amazon.com Note

How many times do you use Amazon.com? Well, this is just a reminder that NARGS benefits every time you buy a book, a lawn mower, tools, a microwave or shampoo. Peter George cleverly engineered a 3%-15% donation (depending on the item purchased) each and every time you enter through the Amazon portal on the NARGS homepage. But you must use it, otherwise no donation. This is free money for NARGS and only a keystroke for YOU.



In Memorium: Rod and Rachel Saunders

Our community of plant lovers is a relatively close-knit extended family of sorts, and these last several weeks have been a tough time for many of us who knew Rachel and Rod Saunders. Reports first surfaced in February that they might have been kidnapped by ISIS sympathizers in the Drakensberg in South Africa, and, to our horror, we have learned over the following weeks that four criminal terrorists were involved and that Rod and Rachel are no longer with us.

Rod and Rachel are best known as the owners of Silverhill Seeds and provided seeds of innumerable species of southern African plants to plant enthusiasts worldwide. They were passionate about their craft and their collective knowledge of the local flora and its cultivation was immense. I was one of many people that have had the great honor of being hosted by them on a couple of visits to South Africa back in the early 1990s when I worked at the New York Botanical Garden. I remember staying with them as one of the highlights of my life. They were kind, knowledgeable and just really nice company. I learned what a "middelmannetjie" is from them—it's the dirt part of the driveway between the cement tire tracks they parked their "bakkie" (van) on. It's a good Afrikaans word that we really don't have a simple translation for in English. I remember vividly the numerous flowers growing in their middelmannetjie from the leftover seed chaff they would scatter there after cleaning seeds. The ursinias, arctotis and other flower heads of the taller species would bounce up and down as we drove over them when taking the bakkie out for another floral adventure.

We went to the Tulbagh area one time to look for seeds of babianas and other bulbs along the road verges and I drank water from a mountain waterfall, somewhere near Franschoek I think. They told me with confidence that it was safe so I just stuck my mug into the cool fast moving water and drank it, something I would never have done had I not been with such experienced hikers.

I learned from them not to press the button above the bed I slept in because it was a "panic button," a not uncommon feature in South Africa that brings the neighborhood private security squad barging in the front door as the local police aren't necessarily reliable nor quick.

I also think I first had honeybush tea at their place; it is the better known rooibos tea's cousin. It is also made from a fynbos legume, in this case, *Cyclopia intermedia* rather than *Aspalathus linearis*, which is the source of rooibos (red bush) tea. I also remember being tasked by them to look for seed of *Aloe microstigma* when I went off with Ernst Van Jaarsveld to the Klein Karoo. I did manage to bring back a decent quantity of it and no doubt there are plants from that collection growing around the world. I helped clean seeds and learned the value of using different sized screens to separate seed from chaff.

Rod and Rachel were great conversationalists and gracious hosts who ably represented the best of South Africa. They had several long-term employees (along with Rachel's mom) who worked for many years with them and they were also close to their cats, mostly rescues that changed over the years but were always well cared for. I had seen them briefly a few years ago here in New York after a talk they gave to the Manhattan NARGS chapter and I corresponded often with Rachel over the years.

When we got our current house in 2012, I was finally able to create the gardens of my dreams on the 0.63-acre plot. It includes a large South African garden, but there are many South African plants in all of the gardens (there is no lawn, I converted all land and even some patios to gardens). Many of those plants came from Silverhill Seeds. Indoors, when winter is at its harshest, many bulbs and other wonders of the Cape flora sustain my soul under lights; again, many if not most of them coming from Silverhill Seeds. I cannot look inside nor outside our home and not be reminded and grateful for what Rachel and Rod have done over the many years I have known them.

