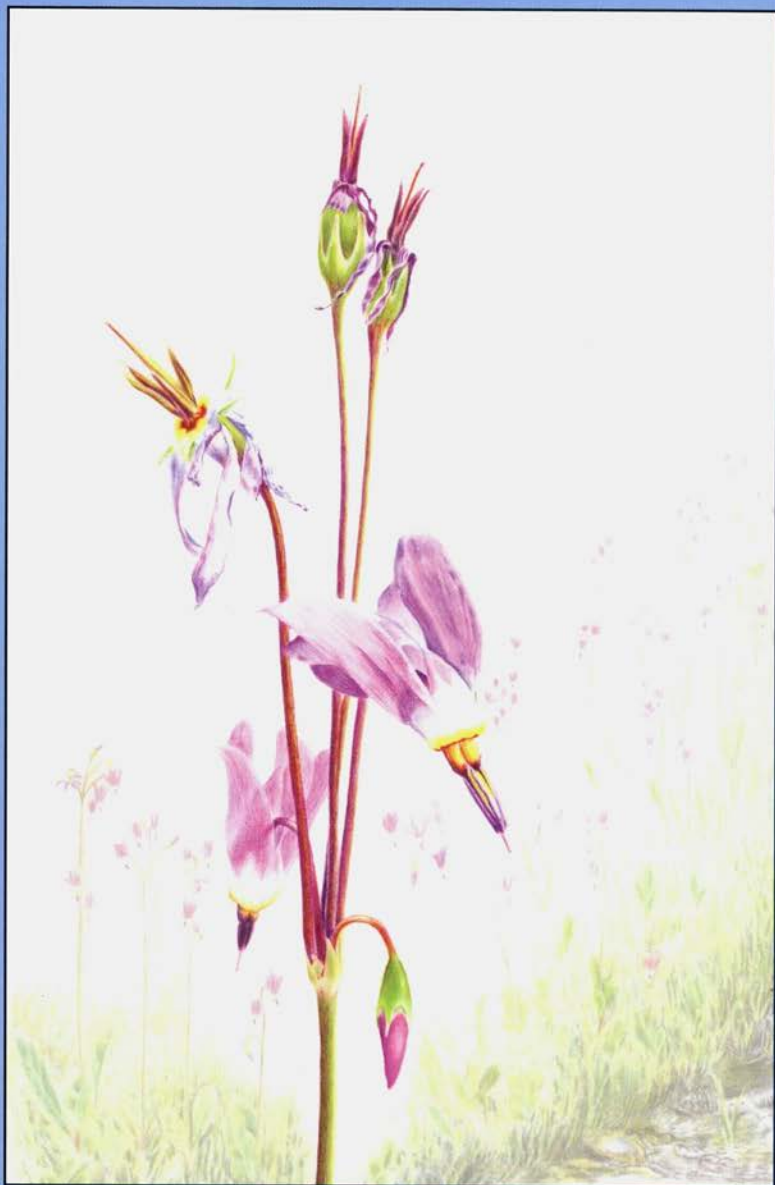


# ROCK GARDEN *Quarterly*



Volume 66 Number 2

Spring 2008

Front cover: *Dodecatheon pulchellum*. Colored pencil drawing by Karen Cleaver, Littleton, Colorado.

Back cover: *Gentiana angustifolia* and *Haberlea rhodopensis* 'Virginalis.' Photo by Esther Wrightman.

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# ROCK GARDEN

## *Quarterly*

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BULLETIN OF THE NORTH AMERICAN ROCK GARDEN SOCIETY

Volume 66 Number 2      Spring 2008

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## From the Editor

This spring 2008 issue comes to you with some effort on the part of the editor and a faithful core of contributors, as the well of material was threatening to run dry around the turn of the year. I've made good my threat to inflict a lot of my own prose on readers who don't feel moved to contribute, and will repeat the usual suggestion that if you don't like that, send in something else.

Thank goodness for the annual Photo Contest, which has provided some beautiful images for this and future issues. And thanks for Alpine-L, the Internet rock gardening forum, whose members helped produce the article "Three Keepers."

Some of the photos illustrating articles in this issue come from digital collections sent to the *Quarterly* in past years by friends and entrants in the Photo Contest. I've been cataloging these so I can find illustrations when authors can't provide them. The photo archive here now exceeds 150 CDs with contents ranging from two or three images to several hundred. These are handled and stored carefully and I hope they'll last well past my term as editor, providing a resource for as many years as CDs can remain uncorrupted. This brings me to another suggestion:

**Will you share your photos with us?** Several NARGS members have sent in generous sets of digital photos for the archive, not in connection with the contest or specific articles but as a source to be tapped as needed. Special thanks to Zdenek Rehaček for photos in this issue! Photographs published in the *Quarterly* are credited, and I do not give permission for their reproduction elsewhere (I refer inquiries to the photographers). They won't show up on websites or in books. The photographer retains copyright; the copyright notice that appears inside our front cover refers to the "compilation," or totality of the issue, not to individual contributions.

If you'd like to help out, you can contact me <janemcgary@earthlink.net> for details, or just send your CD to me at the address given on the last page of this issue. Files should be labeled with the subject of the image and should be in a standard format, preferably jpg or tiff.

In addition to plant and garden photos, we would be grateful for photos showing NARGS activities and personages, clearly identified. Notes can be included in a text document on the CD. Photos documenting gardens will be an invaluable source, as will those recording unusual species seen on your travels.

Line artwork is also valuable. This issue includes several drawings by Doretta Klaber, an early member of the Society and author of several books, including *Rock Garden Plants* (1959), for which she did this artwork. The drawings were preserved and then donated for our use by another longtime NARGS activist, Anita Kistler.

*Thanks to all of you who make this journal possible.*

# When a Shooting Star Is Really a Primrose

James L. Reveal

In my heart two things are true: shooting stars will always belong to *Dodecatheon*, and, regretfully, all of them are actually members of the genus *Primula*. There is no question that *Dodecatheon*, the symbol of the North American Rock Garden Society, is a distinct and natural group from both evolutionary and aesthetic points of view, and yet it is a group that is not only a part of *Primula* but deeply embedded in its evolutionary history. How we know this, and why *Dodecatheon* is now a mere taxonomic section of one of the subgenera of *Primula*, is the tale related here.

Fortunately, we have someone to blame: the bees. The fault lies completely and totally with the bees, the pollinators of *Dodecatheon*, whose activities over time stimulated the evolution of swept-back petals and sepals, a long, protruding, connate-anther-surrounded style, and a compact, capitate stigma, all with elegantly placed footholds perfectly formed for a specialized form of bee pollination—or, to put it more succinctly, a flower that resembles a shooting star. Add to this polyploidy, that fundamental modification of chromosome numbers that is so prevalent in the plant world, and one has a new group.

In this case, the lowly taxonomist is innocent, so there is no need to shoot the messenger!

I can point fingers, of course, and in this case the evil scientist is my colleague Austin Mast, who looked into the evolutionary history of *Primula* and related genera. What he found was that recognition of *Dodecatheon* created a paraphyletic *Primula* (Källersjö et al. 2000; A. R. Mast et al. 2001, 2004; L. Martins et al. 2003). What is meant by “paraphyletic”? This adjective describes the situation occurring when recognition of a genus divides another genus into two parts so that one can have one genus or three genera, but not two. Unfortunately, *Dodecatheon* falls within *Primula* subgenus *Auriculastrum* and has been found to be closest to the Sierra Nevada endemic *P. suffrutescens*, the only species of sect. *Suffrutescens*. The two share the feature of involute leaf vernation, a fancy term meaning that the leaves are rolled inward as they emerge from the bud. Obviously, this is not something that one sees all the time or even notices, but it is a fundamental means of leaf presentation and is rare in *Primula* except for subgenus *Auriculastrum*.

