

The Trillium

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View from Indian Trail Ridge, Colorado

By Tim Alderton

A haze of smoke blown in from wildfires in California settled in the valley below Indian Trail Ridge despite a brisk wind blowing over the crest. The cool morning in the 50s with a strong breeze caused a bit of a shock to my system as our group of about twenty people exited the vehicles at the Kennebec trailhead where we departed for the hike to the summit at Indian Trail Ridge at 12,200'.

The trailhead provided a taste of the flora awaiting us. Creamy white 15" tall drumsticks stood above the strappy foliage of the *Bistorta bistortoides*, the American bistort. Hundreds of tiny white flo-

rets aging to a soft pink made up the head of the drumsticks floating above the shorter grasses and other wildflowers throughout the meadows surrounding the parking area. *Veratrum californicum*, a synchronized bloomer, just finishing flowering after a mega bloom densely covering large expanses with corn like foliage and tassel-like spent flower stalks. Literally millions of the four-to sixfoot-tall green giants dominated acres of the meadows covering the mountain slopes hiding many less dominating species among their stems. Aspen, spruce, and fir dominated the valleys below, with only a few scattered spruce and shrubby willows sprinkled up the slope in sheltered pockets.

The start of the trail gently undulated following the side of the ridge from the parking lot at the Kennebec Trailhead to near Taylor Lake. Beginning down the trail, more variety became visible among the dominant species. Within the tall foliage of the Veratrum, equally tall *Delphinium barbeyi*, Barbey larkspur, flowered. The saturated blue/purple five petaled spurred flowers arranged in loose spikes topped the stems lined with deeply palmately lobed leaves. Intermingling with the corn-like stalks of the



Veratrum californicum

Veratrum, the much smaller *Senecio bigelovii* var. *hallii*, nodding ragwort, blossomed in two color forms. Clusters of apetalous inflorescences tightly wrapped in chartreuse or burgundy phyllaries flowered atop sparsely leaved stems 12-24" tall.

Continuing along the trail, views of slopes above the trail showed a more sparsely vegetated area, yet no less spectacular. Soft purple shades of an unknown *Erigeron* blossomed in foot tall mounds interspersed with open ground, stones, and other wildflowers. Among the *Erigeron*, 24" tall clumps of *Senecio atratus*, black-tipped ragwort, stood with silver foliage topped with butter yellow flower heads. A few stalks of flaming orange red *Castilleja miniata*, scarlet Indian paintbrush, stood out like a sore thumb from the otherwise pastel pallet of the Erigeron and Senecio. A break in the taller vegetation along the trail gave way to patches of delicate *Campanula rotundifolia*, harebells. They mingled with the surrounding short foliage of *Bistorta bistortoides* and spent *Helianthella*. A few stalks of *Gentianella amarella*, autumn dwarf gentian, stood along the trail as well. The diminutive gentian flowers at each node with a tubular star of soft purple highlighted by the often-purple flushed foliage.

The gentle trail guided us past more Delphinium, Veratrum and willows, taking us toward

Taylor Lake and the base of the ridge we would be climbing to reach Indian Trail Ridge. At an intersection, we found the deep blue vase shaped blossoms of *Gentiana parryi* just opening for the day. A stream exiting Taylor Lake created a moist meadow providing conditions for the succulent alpine cousin of Sedum, *Rhodiola rhodantha* or Queen's crown. Soft pink clusters of flowers topped the narrow leaves held on erect stems growing up through the round foliage of *Caltha leptosepala* that flowered



Gentiana parryi

more than a month before. On slightly drier areas in the meadow, a few deep purple spikes of *Aconitum columbianum* subsp. *columbianum*, monkshood, stood. More numerous hot pink bracted clusters line the upper stems of the clumps of *Castilleja rhexiifolia*, rose paintbrush, standing out from the surrounding green of all the other plants in the meadow.

From here we started up. Initially the trail was dominated by shrubby willows but transitioned into acres of *Veratrum* again. In oth-

er areas with drier open soils, *Heterotheca scheideri*, Scheider's golden aster, colonized, forming low mounds topped in glowing yellow daisies spaced over the reddish earth. The narrow trail began to gain elevation quickly at this point, zigging and zagging up the ridge. This provided spectacular views of Taylor Lake and the valley below, but for me provided some stress as heights are not my thing. My focus came more to the uphill side of the trail (less frightening for one who does not like steep slopes and cliff edges). Among the flora along the elevating trail were clumps of creamy *Castilleja occidentalis*, mats of dwarf *Achillea millefolium*, and low clumps of already spent *Trifolium attenuatum*. Other spots provided homes to more clumps of



Gentianella amarella



Aconitum columbianum subsp. columbinanum

Campanula rotundifolia and a few lone plants of *Cerastium beeringianum*, Bering Sea chickweed, with five two-lobed white petals. The upside of the slope became rockier with the increase in elevation, but the flora did not become less diverse. Boulders gave shelter to species that one might not expect at over 12,000 feet. Hiding in one shady crevice grew an unidentified fern and an *Antennaria* species. Another

outcrop provided a home with more sunny exposure where a silver-leaved Antennaria, a green flowered Heuchera, and grassy Allium geyeri were topped in pale purple umbels. Larger crevices contained flowering clumps of Chamerion angustifolium, fireweed, along with clumps of shrubby Salix species. On wind-protected slopes Picea engelmannii, Engelmann spruce, colonized the rock outcrops.