We often have a dream of some sort that we hope will come true one day, and one of my dreams was that I would return one day to South Africa, perhaps after my retirement in a few years. I would meet up with Rod and Rachel, and we could wander the veld in search of treasures again. Or that one day they would come to the U.S. again and stay with us so that I could return the kind hospitality they showed me, and I could show them the fruits of their labors in my extensive gardens. I know I have invited them to do just that if they had a chance one day. Now Rod and Rachel have been taken from us, and these dreams of mine will remain unfulfilled. However, my memories of Rod and Rachel cannot be taken, nor will the wonderful plants I grew from their seeds. I am inspired, as I am sure many others are, to work even harder to preserve their legacy in our gardens and collections in the future.

Ernie DeMarie

Photo of Rod and Rachel courtesy of Dave Lehmiller

Seed Exchange

We concluded another successful Seed Exchange in April.

With all the wonderful donations from our members, both individual and institutional, we were able to reach out and fulfill 596 requests in the Main Distribution (29 more than last year) and 260 orders in the Surplus Distribution (60 more than last year).

In addition, we sent shipments of the leftover packets of seed (including some interesting and choice items) to the 29 chapters that requested them. These chapters made the seeds available to all their members and also, in many instances, to other educational and horticultural organizations. You can see that the Seed Exchange has a far-reaching impact on many, many gardeners, and your donations have an outsized effect.

When you are watching your plants mature their seed heads this summer, we hope that you will keep in mind all the positive outcomes those little seeds accomplish and gather them to share with your fellow gardeners. It only takes a contribution of five different types of seeds to attain Donor status, which rewards you with an additional ten packets of seed as well as priority in having your order filled in the Main Distribution. But we certainly hope that you will donate more than the minimum.

This issue of the Quarterly contains the Donor form and instructions. Our Canadian and overseas members also receive copies of our import permit and the necessary green & yellow shipping label. If any of these documents is missing from your copy, please contact Laura Serowicz immediately, and she will send replacements. If you live outside the US and wish to send more than the 50 packets of seed allowable in one shipment, contact Laura and she will be more than happy to send an additional set with the donor form, permit, and shipping label.

In order for you to receive Donor status and be listed in the Seed List, your seeds must reach Laura by November 1. So, mail them by October 25 if you live in the U.S., or by October 15 from Canada or overseas:

Laura Serowicz
15411 Woodring Street
Livonia, MI 48154-3029
U.S.A.

If you are planning to donate seeds that ripen late in the year (rhododendron, some native plants), include the names of those seeds with the other items on your donation form; then send the late-ripened seed to Laura by December 1.

We are very grateful to the two chapters that handled the distributions these past two years: Sierra (Main) and Columbia-Willamette (Surplus). The coordinators, Val Myrick and Jane McGary, and their excellent volunteers did an outstanding job of handling the hundreds of orders and sending out those seeds in a timely way. We greatly appreciate all their hard work!

Our Fall issue of the Quarterly will contain information about ordering seeds from the 2018-2019 Seed Exchange. Ordering will begin online on December 15. If you do not wish to place your order electronically, request a print copy of the Seed List and order form by December 1 from:

Joyce Fingerut
537 Taugwonk Road
Stonington, CT 06378-1805
U.S.A.
alpinegarden@comcast.net

In the meantime, I hope you all enjoy a wonderful summer and a bountiful garden –

Joyce

Joyce Fingerut, Director
NARGS Seed Exchange

alpinegarden@comcast.net
860-535-3067

A Brief History of the U.S. Requirement for Seed Phytosanitary Certificates

In January, 2002, the Animal and Plant Health Inspection Service–Plant Protection and Quarantine (APHIS-PPQ) began requiring a phytosanitary certificate for all seed imported into the United States. This certificate has to be obtained by the exporter from his/her country's government agency, with an expense of time, effort, and money. This cost and process effectively cut off the supply of donations to our Seed Exchange from Canadian and overseas members of NARGS. The attendant issues – diminution of the Seedlist, loss of Canadian/overseas members – threatened one of the prime NARGS membership benefits.

More than four years of frequent and continued discussions with APHIS-PPQ produced the Small Lots of Seed permit, published in May, 2006, which allowed the importation of seeds in less-than-commercial quantities, subject to special conditions and inspection.