Another feature which cannot be seen, but is important in the evolutionary history of a group, is its basic chromosome number. In *Primula* this is  $x = 11$ , while in *Dodecatheon* it is  $x = 22$ . In other words, not only is *Primula* the basal group from which *Dodecatheon* evolved, but the latter's isolation from most of *Primula* was reinforced by a doubling of its chromosomes, which more or less instantly isolated *Dodecatheon* from *Primula*, allowing each to evolve with essentially no mutual genetic influence. This resulted in a monophyletic *Dodecatheon* (i.e., a group that arose from a single ancestral group), so that while its point of origin in the plant world is not in doubt, what happened after that chromosomal isolation meant that *Dodecatheon*—and, as we shall see, its nearest relatives long associated with *Primula*—could evolve their own specialized morphological features without being swamped continually by new and novel genes from *Primula*.

## The Evolution of a New Pollination Strategy

The morphological key to the differentiation of *Dodecatheon* from *Primula* was the evolution of bee-buzz-pollinated flowers (similar to those found in *Solanum*), coupled with a homostylous rather than the heterostylous floral condition typical of most species in *Primula* (Mast et al. 2004). This type of pollination typically occurs in “upside-down” flowers where the anthers and stigmas point downward and pollen release from the anther is accomplished mechanically through the vibration of the anthers caused by rapid movement of a bee's wings. In this case one can actually hear the beating of the wings and even observe pollen being shaken from the anthers onto the bee's body. Once finished with one flower, a bee may clean itself by removing pollen and storing it, but only rarely is the process so successful that there is not some pollen remaining on the bee; or it may simply forgo the grooming process and go to another flower. When it lands on another flower and positions itself to “buzz”—and thus vibrate more pollen from the anthers—this act of positioning itself allows pollen to be transferred from the bee to the stigma of the new flower. And voilà, successful cross-pollination!

It is impossible with the evidence now at hand to know if the direct ancestors of modern *Dodecatheon*, a now extinct element that in a modern sense would be identifiable as *Primula*, first became isolated as a result of a change in their chromosome number—that is, due to polyploidy—or as the result of a new and specialized type of pollinator association. But we can speculate with some supporting data.

Almost without exception, species of *Primula* ensure outcrossing by being heterostylous (Mast & Conti 2006)—that is, the relative position of the stamen to the pistil differs from plant to plant in a population. One plant will have flowers with a long, usually exserted style and stigma positioned well above the anthers, whereas another plant of the same species will have flowers with long, usually exserted anthers and the stigma positioned well below the anthers, inside the floral tube. In this way, self-pollination generally can be avoided because, almost always, two different plants contribute genes to the offspring.

In *Dodecatheon*, the strategy for promoting cross-pollination was modified such that a pollinator was required for pollen removal in a fashion that did not necessarily guarantee that there would be gene exchange between two different plants. In other words, a bee could move from one flower to the next on the same plant in *Dodecatheon* with the possibility of a successful pollination event, but in *Primula* it was necessary for the insect to go from one plant to the next for pollination to occur; not only that, but the next plant had to have its anthers and stigma positioned differently.

The key to success in *Dodecatheon*'s strategy for outcrossing was the timing of an individual flower's receptiveness for pollination. In many species of *Primula*, several flowers on a single plant present their pollen or are receptive for pollination at the same time. If an insect visits different flowers of a single plant with exerted stamens, all that can be accomplished is that pollen will be gathered. By repeating the same process, but with the relative positions of the anthers and stigma reversed, the same insect can deliver pollen to the elevated stigma. Of course, the system is not fool-proof. Pollen can be accidentally scattered from an anther onto its own stigma when the anthers are positioned above the stigma, but it is less likely that pollen will be placed on the flower's own stigma from anthers positioned well within the floral tube. To reduce the likelihood of self-pollination even more, many species of *Primula* have evolved self-incompatibility barriers so that seeds resulting from self-pollination will not germinate, thus requiring successful cross-pollination for seed set.

The likelihood of an insect's visiting numerous flowers of a single *Dodecatheon* plant is lessened by having fewer flowers producing pollen or having their stigmas receptive all at the same time. It is true that many flowers may be present at one time on a plant—occasionally 20 or more—but of that number, the “presentation mode” at any given time means that only a few flowers are primed perfectly for pollination. For example, flowers may be pointing upward or to the side, not downward, so that the orientation of the flower makes buzz pollination impossible or difficult. Some flowers may already have been pollinated, with a resulting change in the key markers on the flower (probably the wavy band of yellow where the petals recurve) that can be observed by bees, though not seen by humans, signaling the bee not to visit. All of this results in bees visiting the same plant time after time over a period of days or even weeks. The advantage of this strategy is that a given plant is providing a continuous source of reward to ensure repeat visits to a small, often highly restricted population of plants in marginal ecological settings where a combination of unfortunate events (cold, predation, etc.) might result in the loss of maturing fruits.

Along with the evolution of buzz pollination in *Dodecatheon*, which was coupled with the development of connate anthers and broad filament connectives, came the adaptation in many species of *Dodecatheon* of a rugose anther connective, a roughened surface on that portion of the filament between the two anther thecae (pollen sacs) that allow pollinators to grasp the flower firmly. In general, anthers with a rugose connective are larger than those with a smooth connective, and the anthers of *Dodecatheon* are always considerably larger than those of any

*Primula*. Also related to these changes was the shift from locucidal to poricidal anthers (L. D. Harder and R. M. R. Barclay 1994), in which pollen grains are released through pores at the tips of the anther—a feature not found in the anthers of *Primula*, which open by longitudinal slits along the length of the thecae.

Another interesting feature in this story is the shared color of the petals among *Dodecatheon* and its allied species of *Primula*. The color shift from the yellows of many Old World primroses (which number close to 400 species) to the purplish reds of several of the New World primroses and shooting stars means that this modification occurred prior to the differentiation of *Dodecatheon* from most members of *Primula*. The number of species of *Dodecatheon* and native New World *Primula* is about the same: 17 in the former and about 23 in the latter. From this it is clear that the vast majority of our American species can be traced to just a handful of introductions from Asia. In the case of subgenus *Auriculastrum*, many of the species have purple flowers, but only a few have exactly the same shades of floral color as are found in most species of *Dodecatheon*.

## Modern Classification Responds to History

Given all of these distinctive floral differences between *Primula* and *Dodecatheon*, why then should *Dodecatheon* be submerged into *Primula*? What is wrong with recognizing *Dodecatheon* as a highly specialized genus for which we clearly know and understand its evolutionary history?

Taxonomically, nothing; but evolutionarily, there are problems that extend beyond the convenience of tradition and mere generic terminology. There is no modern group of plants or animals that did not evolve from another group that, in some cases, is itself still extant. This is not confined merely to different species of a genus or even related genera in a family, but likely occurs at almost every taxonomic rank. It follows that an advanced group has evolved from a less advanced group.