Approaching the top of the first ridge, the trail rounded off into a willow thicket and an alpine meadow. The meadow was a tapestry of yellow *Potentilla*, creamy white *Bis*-



Castilleja occidentalis

torta bistortoides, soft pink *Castelleja*, brick red *Rhodiola integrifolia*, and a scattering of blue *Mertensia*. The trail leveled off and started down slightly as it turned north toward our destination. Passing the ticket of willow and opening into a windblown meadow edged in a rock scree on the northwest side. A few *Hymenoxys grandiflora* dotted the green expanse. In an open rocky area along the path, clumps of *Senecio amplectens* var. *holmii* grew to only 6" tall topped with only a few nodding yellow daisies held just above the leathery foliage flushed with a purple midrib against blue green blades.

The trail continued down to a narrow strip edged in a steep scree on the west side and boulders leading to a cliff's edge on the east side. My fear of heights was getting to me in this area, and with a thirty-mile-an-hour wind blowing across the trail I crouched down low to the ground to appease my fear of being blown over the cliff. Despite my fears, though everybody else walked over totally erect and unfazed. My fears did not keep me from finding a few plants nestled in the thin soils among the



stone. One crevice contained a clump of *Oxyria digyna*, alpine mountainsorrel, a few spent flower stalks grew from the cluster of round leaves. Another hollow held a tight clump of one of the many species of *Erigeron* that call the San Juan Mountains home. At only a few inches tall the dark green foliage held a few soft lavender inch wide inflorescences. A shaded crevice held a carpet of moss like foliage with small white flowers flecked with red spots floating on wiry stems. This small gem was *Saxifraga bronchialis*, spotted saxifrage.

Senecio amplectens var. holmii

The narrow crossing led to a windblown rocky meadow with tuffs of alpines. A few highlights included *Minuartia macrantha*, large-flower sandwort, with five petal white flowers topping the 2" tall foliage, *Gentiana algida*, whitish gentian, with two-inch white challis growing from the six-inch tuffs of foliage, and *Castilleja haydenii*, Hayden's Indian paintbrush, a regional endemic only found in the southern Rocky Mountain with hot pink bracts sheltering the flowers on a 4" tall plant.

Yards from the destination, a rock shelter on top of Indian Trail Ridge, the meadow transformed into a lush blend of new flowers. Larger soft purple *Erigeron*, deep burgundy *Penstemon whippleanus*, spikes of pink *Castelleja rhexiifolia*, airy stalks of *Valeriana edulis*, and a variety of DYC's to name just a few of the species.



Gentiana algida

for the coming winter. The shelter visibly held the stash, squeezed within the voids of the rocks, that would sustain the pika in the coming months. At this spot many of the participants sat among the flowering meadow looking down onto Taylor Lake a few hundred feet below eating their lunches and admiring the ptarmigan and pika.

This was only a sampling of what participants in the 2021 AGM experienced in the San Juan Mountains of southwest Colorado. Come to the meeting on January, 15, 2022, to hear more of the Four Corners region. Hope 4 to see you there either in person, or via Zoom!

Reaching the rock shelter, a surprise awaited. Not a plant but some of the southernmost white-tailed ptarmigan, a beautiful bird



Castilleja haydenii

found this far south on these high peaks. Two adult females and three half grown chicks crept among the meadow and stones surrounding the shelter. Also, in the southern part of their range, a pika scurried around the rocks of the shelter stashing hay



Penstemon whippleanus

Piedmont Chapter NARGS Speakers & Events Spring 2022

Saturday, February 12, 2022 (in person) Scott McMahan Atlanta, Georgia "Plant Exploration with a Purpose'

Saturday, March 19, 2022 (in person) Elisabeth Zander Goshen, Connecticut "The Spectacular Gardens of the Czech Republic"

Saturday, April 16, 2022 (in person) Scott Zona Hillsborough, N.C. "Salvia: A Natural History"