Since then, NARGS has been able to continue to receive seeds from its members outside the U.S. But there have been some issues that created problems for both APHIS and the users of the permit.

An immediate problem was that the staff at some of the Plant Inspection Stations (PISs), which receive and inspect all seeds from exporters, were contacting the U.S. permit holders and requiring additional postage in order to forward the seeds to the importer (e.g., our seedex Intake Manager).

The problem was not caused by the U.S. Postal Service, which clearly recognizes the chain of custody of the shipments and allows the seeds to be forwarded from the Plant Inspection Stations to their recipients without any additional postage or costs. After many discussions with and among staff at both APHIS-PPQ and the USPS, it was decided that:

- Staff at the Plant Inspection Stations would stamp each shipment after it had passed inspection;
- The shipment would then be forwarded to a designated post office closest to the Station;
- The staff at the designated post office would recognize that stamp and place the seed shipment back in the mail stream to be forwarded to the importer without additional postage.

The discussions were begun in November, 2006, and finalized in early 2012. Since then, there have been no problems with forwarded seed shipments.

Other problems involved the special green & yellow shipping labels that the exporters place on the outside of the seed shipment to direct it to a Plant Inspection Station. In the case of the PIS that is based at JFK Airport in New York, there was no U.S.A. on the final line of the label (all international mail must have the country as the final line of the address). The PIS is in Jamaica, NY. Without USA in the address, seeds were being sent to Jamaica, in the Caribbean. It took several requests to have APHIS-PPQ amend the shipping label (and correct the zip code, as well).

Due to the slow response times at the JFK inspection station, which is one of the two busiest in the US (Miami being the other overwhelmed station), we began using the less busy inspection stations in Linden, NJ, and Atlanta, GA. Response times immediately dropped from weeks to days, and inspected shipments rarely arrive beyond the seedex deadline.

There have also been problems with the shipments of seed sent by our donors, including poor packaging, incomplete invoices, unhealthy seeds, and seeds that are forbidden entry into the U.S. To help mitigate the latter problem, we have a list of "Restricted Seeds" on our website (https://nargs.org/restricted-seed); that is, seeds that cannot be imported because they are from invasive plants, endangered plants, or require special post-entry treatment. The first three issues are periodically addressed with reminders in the Rock Garden Quarterly (see: spring, 2018 issue).

At a recent meeting, the staff at APHIS-PPQ was shown how NARGS continues to work with its members to achieve perfect compliance with the 17 conditions set by the Small Lots of Seed permit (see sample below). They were impressed with our instructions to Canadian/overseas donors, the website page with Restricted Seeds (which has also been used by overseas seed exchanges, as well as PIS inspectors), instructions for obtaining and using the Small Lots of Seed permit, and the ongoing work and relations with the staff at the two Plant Inspection Stations.

We have common goals with APHIS-PPQ: the protection of horticulture and natural resources against disease and invasive plants. The staff members at APHIS-PPQ are also avid gardeners, who were impressed with our Rock Garden Quarterly and the breadth of our Seed List. Our combined efforts allow the international exchange of seeds, while keeping our gardens secure.

Joyce Fingerut

Minnesota Chapter Award for Service: Charles (Chuck) Carlson

I nominate Charles (Chuck) Carlson for the NARGS Chapter Award for Service. Chuck has been a longstanding member of the Minnesota Chapter and has played key roles in our organization over the years. He filled our vacant editorship on short notice and utilized his software expertise to publish newsletters without a hiccup in production from 2012 through 2014. Chuck eagerly shared his rock gardening expertise via newsletter articles he penned and numerous plant photos he took. Photos were especially useful to future editors if there was newsletter space to fill just before going to print. Chuck's articles were written in a style that readers of all ages could understand and enjoy.

The Minnesota Chapter's very first website was created and maintained by Chuck from 2008 until this year. He was our first webmaster and fearlessly took on this daunting project.