In their detailed study of *Primula*, Trift, Källersjö and Anderberg (2002) found that four long-recognized genera fell well within *Primula*, meaning that this genus has undergone repeated episodes of differentiation of specialized terminal groups that were subsequently distinguished as different genera. Three of these are found in the Old World: *Cortusa*, *Sredinskyia*, and *Dionysia*. *Dodecatheon* is the sole New World derivative (Richards 2003). *Cortusa* is a genus of eight species found mainly in the mountains from central Europe to northern Asia, with *C. matthioli* commonly cultivated; *Cortusa* is embedded in subg. *Auganthus*. *Sredinskyia*, a monospecific genus long included within *Primula*, also is found in cultivation; *S. grandis* is endemic to the Caucasus. Both *Cortusa* and *Sredinskyia* have their stigmas positioned well above the anthers, just like *Dodecatheon*, and buzz-pollination is the norm in *Cortusa*. *Dionysia* is composed of some 50 species found mainly in arid places in the Middle East from Turkey to Pakistan (Trift et al. 2004); molecular evidence suggests that it probably evolved from the subgenus *Sphondylia*. *Dionysias* are cultivated by many enthusiasts, and like *Primula*



their flowers are heterostylous. Of the five genera postulated by Wendelbo (1961) as being most closely allied to *Primula*, only *Hottonia* now remains generically distinct from *Primula* (Anderberg 2004). The genus *Kaufmannia*, another genus of Central Asia, is clearly allied to *Cortusa* and it too likely evolved from *Primula*; it is composed of only one or two species.

As we can see, therefore, adaptive radiation, so common at the species level, can also occur at the genus level. This is certainly the case in *Dodecatheon*, a relatively recent, highly specialized evolutionary group that evolved directly from a more primitive, less specialized *Primula*.

Distinguishing such groups taxonomically is easy because they inevitably have evolved a series of profoundly distinct morphological features that readily separate them from the parent group, with the resulting new evolutionary unit (e.g., *Dodecatheon*) almost instantly undergoing rapid adaptive evolution entirely independently from its parent group (Richards 2002). In the case of *Dodecatheon*, the adaptation to buzz-pollination was absolute and was achieved rapidly, with a minimum of genetic change relative to its parent group. When we look at the overall genetic similarities between *Primula* sect. *Dodecatheon* and *Primula* sect. *Suffrutescens*, the number of changes even at the individual gene level is minimal. By shifting to a new pollination strategy, *Dodecatheon* effectively removed any gene exchange between itself and *Primula*, and thus genetic isolation between the two was no longer necessary for evolutionary differentiation to proceed.

There is less genetic difference between *Dodecatheon* and its nearest relative in *Primula* than there is between different subgenera in *Primula*. In fact, the generic differences between *P. suffrutescens* and *Dodecatheon* are fewer than those between some species groups within the same taxonomic section of some Old World subgenera now assigned to *Primula* where separation of the species has had a far longer evolutionary history than the entire existence of *Dodecatheon*.

## An American Innovation

What caused *Dodecatheon* to come into existence in the New World? Its development likely can be traced to events associated with the introduction of *Primula* itself. In the Old World, members of *Primula* have occupied successfully most of the available ecological niches for such plants. One can find primulas in a multitude of mainly moist habitats, with a proliferation of species occupying the microhabitats within that main theme. In the Old World there was also a long and well-established history of a plant-pollinator relationship, so that a population just becoming established in a new niche was almost certainly assured to have an effective pollinator available.

Think of it this way: species of *Primula* evolved because of edaphic (soil-related) and spatial (geographical) isolation coupled with shifts in phenology (the inter-relationship of climate and living organisms) that allow them to survive. With the introduction of *Primula* into the New World, only a tiny portion of its genetic diversity arrived and likely its pollinators too were rare. New strategies were

required for survival. Moving too far from its basic requirement for moist places was not possible. Some of the species of *Primula* that entered the North American continent were circumpolar in their distribution and as such were subject to little or no structural or even evolutionary change. Those that migrated southward in the mountains, perhaps even in long-distant dispersal events, surely occupied sites with an even more reduced pollinator base. For *Dodecatheon* to be successful, a shift in the mode of pollination was fundamental, leaving the established pollinators for those species of *Primula* that survived, as primroses, in the New World.

Another way to think of this is that in Old World primroses the relationship between a plant and its pollinator was set so that whenever there was a shift in one it was matched by a modification in the other. This type of co-evolution is fairly common. But when the plant undergoes a major change (such as loss of its primary pollinator), then rapid evolution of plant structure must occur that allows the new (and likely only available) pollinator to be successful, or the plant will go extinct. In the case of *Dodecatheon* it is likely that the driving force was the pollinator that forced the sequential evolution of the plant to fit the pollinator's already established method of pollination. Again, blame the bee, for likely the bee was already present, and the newly established, New World plant quickly adapted itself to fit the requirements of that pollinator. This is **sequential evolution**, a fancy term for the hypothesis that the plant follows the lead of its available pollinator. To put it bluntly, the evolutionary success of the pollinator was dependent upon this plant, but the success of the plant was absolutely dependent upon its establishing an evolutionary relationship that, through the act of pollination, would promote successful seed set and germination.

*Primula* subg. *Auriculastrum* is found in both the Old and New worlds. Including *Dodecatheon*, it is composed of six sections and nearly 50 species. Three of those sections are critical to our discussion. *Dodecatheon* is most closely allied to sect. *Suffrutescens*, a taxon consisting of a single species, *P. suffrutescens* (photo, p. 97), a trailing subshrub confined to the Sierra Nevada of California from near Lake Tahoe south to Mt. Whitney. Like *Dodecatheon*, *P. suffrutescens* has a base chromosome number of  $x = 22$ , suggesting that the origin of both sections (*Suffrutescens* and *Dodecatheon*) evolved from an ancestral group that probably was already a polyploid.

Allied to sect. *Suffrutescens* is sect. *Cuneifolia* with its two species, *Primula cuneifolia* and *P. nipponica*. As Richards (2003) states, this section ties the Old World sect. *Auriculata* to the New World sect. *Parryi*; the latter until recently generally thought to be the closest relative of *Dodecatheon* (Wendelbo 1961). Sect. *Parryi* is now defined as including five species, all confined to western North America: *P. parryi*, *P. angustifolia*, *P. rusbyi*, *P. cusickiana* (with three varieties), and *P. capillaris*. Again, we are dealing with a taxon with a base chromosome number of  $x = 22$ , suggesting that all three sections evolved after a fundamental polyploidy event that did not involve sect. *Auriculata* ( $x = 11$ ). Given the polyploid level of  $x = 11$  in the strictly Old World sections of subg. *Auriculastrum* (especially sect. *Auricula*) and elsewhere in the genus (Guggisberg et al. 2006), it seems likely that the change to  $x = 22$  was an independent New World event resulting in the now extinct progenitor of sections *Parryi*, *Suffrutescens* and *Dodecatheon*.

## The Molecular Evidence

All of this evolutionary change in the morphology of *Dodecatheon* is reflected in the recent molecular evidence derived from DNA studies of both chloroplast and nuclear genomes. The most detailed paper was published by Mast and his colleagues in 2004, when they examined the chloroplast DNA (cpDNA) of 16 of the 17 species of shooting star and compared them with representatives of all seven subgenera of primroses. Even within the subg. *Auriculastrum*, three of the four major sections of that subgenus were examined in detail by essentially studying all of the known species. Their study demonstrated that *Dodecatheon* was a strongly supported monophyletic group and was allied only to sect. *Suffrutescens*. These relationships are expressed in a percent of “bootstrap frequency,” a statistical method for ascertaining the reliability of one’s observations. In this case, a small sample of DNA of one species is compared statistically with similar samples from other species in an effort to determine the likelihood of the DNA being statistically the same. In the case of the 16 sampled species of *Dodecatheon*, the hypothesis that they formed a single group was supported by a bootstrap frequency of 97%, whereas when sect. *Dodecatheon* was compared with the one species (*P. suffrutescens*) of sect. *Suffrutescens*, the frequency was 100%. These are exceedingly high percentages for this type of study.

Martins and colleagues sampled only two nuclear ribosomal genes (rDNA), using representatives from five of the seven subgenera and a single species of *Dodecatheon*. Yet, here again, the association of *Dodecatheon* with subg. *Auriculastrum* had a bootstrap frequency of 100%.