> SAVE THE DATE!!! May 2022 Spring Picnic TBA

Visit https://www.piedmontnargs.org/ to learn more about the Piedmont Chapter



Scenes from my Winter Garden from Marian Stephenson

Above: Mahonia eurybracteata 'Soft Caress Right: Iris unguicularis





by Scott McMahan

My position as manager of the International Plant Exploration Program for the Atlanta Botanical Garden has taken me all over the temperate jungles of Southeast Asia, but few landscapes are as breathtakingly beautiful and home to such amazing botanical treasures as the karst mountains that make up the border between Vietnam and China. While most people probably think of Vietnam as being a strictly tropical country with sweltering jungles, palm trees and stunning rice terraces, it is also home to the tallest mountain in Indochina... Fansipan Mountain (10,326'). In 2007, when I made my first trip to northern Vietnam with Ozzie Johnson and Bleddyn-Wynn Jones, I had my sights firmly set on botanizing as much of Fansipan as I could. While the elevation was a little higher than we had worked in before in China or Vietnam, the plants we were seeing (Maples, Magnolias, Oaks, Hydrangeas, Lilies, Clematis, Arisaema) told us we were in the right place for finding plants that might be hardy in the southeastern US. We spent several years going back to the same area in northern Vietnam before deciding one year to travel further east to the provinces of Ha Giang and Cao Bang to see what was growing at a slightly lower elevation, and I'm so glad we did.

In 2010, Dan Hinkley, Ozzie and I spent a few days at the end of our trip to Fansipan traveling east to Ha Giang province to look for a rare, recently described conifer called *Xanthocyparis vietnamensis*. Dan had been to Ha Giang a couple of years before looking for this conifer and had found only a single specimen. Our hope was to locate other populations of *Xanthocyparis* as well as seeing what else grew in the limestone cliffs with these trees. We had only a couple of days to scout around on this first trip and while we didn't succeed in finding *Xanthocyparis*, we did find nice plants of *Amentotaxus hatuyenensis* which was really an even greater find as there are thought to be only 250 or so mature specimens existing in the wild. Sadly the *Amentotaxus* had no seed on them at the time, but we had now caught a glimpse of the exciting plants we might find in the daunting limestone spires where these and other rarities grew. Our time to explore was very short on this trip, but we would be back.

We made another trip back to this area in 2013, this time with Andrew Bunting joining Dan, Ozzie and I. Today there is a decent highway that goes from Hanoi up to Ha Giang which is about an 8-hour drive,

but the road had not yet been built at the time of this trip and getting there was much more difficult. We started our trip by catching the night train on the outskirts of Hanoi at 9 pm. The four of us jammed ourselves and all of our gear into a sleeper car with two bunkbeds, had a few beers and tried to let the clickity-clack of the train put us to sleep as it meandered north. When the train rolled into the station at 4:30 am, someone walked through banging on every door letting us know it was time to wake up and get out. We had a day to recover in the mountain town of Sapa before we piled into the SUV and began our 12-hour drive to the village of Ha Giang. Andrew turned out to be our good luck charm as we had amazing weather and wonder-



Remote village on the valley floor

ful collections on this outing. The only hiccup was getting unbelievably lost while hiking for 2 ¹/₂ days and having a search party called out to look for us, but all's well that ends well.

This time we were really able to sink our teeth in to the area by taking very long day trips in different directions which allowed us to get a much better feel for the area. One glorious day in particular will always stand out in my mind. We had started early and began hiking towards the mountains first through rocky fields and we gradually began to climb up into the sharp limestone. Our goal that day was the same as it had been several years ago when we had come to Ha Giang the first time, to find



Begonia sp

Xanthocyparis vietnamensis. As soon as we began to climb, we started to see interesting plants. Begonias, Arisaemas, Aucubas, Amentotaxus, Podocarpus, Tsuga dotted the hillside, but still no Xanthocyparis. By noon we were getting hungry and ready to take a break. Dan suggested we climb to a slightly higher vantage point for a breeze, so one at a time we all scurried up a small, flat topped hill to have lunch. I was last and by the time I had reached the top and regained my footing, the rest of the crew had scattered in different directions examining the diversity perched atop this volcano-like hill. Andrew was studying a bizarre looking Mahonia, Dan had found a huge leaved Aucuba, but Oz-

zie had found the real prize...Xanthocyparis. It was a scraggly, Charlie Brown Christmas Tree sort of

specimen, but there it was exhibiting both mature and juvenile foliage on the same plant which made it pretty easy to identify even though it was not the majestic tree we were all imagining. We were ecstatic. The next thirty minutes were spent creating a photo shoot around this tree while we quickly devoured our dried beef and an apple so we could continue the business of taking all of this in.