Chuck was our 'go to' audio-visual guru who fully understood the chapter's LCD projector, knew how to place an image in an unfamiliar format into a PowerPoint presentation, and could assist a meeting speaker using our equipment with his/her laptop. For our technology-challenged members, Chuck came to our rescue! He would add a special touch to our meetings by streaming gorgeous photos of his own rock and alpine plants on the screen during break times.

In the days of videotape, Chuck would often tape meeting presentations. He kept a video library that was available to the membership, so those who were not able to attend a meeting could still benefit by watching the recording.

Everyone knows by-laws are the backbone of a well-run organization. Chuck periodically reminded the Board and members if we were straying from aspects of our bylaws, and suggested revisions to make them more in tune with the times. Chuck excelled at this, so much so, that I wonder if he was a lawyer earlier in his life!

Chuck always kept members abreast of what NARGS was accomplishing and would suggest how our chapter could benefit by utilizing our national organization.

Being a very organized and disciplined person, Chuck stressed the importance of always having a full year of programs scheduled (which can be challenging to accomplish) – this was a skill he brought from his previous involvement in other horticulture organizations over the years.

Having a successful annual banquet takes many volunteers, and for multiple years Chuck willingly offered to take registrations, print beautiful name tags, and man the registration table with name and entrée tags displayed beautifully. Without blinking, he'd graciously deal with last-minute sign-ups or changes, and promptly reconcile the event.

Chuck maintains a lovely, south-facing rock garden chock full of plant gems throughout the growing season. Years ago, hip surgery didn't deter Chuck from continuing to rock garden and cultivate a wide variety of other plants and flowers on his suburban property.

Our chapter is indebted to Chuck for his many contributions over the years –because of his service and sharing the love of rock gardening, we are a better organization. Thank you, Chuck!

Submitted by Cheryl Philstrom

NARGS Donations

February 9, to April 30, 2018: $2,847

To support the Seed Exchange, The Rock Garden Quarterly, Traveling Speakers Program, and General Fund.

Siskiyou Chapter--NARGS
Accardo, Marlene (Colorado)
Baker, Patricia (Colorado)
Barrett, Karen (Maryland)
Bauer, Bill (Connecticut)
Benedict, Esther (Indiana)
Benevity Comm. Funds
Bennett, Teri L. (Virginia)
Blaha, Karel (Washington)
Bouffard, Vivien (Massachusetts)
Bowlby, Astrid (Maine)
Brastow, Dave (Washington)
Brown, Alison (Maine)
Brunjes, Roy (Colorado)
Buch, Carl (Denmark)
Bush, Allen (Kentucky)
Carrier, Bernard (Quebec)
Clark, Mary (Colorado)
Conway, Gregory (Quebec)
Cook, Scott (United Kingdom)
Curtis, Lee (Colorado)
DeRouin, Cecile (Florida)
Domin, Patricia (Alberta)
Donahue, Maura (Massachusetts)
Dupey, Jeannette (Washington)
Dussler, Barbara (Germany)
Evanetz, Susanne (British Columbia)
Favennec, Jean-Luc (France)
Fisher, Alister (New Zealand)
Fowler, Mary (Colorado)
Franklin, Catherine W. (Alaska)
Friberg, Shirley (Minnesota)
Goldsworthy, James (Washington)
Gonzy, Michele (France)
Green, Richard (United Kingdom)
Gregg, Laura (Pennsylvania)
Haas, Joan T. (Pennsylvania)
Hammerschlag, Richard S. (Maryland)
Hampton, Sandra Kay (Illinois)
Hensley, Christopher (Ohio)
Hirara, Seisuke (Japan)
Hoeffel, Joan Z. (New York)
Houdek, Robert (Ohio)
Jaward, Susan (Ontario)
Jones, Samuel (North Carolina)
Koch, Helen G. (Maine)
Kosonen, Kirsi (Finland)
Kramer, Hans (Netherlands)
Kurio, Cathy (Alberta)
Leggatt, Anna (Ontario)
Levi, Lika Lale (New York)
Levy, Sterling R. (Nova Scotia)
Lockhart, Bruce (Massachusetts)
Magyar, Sandra L. (Connecticut)
Maksymowicz, Alex & Lillian (Oregon)
McInnes, Laurie (Australia)
McKanna, Jane (Australia)
McKenzie, Laurel (New Hamphire)
Mizin, Michael (Pennsylvania)
Moore, Walter (North Carolina)
Moscetti, Paula J. (New Jersey)
Muggli, Michael A. (Minnesota)
Pacholko, Helen (Alberta)
Rafferty, Sean (British Columbia)
Rankin, David (United Kingdom)
Rayner, Gizelle C. (Washington)
Rembetski, John (New Mexico)
Rietveld, Arie (Netherlands)
Ropeid, Tor Jan (Norway)
Ruault, Bob (Alberta)
Scott, Caroline (Alberta)
Smith, Lois (Ontario)
Spiegel, Anne (New York)
Spiers, William (Michigan)
Tarrant, Georgina (Nova Scotia)
Thompson, Daniel (Kentucky)
Thompson, Paula (Michigan)
Thrasher, Allen W. (Virginia)
Turner, Larry (Colorado)
Turunen, Michael (Finland)
Vanspronsen, Arie (Ontario)
Vaxvick, Linda L. (Alberta)
Voran, Allyson (Utah)
Whyman, Steven (North Carolian)
Wiersdalen, Inger Lise (Norway)
Wilk, William (California)
Williams, Linda (Oregon)
Wysocki, Raymond (New Jersey)
Zander, Elisabeth B. (Connecticut)