Although only a few of the thousands of genes have been sampled, those that have been studied have proved to be informative about relationships among most groups of flowering plants, not just *Dodecatheon* and *Primula*. What this has demonstrated is where within the primroses the shooting stars had their origin. With this information, we can now better understand the morphology and speculate (as I have done here) on how this morphology changed, given our precise understanding of where, within *Primula*, *Dodecatheon* had its origin.

## The Taxonomists’ Choice

Given the evolutionary history of *Dodecatheon* as now understood, and the relatively little genetic change required for the formation of buzz-pollinated flowers coupled with a homostylous condition, one is faced with the question of how to deal with a paraphyletic *Primula* if *Dodecatheon* is retained as a distinct genus. In this case, it can be done in one of three ways. The first is to reduce *Dodecatheon* to synonymy within *Primula* and recognize that *Dodecatheon* only forms a monophyletic section within subg. *Auriculastrum*. Another option is to subdivide *Primula* into numerous small genera, with subg. *Auriculastrum* itself divided into six genera. The third option is to assign generic rank to each of the recognized subgenera of *Primula*. At least at this level, some generic names already exist with

*Primula*, *Dodecatheon*, and *Cortusa*—all Linnaean names dating from 1753. But, if we did this, *Dodecatheon* would become a genus of some 50 species found in both Eurasia and North America with the majority of those species being previously considered members of the genus *Primula*.

From these options, we chose the first: to transfer *Dodecatheon* to *Primula* (A. R. Mast and J. L. Reveal 2007), establish *Primula* sect. *Dodecatheon* within subg. *Auriculastrum*, and accept the principle that evolution as reflected in modern molecular studies trumps taxonomic tradition.

## Treatment in *Flora of North America*

But is this the final word? Not really. The forthcoming *Flora of North America* volume dealing with *Primulaceae* will recognize *Dodecatheon* (see <http://www.plantsystematics.org/reveal/pbio/fna/dodecatheon.html>), but only because a decision was made early in formatting the volume that *Dodecatheon* would be accepted. No doubt this will help perpetuate recognition of *Dodecatheon*. The name will long be with us, and arguments about its placement, both scientific and emotional, will continue well into the future. Furthermore, even though *Dionysia* clearly evolved from *Primula*, it will likely be some time before anyone is willing to reduce that important ornamental genus to synonymy under *Primula*. Emotions and tradition are always factors when humans are making taxonomic decisions.

Following is a brief list of species that will be treated in *Flora of North America*, with their ranges. For those wishing to assign the genus to *Primula* the appropriate combinations are noted.

***Dodecatheon conjugens*** Greene (*Primula conjugens* (Greene) Mast & Reveal) (photo, p. 97). Var. ***conjugens***: widely scattered east of the Cascade Ranges from northeastern California and northwestern Nevada northward through Oregon to Washington, eastward through central and northern Idaho to western Montana and northern Wyoming. Var. ***viscidum*** (Piper) H. Mason ex H. St. John (*Primula conjugens* var. *viscidum* (Piper) Mast & Reveal): southeastern British Columbia, southern Alberta and southwestern Saskatchewan south to eastern Washington, northern Idaho, and western Montana.

***Dodecatheon hendersonii*** A. Gray (*Primula hendersonii* (A. Gray) Mast & Reveal): southern Vancouver Island southward in the coastal ranges to west-central California and disjunct onto the San Bernardino Mountains of southern California, and in the Siskiyou Mountains and Sierra Nevada.

***Dodecatheon subalpinum*** Eastw. (*Primula subalpina* (Eastw.) Reveal & Mast): western slopes of the central and southern Sierra Nevada.

***Dodecatheon clevelandii*** Greene (*Primula clevelandii* (Greene) Mast & Reveal). Var. ***clevelandii***: Transverse and Peninsular ranges of southern California south in Baja California to the Sierra San Pedro Mártir, and along the coast to near El Rosario. Var. ***insulare*** (H. J. Thomps.) Reveal (*Primula clevelandii* var. *insularis* (H. J. Thomps.) Mast & Reveal): Monterey Co. to Santa Barbara Co., California, and on

the Channel Islands; disjunct near Ensenada, and on Guadalupe Island, Baja California, Mexico. Var. *gracile* (Greene) Reveal (*Primula clevelandii* var. *gracilis* (Greene) Mast & Reveal): coastal and western Transverse Ranges from San Francisco Co. to Ventura Co., California. Var. *patulum* (Kuntze) Reveal (*Primula clevelandii* var. *patula* (Kuntze) Mast & Reveal): central and northern California in the Central Valley, on the inner coastal ranges, and on the western foothills of the Sierra Nevada, disjunct to the Santa Monica Mountains, Los Angeles Co.

*Dodecatheon redolens* (H.M. Hall) H.J. Thomps. (*Primula fragrans* Mast & Reveal): Peninsular, Transverse and southern Sierra Nevada of California eastward across central Nevada to northeastern Nevada and west-central Utah.

*Dodecatheon jeffreyi* Van Houtte (*Primula jeffreyi* (Van Houtte) Mast & Reveal) (p. 97): northern and eastern California and western Nevada, northward through Oregon, Washington, and British Columbia to south-central Alaska, eastward to northeastern Oregon, central and northern Idaho, and western Montana with disjunct populations on the Olympic Peninsula of Washington and in Grand Teton National Park, Wyoming.

*Dodecatheon alpinum* (A. Gray) Greene (*Primula tetrandra* (Suksd. ex Greene) Mast & Reveal) (p. 97): San Jacinto Mountains, Transverse Ranges, Sierra Nevada, northern coastal ranges, and the Siskiyou Mountains of California, southwestern Oregon, and west-central Nevada, northward in the Cascade Ranges to south central Washington, and eastward to eastern Oregon, central and northern Nevada, northern and western Utah, and in north central Arizona.

*Dodecatheon frigidum* Cham. & Schltdl. (*Primula frigida* (Cham. & Schltdl.) Mast & Reveal): northern British Columbia, southern Northwest Territories and northwestern Saskatchewan, and Yukon westward across most of Alaska (except near the immediate southern coast and Aleutian Islands) to the Chukotsk Peninsula, Russian Far East.

*Dodecatheon dentatum* Hook. (*Primula latiloba* (A. Gray) Mast & Reveal): eastern slope of the Cascade Range from south-central British Columbia to central Washington, with disjunct populations in southwestern Washington, northeastern Oregon, and northern Idaho.

*Dodecatheon austrofrigidum* K.L. Chambers (*Primula austrofrigida* (K.L. Chambers) Mast & Reveal): southern Olympic Peninsula, Washington, and in northwestern Oregon.

*Dodecatheon utahense* (N.H. Holmgren) Reveal (*Primula utahensis* (N.H. Holmgren) Mast & Reveal): Salt Lake Co., Utah.

*Dodecatheon ellisiae* Standl. (*Primula standleyana* Mast & Reveal): mountains of west-central New Mexico and southeastern Arizona south to northern Chihuahua, Mexico.

*Dodecatheon pulchellum* (Raf.) Merr. (*Primula pauciflora* (Greene) Mast & Reveal) (p. 97). Var. *pulchellum*: widespread in western North America from southeastern Alaska and western Canada east to southeastern Manitoba south to northeastern California, northern and eastern Arizona, New Mexico, and northern Mexico with scattered populations in western North Dakota and in western Nebraska. Var. *zionense* (Eastw.) S.L. Welsh (*Primula pauciflora* var.