After lunch, we were on Cloud 9. We had been botanizing all morning which means we were moving very slowly, so in order to make it back out to the road before dark we needed to pick up the pace. We walked, talked and botanized for the next several



Amentotaxus hatuyensis

hours when we came upon the backside of a small village. As we walked down the trail, it lead us right through the middle of the village. We could hear a few people, but most had scattered out of sight except for one man and his grandson. Our guide explained to the man who we were and what we were doing. In true Vietnamese fashion, he invited us all to sit under the shade of his roof and have some of his finest homemade liquor. He pulled out a half dozen wooden stools that sat about 6" off the ground and we all sat while our guide spoke to the man. He told us that they had not seen white people in that area since the war, which is why everyone scattered when we arrived. As we sat



Gettting to know the locals

While I have been back to the Ha Giang area several times since 2013, it was a trip I took in November of 2019 with Peter Zale (Longwood Gardens) and Greg Paige (Bartlett Research Lab and Arboretum) where I truly began to appreciate the diversity found on the porous, rocky limestone ridges in these mountains. Our goal this time was to explore the higher peaks in an area of Ha Giang province

and talked, a few more people began to emerge or at least peek through the cracks in the door to get a glimpse of us. After a few shots, we learned that we still had hours to go before we reached the paved road so we left our new friends and began our long walk out. The entire way back I remember thinking to myself how lucky I was to have had that experience and knowing that the career path I had chosen was the right one.



Three generations

known as Bai Dot Son. We met our local guides at the Conifer Conservation Center in a small village on the valley floor. Having been to this area a few times before, I knew what we were in for. The hiking in



this part of the world has nothing to do with meandering switchbacks, but rather grueling climbs that are the most direct routes from the bottom to the top. After all the locals here do not climb these mountains for fun and exercise, they do it to farm, forage and collect firewood. They do it to survive. We left on foot from the conservation center, walking down a narrow muddy path in between thatched roofs and mud walled homes until we fell into a single file line marching slowly up the hillside. After a few hours, we broke through the bamboo and corn fields

Conifer Conservation Headquarters

which gave way to the sharp,

blackened limestone wall that we had come to climb. Immediately we began to see fantastic Begonia species growing out of pockets in the rock. In some areas, the plants were so lush our porters began to pick and chew on the stems. These young men know the benefits, and dangers, of almost every plant in the jungle. They harvest mushrooms and



Begonia species

flowers from the forest floor for our meals and catch fish from the streams with ease using nothing more than a piece of a worm and a strand of fishing line. In the case of the Begonias, they were thirsty and the higher we climbed, the fewer streams there were to drink from. They knew the juicy stems of Begonias were a great way to quench ones' thirst, so they helped themselves.

It was painfully obvious that this little excursion was child's play to our porters, but it got them out of farming for the day and it was well worth the money they would earn dragging us up the mountain. Once we had regrouped and rehydrated we began again, but this time the going was a little steeper. We were making good time, but



Climbing to the ridge

about an hour after our first stop we began to feel a breeze. Since we were still well below the line at which poachers feel like the effort is too great for their reward we were seeing no plants of interest, but we were now high enough to see that there may be some wet weather in the distance. We stopped once more at a seemingly abandoned hut for a quick snack and to mentally prepare for the steep, sharp climb we had ahead of us. Now we had arrived at the base of the exposed karst, or limestone



Seemingly deserted hut

that makes up the ridgeline of these mountains. From here on up, the plants would become much more interesting because the hiking becomes much more difficult and dangerous. It is hard to describe what it is like climbing / hiking through these jagged rock mazes with vines and trees growing out of every crack and crevice. Truly, the hardest part is focusing on what you are doing with your hands and feet rather than becoming distracted by the fascinating plants that are tucked in all around you. In fact, if you take your eyes off of the person in front of you for just a minute or two to take a picture or adjust your pack they can easily be out of view causing you to lose your way.

We had just arrived at a high spot on the ridge where we could fan out and start to look closely at what was growing up there when a very loud rumble of thunder rolled overhead. The refreshing breeze we felt earlier had now changed to a stiff gust as the weather we saw in the distance an hour or so before had now caught up to us. We had literally spent less than 15 minutes at this spot we had worked so hard to get to and we were all now scrambling to figure out the best way down. As the lighting began to pop, our guides scurried quickly over the sharp rocks hopping from one to another leaving us far behind. The heavy rain began and we immediately realized we could not safely keep up with our guides. The rest of our group decided the safest thing to do would be to turn around and try to go back exactly the way we came up which sounds much easier than it turned out to be. Finally, after slipping and sliding down the now slick as glass limestone, all of us reconnected just before we arrived back at an abandoned hut we had passed earlier on our assent. We were covered in mud and certainly smelled worse than we looked, but we all piled into the dark, smoky shack to try and escape the downpour and have a bite to eat. I soon realized that there was an extra person sitting in our crowd. It turns out someone lived in this dingy little hut after all and we had barged right in on him, but for some reason he was grinning from ear to ear. Once the rain stopped and we had begun walking back down the mountain, our guide explained to me that the man in the shack was born deaf and at a very young age was basically banished by his village to the remote mountains so as not to be a burden on anyone. No one EVER goes to see him and most avoid that area because of him. He was so excited we had stopped that he began to cry when we had to leave.