Treasurer's Report

Introduction and Summary

Thanks to the generosity of our members, the activities of NARGS in 2017 resulted in a profit of $45,650. A deficit of $8,200 was projected in the 2017 Budget. The areas primarily responsible for this net profit are as follows:

- Donations to the society totaled $48,394 versus a budget of $16,500. You were again generous beyond our wildest dreams in response to our financial challenges.
- The Rocky Mountain Chapter offered to match Chapter donations up to $10,000. In response, our Chapters donated $8,998 to NARGS and The Rocky Mountain Chapter matched each donation.
- Our membership revenue continued to decline, dropping 11% or $6,159 from 2016 to 2017.
- The Seed Exchange program returned positive profit in 2017 due to increased revenue and a large number of member donations (which are included in the donation total above).
- The Dolomite and Wyoming tours were a tremendous success in 2017 generating over $16,000 in profit for NARGS. Thanks greatly to our Tours Committee and their volunteers.
- The Annual General Meeting hosted by the Piedmont Chapter generated $1,855 from the meeting and an additional $1,540 from the live auction.
- A significant decrease in our *Quarterly* editing cost also contributed to our net profit for the year.
- General internet services in support of our website increased somewhat in 2017.
- Insurance expenses increased this year due primarily to paying for our Directors and Officers Liability two times during the calendar year. Our 2016 premium was paid in 2017.
- The Norman Singer Endowment Grant for 2016 of $5,000 has not yet been disbursed but will be in 2018. A 2017 Norman Singer Endowment Grant for $5,000 was disbursed in 2017 with an additional $1,500 Grant scheduled for 2018.

A major factor in our annual deficit is that our membership revenue continues to decline year-over-year as fewer members renew their membership each year.

As of 12/31/2017, all bank accounts and investments have been recorded into our QuickBooks accounting system and all accounts have been balanced to the appropriate year end statements.