*zionensis* (Eastw.) Mast & Reveal): hanging gardens of north-central Arizona, southwestern Utah, eastern Utah and northwestern Colorado. Var. *monanthum* (Greene) B. Boivin (*Primula pauciflora* var. *monantha* (Greene) Mast & Reveal): northwestern California and southwestern Oregon, disjunct in northeastern Oregon, southeastern Washington, and central and southern Utah. Var. *macrocarpum* (A. Gray) Reveal (*Primula pauciflora* var. *macrocarpa* (A. Gray) Mast & Reveal): coastal and montane Alaska south through British Columbia and western Washington to western Oregon. Var. *shoshonense* (A. Nelson) Reveal (*Primula pauciflora* var. *shoshonensis* (A. Nelson) Mast & Reveal): desert areas from eastern California and southwestern Oregon eastward to southern Idaho and western Utah. Var. *distolum* Reveal (*Primula pauciflora* var. *distola* (Reveal) Mast & Reveal): Big Horn Mountains west to the Black Hills of northeastern Wyoming and adjacent west central South Dakota. Var. *cusickii* (Greene) Reveal (*Primula pauciflora* var. *cusickii* (Greene) Mast & Reveal): northeastern Oregon to southeastern British Columbia eastward across Idaho to western Montana and northwestern Wyoming.

*Dodecatheon poeticum* L.F. Henders. (*Primula poetica* (L.F. Henders.) Mast & Reveal: Columbia River Gorge and eastern edge of the Cascade Range in Washington and Oregon.

*Dodecatheon amethystinum* (Fassett) Fassett (*Primula fassettii* Mast & Reveal): southwestern Wisconsin and adjacent southeastern Minnesota south to northeastern Iowa, western Illinois, and eastern Missouri, then disjunct to southeastern Pennsylvania.

*Dodecatheon frenchii* (Vasey) Rydb. (*Primula frenchii* (Vasey) Mast & Reveal): southern Illinois, southern Indiana, and western Kentucky, disjunct in Alabama, Arkansas, and Missouri.

*Dodecatheon meadia* L. (*Primula meadia* (L.) Mast & Reveal): widespread in eastern North America from Manitoba to New York, south to eastern Texas, northwestern Alabama, and northern Florida.

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# Chile's Flowering Desert

Jane McGary

The northern region of the long, narrow country of Chile is best known for its mineral resources and for the presence of one of the world's driest, most barren places: the Atacama Desert. Even in the rare years when the Atacama receives measurable rainfall, no growth appears there, except where seeds have been carried from far away by vehicles and have fallen by the roadside or railroad line; there is no permanent seed bank in these red, buff, or gray soils. One I was able to spot is a little cushion, *Philippiumra celosoides* (photo, p. 104).

But the Atacama is not the only habitat in northern Chile. All along the coast, dense fogs from the cold Pacific Ocean—a weather pattern called *la camanchaca*—deliver enough moisture for the growth of many species of xerophytes (plants that inhabit arid regions). The southern margin of the desert, the Norte Chico, has rivers whose valleys feature trees and even coastal wetlands.

Timing is crucial in planning your trip here, for the flowering of this habitat occurs only in response to the unusually high rainfall that accompanies an El Niño winter. Residents of the Pacific coast, north or south, are well aware of this phenomenon, but those dwelling inland or on Atlantic shores will have to check weather websites or other resources beginning in late November of the year before they want to travel. El Niño is one component of a larger ocean current and climatic cycle abbreviated ENSO (El Niño and the Southern Oscillation). Sea surface temperature changes cause disruption in typical weather patterns from Australia to California during such seasons. Although the Atacama Desert proper, as mentioned, hosts no vegetation even in an ENSO year, in marginally arid parts annuals germinate in the millions after winter rains, and perennials and bulbs burst into bloom beginning around the end of August. I made my first trip there in October following the ENSO rains of 2001.

In 2007, meteorologists predicted another El Niño, but it “fizzled out” and the long drought was not broken. Three friends and I had already made our arrangements before we knew the rains weren't coming, so we went anyway and saw a subset of the desert plants (including many woody species but few annuals and bulbs) in flower. Then we fled to the south and the Andes for the rest of our stay. Now I'd recommend not committing to an October trip before the end of July.



International flights to Chile arrive at Santiago. Visitors may wish to spend a few days there seeing the city's excellent museums and monuments, shopping for crafts and other souvenirs, and perhaps picking up some maps at the Military Geography Institute, which is similar to the American USGS. Chile is building new roads quickly, so even fairly recent maps may be out of date. Santiago is also the place to rent a vehicle. Four-wheel-drive cars and trucks can be rented, but they're very expensive, and you'll probably not need one if you're willing to walk rather than drive along the steeper, more deteriorated back roads. For my first trip I rented one of the short-bed, king-cab Toyota pickups that are ubiquitous in the country. You can get plenty of baggage in the rear seat compartment, and the clearance is better than that of a car. Also, it's inconspicuous when parked on land not strictly open to the public, and handy for picking up hitchhikers between villages. Our second trip, with four people and a lot of baggage, required a midsize SUV. A decent sedan is suitable for many travelers, as long as you're willing to revise your route to avoid dubious fords and are a paid-up member of that well-known botanical society, the International Association for the Abuse of Rental Cars.

Chile has numerous national parks, but many of these are not conserved to the same extent that U.S. and European parks are. Some are more like U.S. national forests, with grazing permitted. In addition, many are small by North American standards, more similar in size to our state parks. Nonetheless, all are worth investigating. The springtime visitor, however, will find that many of the parks are not open every day of the week. Before traveling, check the CONAF website [URL] for opening days, and if a particular park is important for you, plan to get to it on a weekend. Parks are your best chance to see plant communities that haven't been degraded by goats, the plague of dryland habitats in so many parts of the world. Most parks charge a modest entrance fee, and some have visitor centers. The most specialized preserves (such as Fray Jorge and Las Chinchillas) may have rangers (*guardaparques*) on site who can give informative talks and even provide guided walks for larger groups. No natural materials may be removed from parks.

The main north-south highway, part of the Pan-American Highway and known as Ruta 5 just like the route along North America's west coast, parallels the coast but for the most part doesn't run near the beaches. Almost any turnoff to a beach is worthwhile for the plant-hunter. Some coastal villages are linked by smaller coast roads, mostly well-maintained gravel. I found plenty of interesting little side canyons while driving along these roads and stopping to walk inland. Vegetation is particularly varied at the bottoms of these moisture-trapping ravines and arroyos. Experienced plant-hunters develop a special sense of what spots to look at closely: places where the vegetation looks a little different from a distance, the bases of cliffs and sand dunes, rocky ledges, and even thickets of spiny shrubs where choice herbs may escape from browsing animals.

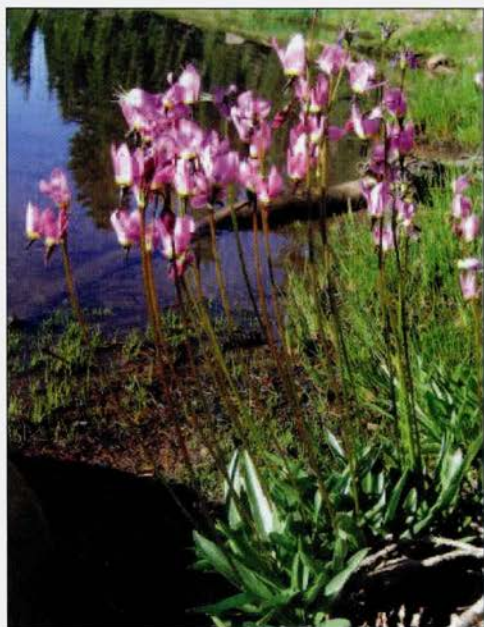
After you reach Ruta 5 and start driving north, an enjoyable introduction to the coastal flowers can be found in the small town of Pichidangui, a turnoff a little north of the large city of Viña del Mar. There are several roads into the town,

all terminating at a coastal road. Public beach access is found toward the north end of this oceanfront road, and is indicated by a sign. Walk down a steep path to the rocky beach and admire the waves breaking high on the offshore rocks before you get down to serious botanizing.