Having finished our time in the north, the next day we began the long drive back to Hanoi. While there we would spend a few days processing, packaging, labeling and getting permits to export the



Khang Nguyen, Greg Paige, Peter Zale, Scott McMahan

material we had collected. Peter, Greg and I also had lunch again with our friends from the Fauna and Flora, Int. (FFI) office in Hanoi. We had a wonderful meeting where we were able to discuss what we had seen while working in Ha Giang as well as to make tentative plans for future work together. In the coming years we hope to be able to work more with FFI and the Vietnam Academy of Science and Technology to create a conservation program focused on field work, in situ conservation and seed storage of the rare and endangered Conifers, Magnolias, Orchids and Lilium species that call northern Vietnam home. 🐝



December 28, 2021 bearded iris ready to open. Chapel Hill



Seed Germination Tips

by Alan Bradshaw

Alan Bradshaw is the longtime proprietor of Alplains, a seed company that specializes in western U.S. flora, as well as seed from Japan, the European Alps, and other locations. Examine his website at www.alplains.com for his seed offerings and additional articles on seed culture and other topics. You can also request a catalog. Alan grows on a commercial scale, but most of his suggestions are perfectly adaptable to the average hobbyist. Consult his bibliography of seed growing for additional information sources.

Introduction: Why start plants from seed? Aside from the enormous satisfaction of seeing young plants develop to maturity, many more plants can be grown from seed than from practically any other method such as taking cuttings or splitting bulbs, etc. The possible exception is tissue culture, but this technique is beyond the typical hobbyist. Often, growing from seed is the *only* way to obtain valuable plants. Besides, seed-grown plants are genetically different individuals and thus can set more seed, unlike clonally-propagated plants.

Germination failure often lies in the grower not knowing the exact requirements for a particular species and most seed lists don't give a clue how to sprout their seeds. Here at ALPLAINS, we constantly run germination tests on the seed we offer and distill that knowledge into codes that accompany every seed packet. Many other people and agencies also run germination tests and publish their results in various books, pamphlets, and websites, etc. which you are invited to study. Some of these are highly technical and may discourage the novice from getting started. If you are reluctant to grow plants from seed, feeling it seems too complicated or involved, then the goal of this article is to simplify seed-sprouting enough to give you the confidence to succeed.

Using only two basic techniques, called stratification and scarification, and various combinations thereof, you can sprout over 95% of seeds. These techniques apply just as well to Asian, European, and other seeds found on seed lists from the UK, Czech Republic, and Japan. There are plenty of challenging cases, to be sure, but just a little knowledge will allow you too sprout most seeds and greatly increase the variety of plants growing in your garden.

Sowing the Seed: Before discussing the techniques, you need to select a way to sow the seeds. Most hobbyists and commercial nurserymen have their favorite sowing medium/potting system. What's important is to sow seed indoors in a sterile medium in a protected area – sowing outdoors directly into the garden invites disappointment due to damage from insects, slugs, rot, and frost. It's true seeds sprout in their native habitat just fine, but nature produces seed in vast numbers in the hope that a few seedlings will survive to adulthood. We are more interested in obtaining the highest germination rate from our little seed packets. I use MetroMix 350, which consists of spagnum peat, vermiculite, and a wetting agent. This sterile material will absorb moisture even when bone dry. I mix about four parts of the medium with one-part fine perlite. I used to sow in obsolete 7 ½" x 5 ½" Styrofoam flats, but now I use 4" square plastic pots,fifteen of which fit in matching trays. I also use only 0.7mm pencil to mark the labels – the ink in those "permanent" markers fades after a year more or less.

Do you sow seeds on top or cover them? Many seeds require light to germinate, but most others don't care, and very few actually require darkness. I always sow on the surface, except for large seed like *Ipomoea, Paeonia, Sophora, Amsonia*, etc. Flat seed *like Asclepias, Yucca*, and *Agave* are best inserted edge-wise into the mix. Some growers apply a thin layer of very fine granite sand on top to discourage algal growth ad stabilize small seedlings, but I don't bother. You can always add more mix to stabilize spindly seedlings if necessary. I keep the flats or trays in 4' x 4' wooden "warm boxes" which have plastic roll-covers to keep moisture in. Heating cables provide bottom heat, which suffuses through an inch-thick layer of silica sand (30 sieve). Over each box is suspended a bank of five 4' fluorescent shop lights. Everybody develops their own system, but it's important to be able to control the temperature and light.

Basic seed germination falls into three categories:

No Pre-Treatment – the absence of the requirement for either basic technique: All seeds must absorb moisture before germination can succeed. Once accomplished, seed sprouts in a relatively short period (days or weeks) at room temperature. Seeds in this category have neither a hard seed coat nor a requirement for cold temperatures.