Below, I have listed those areas of Net Income and Net Expense that have a significant impact on our operations. Net Income in this table is the net of total income minus total expense for each program to more clearly show each program's impact on our finances. The formal NARGS financial statements as of December 31, 2017 follow:

Net Income:	**2016**	**2017**	Change
Memberships	55,007	48,848	-6,159
Donations	39,866	48,394	8,528
Interest & Dividends	7,718	7,386	-332
Advertising	1,491	1,011	-480
Book Service	462	23	-439
Amazon Payments	945	754	-191
Seed Exchange	-4,187	1,753	5,940
AGM and Tours	11,983	21,606	9,623
Total Net Income	115,301	129,775	14,474
Net Expense:			
Grants and Awards	198	5,100	4,902
Bank Fees	1,903	80	-1,823
Speakers Tour	0	0	0
Internet Services	5,803	7,627	1,824
Quarterly	58,073	51,969	-6,104
Administration:			
Exec. Sec.	14,515	15,333	818
Insurance	1,633	3,283	1,650
Other	2,373	733	-1,640
Total Net Expense	**84,498**	**84,125**	**-373**
Net Profit & Loss	**30,803**	**45,650**	**14,847**

NORTH AMERICAN ROCK GARDEN SOCIETY
2017 Financial Review Report

Betty Anne Spar, President
North American Rock Garden Society
5051 N. Gray Mountain Trail
Tucson, AZ 85750-5942

February 1, 2018

Dear Ms. Spar:

I have examined the NARGS financial records for calendar year 2017 maintained by the Treasurer, Richard Lane. The records include the following:

- Balance Sheet and Profit and Loss Statement as of 6/30/2017
- Balance Sheet and Profit and Loss Statement as of 12/31/2017
- Account reconcilements for each of the NARGS bank accounts for the period ending 6/30/2017
- Account reconcilements for each of the NARGS bank accounts for the period ending 12/31/2017
- Account reconcilements of the Fidelity Investment Money Market Fund and Exchange Traded Products as of 6/30/2017
- Account reconcilements of the Fidelity Investment Money Market Fund and Exchange Traded Products as of 12/31/2017
- samples of several disbursement records

After reviewing these financial records, I find that the year-end Balance Sheet and Profit and Loss Statement accurately represent the financial status of the North American Rock Garden Society as of December 31, 2017. All bank accounts and the Fidelity Investment Cash Account and Exchange Traded Products have been consistently and correctly reconciled and are accurately recorded in the financial statements. The examination of several sample of disbursements records found that the appropriate documentation and/or authorization was obtained to support the disbursement.

In conclusion, the review found no significant issues of concern.
Sincerely Yours,