The Pichidangui beach is a great place to see *Alstroemeria pelegrina*, a medium-sized species (photo, p. 99). It can be instantly recognized by its crisply curled, succulent, bright green leaves. The flowers are large, strongly patterned in white and deep rose. The compact growth habit of this species makes it useful in gardens in warm climates, but it is one of the less cold-hardy alstros (as they're casually called). Its distinctive foliage seems to crop up in the recently introduced Princess Series of hybrids, suggesting the reason for the limited cold tolerance of these pretty, low-growing cultivars.

If you think cacti are plants of the inland deserts, Chile will change your mind: some of its many cactus species are strictly coastal and grow in beach gravels right up to or even below the limit of the surf. On the Pichidangui beach we saw two cacti, which I (no cactus expert) tentatively identified as *Echinopsis littoralis* and *Eriosyce subgibbosa*. The former is a columnar cactus (*quisco* is the general name for these in Chile) with creamy white flowers. The other is a ball cactus of moderate size, at its most appealing where it springs from crevices (p. 99), dotting the red-brown stone with its varicolored blooms. Cacti and alstros often grow together, partly because they enjoy the same soil and moisture conditions, and partly because the cacti afford some goat protection to the palatable herbs. Here on this tiny stretch of rocky beach you will find numerous other specialties of the northern coast. *Nolana* is a populous genus in the Solanaceae (potato family). Its flowers may be mostly tubular or widely open like petunias. The most spectacular are the trailing species *N. paradoxa* (p. 100) and *N. rupicola* with large, brilliant true-blue flowers (caution: an inferior annual species has been distributed as seed under the name *N. paradoxa*). Present on nearly every stretch of coast and in a few places inland is the succulent, mat-forming *N. crassulifolia* (p. 99); a finer ground cover for draping rocks can hardly be imagined, though its flowers are rather small and dull, and it's likely to lack cold tolerance. The genus *Nolana* also includes many upright shrubs (p. 100), mostly small, and some desert annuals.

Returning to the drive north, you may wish to detour inland a bit to the town of Illapel for an overnight stay and a visit to the nearby nature preserve of Las Chinchillas. It was a surprise to me that chinchillas were native to Chile, and that the Chilean species is different from the familiar furbearer of the Andes farther north. The local species is nearly extinct, partly because of hunting in earlier days and partly because of habitat destruction. Here in this preserve the vegetation community crucial to the chinchillas' survival is being preserved and rehabilitated; *Puya chilensis*, a huge, spiny bromeliad, is a favored den site, since predators such as foxes avoid its vicious foliage. Las Chinchillas reserve features the "Nocturama," an indoor zoological exhibit where chinchillas and other rodents and tiny marsupials of the park, some of them also rare, are bred in captivity and can be viewed through one-way glass. A ranger must open the Nocturama, and will explain each species. Signage here and in other parts of the park also



Four *Dodecatheon* species (p. 90) of the American West: above left, *D. alpinum* in northern California (David Dobak); above right, *D. pulchellum* var. *cusickii* in British Columbia (David Sellars); below left, detail of *D. jeffreyi* in the Willowa Mountains, Oregon (D. Sellars); below right, minute *D. conjugens* in the Bighorn Mountains, Wyoming (Iza Goroff).





*Primula suffrutescens* is the closest relative of *Dodecatheon* (p. 88). (Jay Lunn)

*Tropaeolum tricolor* in Fray Jorge National Park, Chile (p. 113, 135; D. Dobak)  
and in Bill Dijk's New Zealand garden (B. Dijk).





A beach cliff in Pichidangui, Chile, with the cactus *Eriosyce subgibbosa* and trailing mats of *Nolana crassulifolia* (p. 96; J. McGary).

Left, *Nolana crassulifolia* (p. 96); right, *Alstroemeria pelegrina* (p. 96).





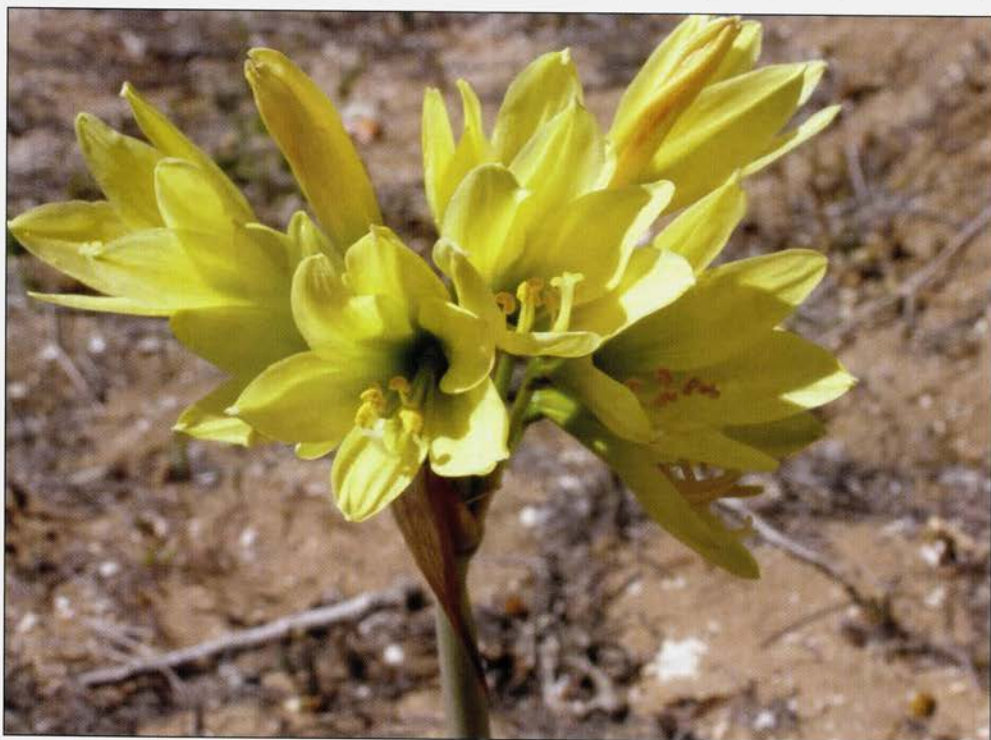
Two expressions of the genus *Nolana*: above, a dwarf shrub, possibly *N. leptophylla*, in coastal northern Chile (J. McGary); below, two color forms of showy, trailing *N. paradoxa* (D. Dobak).





Terrestrial orchids seen near Chile's central coast include *Gavilea leucantha* (p. 116; Terry Laskiewicz) and *Chloraea chrysantha* (p. 116; D. Dobak).

*Rhodophiala bagnoldii* (p. 113; T. Laskiewicz).





A typical scene on the coastal strip in northern Chile during a “flowering desert” year (p. 94; J. McGary).

*Cruckshanksia capitata* (left; J. McGary) and *C. monttiana* (right; D. Dobak)  
brighten sandy places in the flowering desert with their showy bracts.







These two *Alstroemeria* species grow by the Pacific Ocean. Above, *Alstroemeria hookeri* subsp. *recumbens* near Algarrobo (p. 116); below, *A. werdermannii* near Huasco (p. 115).





*Solanum chilense* (left; p. 115; D. Dobak) and *Philippiamra celosioides* (right; p. 115; J. McGary) flower copiously in one of the driest areas of the globe.