Stratification: After absorbing moisture, seeds in this category require one or more shifts in temperature for certain lengths of time. Dry seed cannot be stratified! After sowing seeds, **Ke**t the flat sit in the warm box for two or three days to allow the to absorb moisture. Then I wrap the flats in plastic and place them in a refrigerator I use solely for this purpose. Every week or so, I check the flats to see if any sprouts appear and return those to the warm box. Other species won't germinate while cold, so I return those flats to the warm box after a pre-determined length of time, where-upon sprouts appear a week or two later.

Some species require "warm" stratification, that is, being held at 70m degrees for a certain length of time, then subjected to cold. Yet other species (fewer yet, thankfully) require more than one cycle of temperature shifts, often referred to as "Oscillating Temperatures"" or "Outdoor Treatment".

Scarification: Seed sprouts only after the seed coat is nicked so water can enter the seed. Germination the follows either with no further treatment (usually) or requires stratification (rarely). Sandpaper (fine grit) is suitable for most cases by dragging the seed along until you see a color change when the endosperm is exposed.

Some seeds are encased in a water-resistant membrane and they can be easily removed by rubbing seeds between bare or leather-clad palms, revealing the often different looking seed inside. *Cas-tilleja, Chionophila*, and some *Penstemon* species are good examples of this type. Note these are all genera in the scrophulariaceae family.

Table of Genera by Category - families, genera, and species

1) <u>No Pre-Treatment</u>: Agastache, Agavaceae, Aioniopsis, Arbutus, Artemisia, Aster, Bouvardia, Buddleia, Calandrinia, Calylophus, Calyptridium, Centaurium, Cerastium, Chamaebatiaria, Chamaechaenactis, Chilopsis, Clementsia, Crassula, Delosperma, Dianthus, Dracocephalum, Dudleya, Enceliopsis, Ephedra, Erigeron, Haplopappus, Heuchera, Houstonia, Hymenoxys, Lepidium,

Leucophyllum, Ligularia, Mimulus, Monarda, Monardella, Oenothera, Origanum, Penstemon hallii, P. harbourii, P. Clutei, Petrophyton, Physaria, Potentilla, Ramonda, Salvia, Sedum, Silene, Talinum, Townsendia, Yucca, Zauschneria, Zinnia

2) <u>Stratification</u>: Abronia, Acaena, Adenophora, Aethionema, Akebia, Allium, Amsonia, Androcase, Anemone, Anemonopsis, Angelica, Antennaria, Apiaceae, Aquilegia, Arabis, Arctomecon, Arenaria, Argemone, Arisaema, Asarum, Asclepias, Asyneuma, Balsamorhiza, Berberis, Calochortus, Caltha, Camassia, Campanula, Cardiocrinum, most Cactaceae, Castilleja, Cercocarpus, Chanactis, Chimaphila, Chionophila, Claytonia, Clematis, Collomia, Corydalis, Cryptantha, Cusickiella, Cymopterus, Delphinium, Dicentra, Dodecatheon, Douglasia, Draba, Echinacea, Eriogonum, Eritrichum, Erysimum, Erythronium, Fraxinus, Fritillaria, Gentiana,, Gilia, Hulsea, Ipomopsis, Irodaceae, Kelseya, Leptodactylon, Lesquerella, Lewisia, Lilium, Linum, Mertensia, Paeonia, Parrya, most Penstemon spp., Phlox, Polemonium, Primula, Pulsatilla, Salvia, Saponaria, Saxifraga, Scutellaria, Stachys, Synthyris, Trollius, Veronica, Viola

3) <u>Scarification</u>: Amorpha, Arctostaphylos*, Astragalus, Baptisia, Caesalpinia, Callirhoe*, Caragana, Cassia, Ceanothus*, Cercis*, Dalea, Iliamna, Ipomoea, Lathyrus, Leucocrinum*, Lupinus, Spharalcea, Sophora, Oxytropis, Pelargonium, Trifolium (Note: an asterisk indicates the need for stratification as well)

Examining this matrix, some patterns begin to emerge: seeds that require stratification belong to hard-shelled families, such as *Convolvulacea, Fabaceae, Malvaceae*, and *Ericaceae*. These seeds are often as hard as small pea gravel.

Unfortunately, habitat is not an accurate predictor of seed germination type. The seeds of many alpine species come up easily with no pre-treatment, whereas many lowland species still need scarification. However, seeds of warm desert species generally sprout with no treatment, except perhaps scarification.