William Adams
330 Carlile Ave.
Pueblo, CO 81004

NARGS Chapters (meeting place/area) and Chairpersons or Co-Chairs

Adirondack (Ithaca, NY)	John Gilrein <basecamp@alum.syracuse.edu>
Alaska (Anchorage & Mat-Su Valley)	Carmel Tysver <garden@gci.net>
Allegheny (Pittsburgh, PA)	David Amrheim <amrheindav@aol.com>
Berkshire (Stockbridge, MA)	Joyce Hemingson <jhem1022@gmail.com>
Calgary Rock & Alpine Garden Society (Calgary, AB)	Margaret Fong <mjfhello@yahoo.ca>
Columbia-Willamette (Portland, OR)	Terry Laskiewicz <fritillaria_3@hotmail.com>
Connecticut (New Haven, CT)	Virginia Gingras <ginnygingras2013@gmail.com>
Delaware Valley (Philadelphia, PA)	Janet Novak <janet@indri.org>
Fells (Newbury, NH)	Thelma Hewitt <thelmakh@gmail.com>
Gateway (St. Louis, MO)	Sandy Evertowski <evertowski@centurytel.net>
Great Lakes (Southern MI)	Holly Pilon <plantscapedesign@yahoo.com>
Hudson Valley (Westchester Co, NY)	Don Dembowski <dondembowski@optonline.net>
Long Island (Oyster Bay, NY)	Donald Ohl <donohl@yahoo.com>
Manhattan (New York, NY)	Brendan Kenney <ny10014@aol.com>
Mason-Dixon (Norrisville, MD)	Marika Sniscak <marika123@verizon.net>
Minnesota (Minneapolis/St. Paul, MN)	Rick Rodich <rrodich@juno.com>
New England (Waltham/Boylston, MA)	Vivien Bouffard <vbouffard55@msn.com>
Newfoundland (St. John's, NL)	Todd Boland <todd.boland@warp.nfld.net>
New Mexico (Santa Fe/Albuquerque, NM)	Robin Magowan <magowanrobin@gmail.com>
Northwestern (Seattle, WA)	Kevin Cretin <kcretin @yahoo.com>
Nova Scotia (Halifax & Truro, NS)	Roslyn Duffus <roz.lakeside@gmail.com>
Ohio Valley (OH & surrounding states)	Joan Day <jdayham@earthlink.net>
Ontario (Don Mills, ON)	Cheryl Johnson & Lin Chevrier <cjohnson24@sympatico.ca>
Ottawa Valley (Ottawa, ON)	Jeff Hurtig and Jane Lund <president@ovrghs.ca>
Piedmont (Raleigh, NC)	Amelia Lane <amelia.lane@gmail.com>
Potomac Valley (Alexandria, VA)	Kevin McIntosh <kmac53@verizon.net>
Quebec (Montreal, QC)	Robert LeClerc <leclercr@bell.net>
Rocky Mountain (Denver, CO)	Glenn Guenterberg <glenn.guenterberg@mac.com>
Sierra (Sonora, CA)	Nancy Piekarczyk <NanPiekarczyk@gmail.com>
Siskiyou (Medford, OR)	Jean Buck <jeanbuck11@yahoo.com>
Wasatch (Salt Lake City, UT)	Tony Stireman <tstireman@gmail.com>
Watnong (Far Hills, NJ)	Michael Wilson <miwilson@ramapo.edu>
Western (San Francisco Bay area, CA)	Ted Kipping <tkippingsprint@earthlink.net>
Wisconsin-Illinois (Madison-Chicago)	Damon Smith <damonsmith@hotmail.com>

NARGS Structure

The officers of the North American Rock Garden Society consist of a president, a vice-president, a recording secretary, and a treasurer. The officers are elected by the membership.

The Board of Directors of NARGS consists of the four above-named officers, the immediate past president of NARGS, and nine elected directors.

The affairs of NARGS are administered by an Administrative Committee (called AdCom) consisting of the president, vice-president, recording secretary, treasurer, and one director-at-large, selected annually by the NARGS officers from among the nine elected directors.

Officers

President	Betty Anne Spar <bettyannespar@gmail.com> 5051 N Grey Mountain Trl, Tucson, AZ 85750-5942
Vice President	Don LaFond <plantjunkies@gmail.com> 11836 McGregor, Pinckney MI 48169-9517
Recording Secretary	Joyce Hemingson <jhem1022@gmail.com> 44 Rock Hall Rd., Colebrook CT 06021-7072
Treasurer	Richard Lane <rhlane01@gmail.com> 4904 Hermitage Dr., Raleigh, NC 27612
Director-at-Large	Panayoti Kelaidis, 1244 S Quince St., Denver, CO 80231 <telesonix@outlook.com>
Immediate Past President	Matt Mattus <mmattus@charter.net> 26 Spofford Rd., Worchester, MA 01607

Directors of the Board

2016–2019	Dave Brastow, Tumwater, WA Julia Caroff, Birmingham, MI David White, Durham, NC
2017-2020	Panayoti Kelaidis, Denver, CO) Marianne Kuchel, Fairlee, VT Steve Whitesell, North Blenheim, NY
2018-2021	Mariel Tribby, Saint Louis, MO Michael Guidi, Denver, CO Judy Zatsick, Fairfax Station, VA

Managers

Executive Secretary	Bobby J. Ward (919) 847-6374 P.O. Box 18604, Raleigh, NC 27619-8604 <nargs@nc.rr.com>

Back cover: *Brachyotum naudini*, Yoko Arakawa

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