Two species of *Copiapoa* in northern Chile:  
left, *C. humilis* (p. 115); right, *C. cinerea* (p. 116; J. McGary).





*Pasithea caerulea* (left; p. 113) and *Phycella ignea* (right; p. 114) are among the most brilliantly colored Chilean bulbs. (D. Dobak)

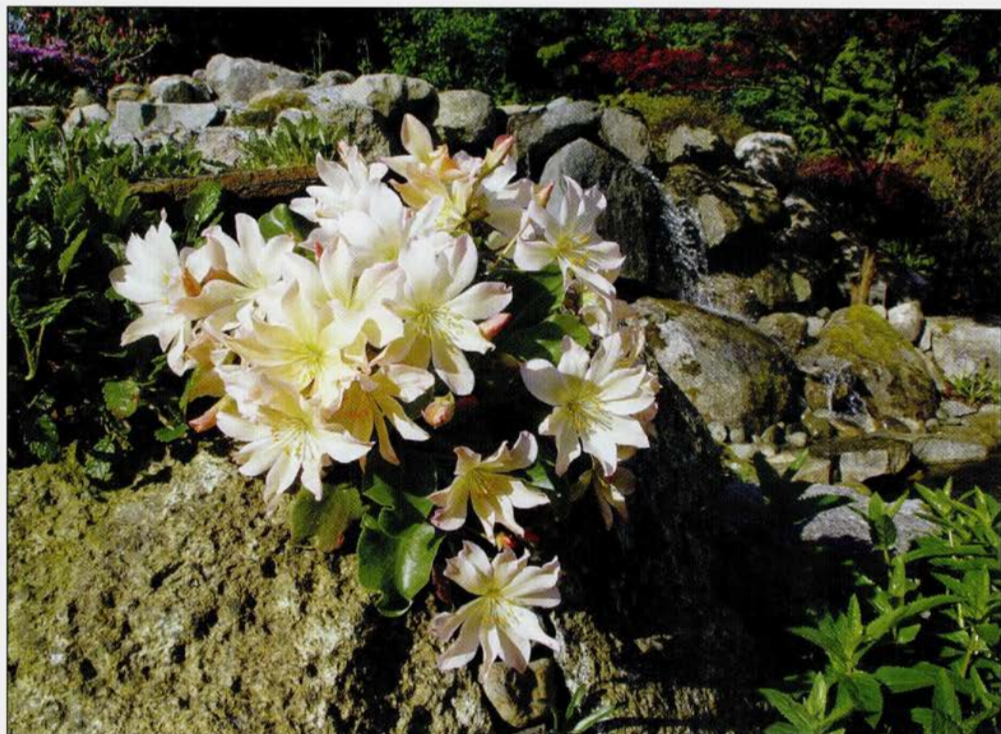
A dark color form of *Argylia radiata* (left, p. 113) in Las Chinchillas Reserve; *Senecio planiflorus* is endemic to Fray Jorge National Park (right, p. 114). (D. Dobak)





Taking advantage of shade and aspect in the Sellars garden near Vancouver, BC (p. 118).

The photo below received first place in class 4 of the 2007 photo contest. (David Sellars)





The grand prize winner in the 2007 photo contest is this digital image of *Asarum speciosum* (p. 145) by Jim McClements.

Another winning photo and lovely plant from the McClements camera and garden: *Sanguinaria canadensis* 'Betty Casto' (p. 145).





*Verbascum*, large and small (p. 137). Above left, *Verbascum phoeniceum* "atrovioleaceum"; above right, *V. arcturus* in typical cliff habitat in Crete. (J. McGary)

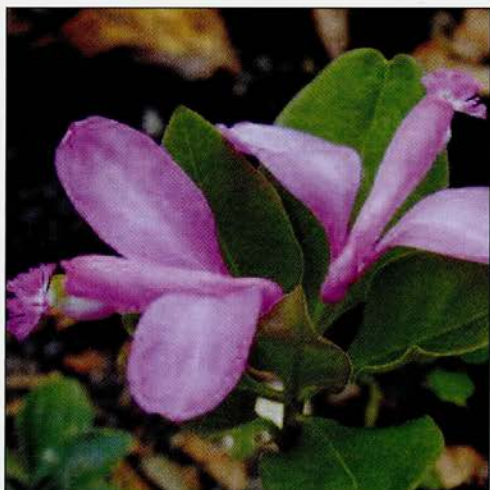
Below left, the large rosette of *V. sinuatum* in Crete (J. McGary); below right, *V. dumulosum* in the garden in Denver (Panayoti Kelaidis).





*Loiseleuria procumbens* (p. 126, 145) earned Bernard Jackson honorable mention in class 3 of the 2007 photo contest.

Two more keepers: left, *Polygala pauciflora* (p. 124; Jim McClements); right, *Physoplexis comosa* (p. 122; Zdenek Rehaček).





*Jeffersonia dubia* (p. 124) is an early spring favorite in gardens east and west. (Todd Boland)

*Dianthus callizonus* is one of the most cherished of the pinks. (Zdenek Rehaček)







*Daphne arbuscula* (p. 125) is a perfect rock garden shrub. (Wiert Nieuman)



Favorite bulbs for northern rock gardens (p. 140) include *Fritillaria meleagris*, above, in two color forms; rare *Iris winogradowii*; and the *Colchicum* relative *Bulbocodium vernum*. (Zdenek Rehaček)



offers information about the ecology and fauna. There is a pleasant covered picnic area next to the visitor center.

A loop trail of moderate length begins at the Las Chinchillas visitor center, climbs a hill to a viewpoint (*mirador*), and drops into a canyon where notable trees are signed and excellent birdwatching can be had. The array of woody plants along the trail is remarkable. The showiest bulb we saw was the widespread *Pasithea caerulea* (p. 105), a robust plant with a widely branching spray of indigo flowers resembling those of a North American *Brodiaea*. In a few places colonies of ferns—at least three genera—are clues to underground moisture in this generally arid spot. A showy annual is *Argylia radiata* (p. 105), seen here in an inland color form of deepest maroon; along the coast it ranges from yellow to deep orange.

The shrubs offer homes to other plants. One mistletoe of the genus *Tristerix* flaunts its long-tubed crimson flowers from the stems of shrubs, including the small-flowered *Fuchsia lycioides*, and another from the trunks of columnar cacti; the fruits of *Tristerix* are also ornamental. Festooning some shrubs are the delicate stems of *Tropaeolum tricolor* (p. 98), widely cultivated in northern greenhouses. It has populations in both the coastal mountains and the foothills of the Andes, and I suspect that the Andean populations might produce garden plants with better cold tolerance. I grow this species in a bulb frame, where it survives temperatures in the low 20°s F without much damage.

Also climbing on the shrubs is *Mutisia cana*, one of a small genus of climbing composites found in most parts of Chile and extending into Argentine Patagonia. Sometimes called “climbing gazanias,” the larger species of *Mutisia* have leaves with tips modified into clasping tendrils; in a few species, entire leaves are in the form of linear tendrils. Their flowers are large, with many slender rays. *M. decurrens* is perhaps the showiest one, with brilliant scarlet-orange rays. Other species have rays of cream, yellow, or pink. A few are cultivated, especially *M. spinosa* from the low foothills of central Chile, which tolerates winter temperatures into the mid-20°s F. There are also a couple of alpine mutisias, not climbers but trailers that can spread from the root, and these are a bit more winter-hardy, especially with reliable snow cover. I grew *M. subulata* subsp. *rosmarinifolia*, with brilliant magenta flowers, on the edge of a raised bed for several years, until a hard freeze finally carried it off.