Other Techniques: If you are just beginning your adventures into the wonderful world of seed germination, I suggest you start with seed requiring no pre-treatment to gain confidence and to increase your skill in growing on the resultant seedlings into mature plants. Naturally, as your interest grows, you may want to learn about other techniques in seed germination to handle more challenging cases. Probably the most useful of the minor techniques is: Gibberellic Acid (GA3):

Much has been written about this growth hormone. Most seed does NOT require treatment with this chemical and its use only results in dead seed or weak, spindly seedlings which quickly rot. The seed of some cacti, rosulate and sagebrush violets, *Glaucidium, Aquilegia jonesii*, and other calciphiles do indeed benefit from GA3 treatment, but if you are working on these examples, you have probably reached a level of sophistication that will help you achieve success. Since I have often been asked how to use GA3, I will outline my procedure here.

First, the seeds to be treated must absorb a solution of GA3. I never pre-mix GA3 with water because it does not keep long. Solid (powdered) GA3 keeps indefinitely and I mix it with water on the spot when needed. I use small glass 2 cc (cubic centimeter) vials (about an inch tall) with tight-fitting lids. I get these by the hundred, including the powdered GA3, from my local chemical supply house. I made a rack to hold the vials from a piece of particle board shelving by



drilling a matrix of ¹/2" deep holes on 2-inch centers. Masking tape between the rows allows for easy labeling. Every vial gets its own batch of seed to be treated and I then add an amount of GA3 that fits on the tip of a small chemist's spatula (equal to about several grains of salt). Using a dropper, I add warm water to half-fill the vials and let them stand overnight in a warm place. By the next day, the water will have absorbed the GA3 and the seeds will have absorbed the solution. It can stand for another day, but not after that, since rot usually sets in. Each vial then needs to be flushed out into a beaker and sown. Swirling the beaker while dumping the seed/solution mix onto the sowing medium takes some practice to equally distribute the seeds, but is the fastest way to complete the chore. The seeds can be drained and dried *briefly*, but must be sown and watered immediately. The flats are then ready for further treatment (stratification). Using GA3, close to 100% germination results on *Viola beckwithii, V. trinervata*, and other sagebrush violets. Dry storage of some seed types (especially cacti) actually increases germination yield and decreases the necessity for GA3 because germination inhibitors are destroyed as the seed ages. For instance, after two years of dry storage, *Maibuenia poepiggii* seed sprouts in a few days without the need for GA3.

More information:

 Deno, Norman. Seed Germination Theory and Practice. State College, Penn: self-published, 1993.*
Emery, Dara E. Seed Propagation of Native California Plants. Santa Barbara, Cal: Santa Barbara Botanic Garden, 1988.

3) Loewer, H. Peter. Seeds, The Definitive Guide to Growing, History, and Lore. New York:Macmillan. 1995.

4) ARGS/Denver Botanic Garden. Rocky Mountain Alpines: Choice Rock Garden Plants of the Rocky Mountains in the Wild and in Your Garden. Portland, Or: Timber Press, 1986.

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*Editor's note: Seed Germination Theory and Practice was published privately by Professor Deno. He has now retired (at the age of 89!), so the book and supplements can no longer be obtained direct from him. Go to: gardenfundmentals.com/seed-germination-dr-deno/ to download the free pdf files of the original publications and the second and third edition supplements. [Update: Norman Deno, a professor of chemistry, died in Pennsylvania a few years ago.]

NARGS SEMINAR available online January 15, 2022



Use this link to buy a ticket:

https://www.nargs.org/nargsrocks-succulents-buy-ticket



Phase Two of the 2021 NARGS SeedEx



SeedEx Volunteers Come Through Again!

Let's express our appreciation to those folks who volunteered to package seeds for this year's NARGS SeedsEx.

> Anna Berry Cyndy Cromwell Vivian Finkelstein Marilyn Golightly Jim Hollister Amelia Lane Elsa Liner Ruth Little Laura Marx Marlyn Miller Judy Simpson Wayne Stephens Marian Stephenson Char Thomann Bobby Ward



All done! About 156 seed packets ready to be sent to Phase3 of the SeedEx—the fulfillment group.

Join us next time around!



A Perfect Rock Garden Gem: Escobaria leei

by Panayoti Kelaidis

There are those who say cacti don't belong in rock gardens. Those who say that have obviously not traveled the North American West where countless outcrops are adorned with cacti. The mountain ball cactus (*Pediocactus simpsonii*) rarely grows below a mile in elevation, and grizzly bear cacti (*Opuntia erinacea v. ursina*) hob-nob with the oldest Bristlecones in the White Mountains at timberline. And let's not even talk about the legions of alpine cacti that grow so abundantly for thousands of miles along the spine of the Andes in South America. Perhaps the clincher in the deal has to be *Escobaria leei*—surely the most irresistible, utterly charming tiny morsel of a cactus any rock gardener worth their salt ought to covet!

From the photos I've included you can see a black, high-fired ceramic container that Sandy Snyder (a talented rock gardener in Littleton, Colorado) planted with this cactus in 2014. You can see the "after" picture of the same con-



jected to the full force of Colorado's changeable and pretty vicious climate (occasional highs over 100F in the summer and lows down to -20F in winter) and it coasts through just fine. Full disclosure: once Sandy got settled in her new home, the container and cactus went back to her!

tainer six years later in full bloom: it won top honors at a cactus show—and everyone who sees it wants it! I was apparently so unsubtle in my admiration of this that Sandy gave that container to me in 2019 when she was downsizing and moving to a new house. That container, by the way, resides outside where it's sub-





I wrote a blog post about this cactus almost a decade ago that shows another champion specimen you might enjoy checking out (https://prairiebreak.blogspot.com/2012/07/all-americantreasure-for-4th-of.html).

The taxonomic status of Lee's cactus is a bit of a botanical game of mirrors: it was long known as *Coryphantha leei*. To the dismay of gardeners, the genus *Escobaria* was segregated from *Coryphantha* based on distinct morphological criteria. Recent DNA studies suggest merging the genera again [you may choose to groan or smirk at this]. Lee's cactus has been subsumed by the rare, and slightly larger, *Escobaria sneedii* by some botanists—an even rarer taxon that grows on a nearby mountain range in New Mexico: they do have a strong resemblance...so *Escobaria sneedii var. leei* is understandably used by some gardeners. There are, however, taxonomists who've lumped both of these with a half dozen or other species together (including *E. duncanii, E. orcuttii, E. albicolumnaria*). Theless said about that the better! For the time being, it's pretty

widely known and loved as *Escobaria leei*. Since it has a distinct range and distinct morphology (two criteria that define a species) let's stick with that name for the nonce!



In the wild, *Esobaria leei* is restricted to 15 sites in the Guadalupe Mountains on the border of New Mexico and Texas (I believe largely within Carlsbad Caverns National Park). It grows at the edge of shallow limestone outcrops mostly on steep slopes in nature. Large parts of the Park where it grows have suffered forest fires in recent years: I doubt these have affected Lees' cactus—which grows so low in open sites. I could be wrong, there. It may have escaped fires, but how will it cope with climate change?

If you look carefully at the picture of seedlings grown by Kelly Grummons (coldhardycactus.com) you will see the fantastic variation in size and color that exists in cultivation. Kelly has selected more minia-

ture forms as well, which he offers (from time to time) on his website. *E. leei* is grown and sold by many other nurseries across the USA and Europe. I make a point of sending large quantities of its abundantly produced seed to

the NARGS seed exchange: it's surprisingly easy to grow from seed under lights at home.

Fortunately, this cactus tolerates much cooler conditions and colder climates—and is being grown by hundreds if not thousands of gardeners around the world. It would be tragic if one day this and so many other plants were to only persist in gardens, due to destruction of their natural habitat, or other unspeakable agencies.



NARGS will be hosting a series of three Webinars over the next few months. The importance and contribution of succulents to rock gardens will be a focus of the second Webinar this winter on January 15, hosted by Rod Haenni, a long-time member of the Rocky Mountain Chapter of NARGS and vice president of the Cactus and Succulent Society of America. Six speakers will explore the use of succulents from all corners of North America. I will be surprised if this plant doesn't crop up at least once during that Webinar! Do check the NARGS website for more information. One more great reason to join NARGS!



NARGS Piedmont Chapter Meeting

Saturday, January 15, 2022 (via Zoom and in person)

> Tim Alderton Raleigh, N.C.

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To get in touch with questions and comments about our chapter or the newsletter, please email us at piedchapter /AT/ gmail.com

Message from the Chair Cyndy Cromwell

I'm writing on a brisk, sunny morning, perfect for packing the last of the seeds for the NARGS Seedex to be sent out for distribution. Fifteen volunteers worked from home this year and did a fantastic job. This wonderful program could not happen without the meticulous volunteers from our chapter and others – thank you so much! Next year, I hope we can work as a group again - it's a lot of fun, and newbies quickly get the hang of sorting and packing.

This January 15 marks the beginning of in person meetings again, but you will still have the option of attending online. Either way, you won't want to miss this meeting, featuring Tim Alderton's report on the wonderful native plants he found in the Durango Colorado area, plus door prize coupons and plants.

Also on January 15, NARGS presents *Succulents* on the Rocks, an online webinar about rock gardening with succulents. There is a conflict, but don't worry! You can attend our meeting, then catch the remainder of the webinar, or view it all later. Videos of any presentations you miss, or want to see again, will be available to registrants to view at their convenience. Check the website, nargs.org, for details on registration. It's going to be a good one! \ll

Notice of Possible Change

While we hope to go ahead with our in person meetings, there is always a possibility that JCRA may close facilities in view of the current covid situation. If this happens, members will be notified as soon as possible, and we will still have the meeting online. For up-to-date information on facility closings, please check the JCRA website jcra.ncsu.edu