In wet years, the Desierto Florido is at its best in the coastal strip and inland just north of Vallenar (p. 102). The flats burst into deep pink almost to the horizon, tinted by annual flowers, mostly on stems about 30 cm (one foot) tall. Most common are species of *Cristaria*, in the Malvaceae (mallow family), and *Calandrinia* or *Cistanthe*, in the Portulacaceae (and closely related to *Lewisia*). Especially near the coast, *Argylia radiata* (Bignoniaceae) is common, its gold to orange trumpets clashing brilliantly with the deep rose of the other tall annuals. When you walk out into these flowery flats, you will find smaller annuals, particularly *Nolana*, tucked close to the ground, and a number of flowering dwarf shrubs. Another spectacle of wet years is the flowering of *Rhodophiala bagnoldii* (p. 101), which resembles a bright yellow *Hippeastrum* (the genus florists erroneously call

“amaryllis”). Tens of thousands of these robust flowering stems can burst from their large, deep-seated bulbs, given adequate moisture. On our dry-year visit, we saw a fairly good population toward the southern limit of its range, quite near the coast, and also a few flowering in a planting of young olive trees that was being drip irrigated.

Despite missing the *R. bagnoldii* show for the most part, we were not deprived by drought of showy amaryllids, and in fact we saw some I hadn't spotted before, mostly near the highway in the semiarid zone. *Rhodophiala phycelloides* is named for its tubular flowers, which resemble those of the closely related genus *Phycella* (p. 105). (The trip's last days in the Andean foothills would hold an even greater treasure: red-and-white *Placea arzae*.)

On my first trip I wasn't able to visit the famous Fray Jorge National Park because I wasn't near it for its weekend open days, but on the second trip we planned our route to ensure getting there on the proper day. We stayed two nights at an excellent hotel a short drive from the park entrance, the Termas (hot springs) de Socos, where guests can enjoy soaking in therapeutic whirlpool baths, relaxing on a shady patio in the strong breeze that whips up the canyon, and dining well. We had the luck to spot a Giant Hummingbird drinking at the hotel's fountain, and learned that these birds usually have departed for the south by mid-October.

Fray Jorge is a botanical preserve established to protect a relict forest containing many plants normally found in much wetter regions to the south, as well as a few narrow endemic species. A combination of terrain and ocean currents provides more moisture here than occurs elsewhere on the northern coast. On the summits and hillsides, where the relict forest grows, there is frequently cold wind and the damp clouds of the *camanchaca*, originating from moisture rising from the ocean and condensing as it rises over the hills at about 600 meters elevation. Annual rainfall here can reach 1,000 mm. In contrast, in the arid interior plain it rarely exceeds 100 mm. There is a visitor center and a campground with bathrooms and hearths.

There are several trails in the park, but the most popular is of course the relict forest, a loop of about 1 km from a parking area. The fact that it took four fit hikers almost 3 hours to complete it, with photo stops at every turn, will give you an idea of how interesting it is! There is some signage identifying notable plants, though of course not as much as we wished there were. Parts of the forest are very dense, with several “stories” of vegetation, including massive creepers and semi-climbing woody plants such as the large-leaved *Griselinia scandens*. Many of the shrubs were flowering in October, as were some annuals in the more open spots. When we came to the end of the loop, we were fortunate to encounter a ranger-botanist, who took us a short distance back into the forest to point out plants of particular interest and also showed us some endemics growing right at the parking area (p. 105). We mined his knowledge intensively until he was called away to lead a tour group. After visiting the forest, we walked one of the longer trails in the more arid part of the park but saw little in flower other than cacti.

Once north of this point, botanical interest depends heavily on rainfall. My first trip took me as far north as the town of Taltal, where the routine for plant

hunters is a stay in the comfortable Hostal Taltal and day trips along the coast road between Taltal and Paposo for hikes up the canyons into the hills. Every coastal flat and ravine discloses fascinating new flowers in rainy years. The rocky outcrops host many alstroemerias, and the flats are studded with annuals large (*Cleome chilensis*) and small (*Viola polypoda*). Among the dwarf shrubs my favorites were a *Solanum* species—probably *S. remyanum*, though there are a number of similar ones—with rich violet flowers, a brilliant combination with the pure yellow flowers of *Solanum chilense* (p. 104).

On our dry-year trip we drove as far as Taltal, but there was no room at the inn, or any other inn of the town, owing to a mining conference. We fled south to Chañaral, where we found every hotel taken up by a poets' convention. Late evening found us exhausted, back in Huasco, where we had stayed two days earlier, and back at the quirky Hotel San Fernando, still under perpetual construction as it had been when I visited three years before. The owner, also named Fernando, not only does the stonemasonry himself but is also an excellent plant photographer. After we admired the flower postcards for sale in the dining room, he showed us many more on his office computer, including some very rare species and forms he had sought out.

The coast road near Huasco has recently been remade and much of the land that was accessible only a few years ago is now closed off for beach cottages. I looked in vain for the spot where I had found the narrowly endemic *Alstroemeria werdermanii* (p. 103) but could not find it. I was worried that it had been destroyed, but Fernando assured me it was still safe.

Chañaral, when not full of poets, is another good place to stay while you look at plants and wildlife in Llanos de Challe National Park, situated in the coastal mountains. The highlight of the fauna here is small herds of guanacos, the wild ancestor of the llama and alpaca. The floral highlight is the narrowly endemic *Leontochir ovallei*, commonly called *garra de león* (lion's paw), closely related to *Alstroemeria*. To find one that the guanacos and goats haven't eaten, it's best to walk up a canyon to fairly high on the hillside. The flowers are produced as the leaves are beginning to yellow, so even if you don't spot the deep crimson of the blossom (rare individuals are yellow-flowered), you may see the distinctive light green of the large leaves. Plants often grow up through shrubs, probably because this is where they escape browsing animals. While looking for this plant, I was amazed also to find a maidenhair fern, *Adiantum chilense* var. *birsutum*, peeping from a shady crevice. We saw a number of other dryland ferns during our second trip, particularly in Las Chinchillas reserve.

In sandy riverbeds and dunes in this area one can find specialized plants such as *Cruckshanksia* (p. 102), a genus of both annuals and perennials notable for their large, brilliantly colored bracts surrounding the actual flowers. Another riverbed dweller is the tiny *Alstroemeria kingii*, a perennial flowering on stems only 3–4 inches (7.5–10 cm) tall in shades from pale cream to deep yellow. Nearer the coast, I enjoyed finding the tiny cactus *Copiapoa humilis* in flower (p. 104).

One of the larger parks along this coast is Pan de Azúcar National Park, among the best places to appreciate the fog desert vegetation. A large, well-

appointed camping area is next to the visitor center, right on a long beach where interesting shrubs grow. A nighttime walk here is punctuated by the soft, sweet fragrance of low-growing *Heliotropium*. A small cactus garden at the visitor center will help you identify the numerous species you can see in the wild, including several species of photogenic *Copiapoa* (p. 104). My favorite walk in Pan de Azúcar was on the upland, reached by a good dirt road. Many cacti were flowering after a wet winter, along with *Nolana* and other dwarf shrubs and annuals, and interesting birds were feeding, some on nectar and some on anything they could beg from the visitors. A group of South American birds known in English as “tyrants” remind me of North American jays with their bold behavior.

During my rainy-year trip I was able to see about 10 species of *Alstroemeria* near the coast, but in the dry year we saw very few. I did spot leaves here and there, but they had often been browsed heavily by goats, and I don’t know if they would have flowered had the goats not been there. We speculated that because of the drought, goatherds had brought their flocks from inland to the coast, where the fog maintained some plant growth; I didn’t see much goat activity right on the coast during the wet year. Fortunately, alstros with their deep, extensive root systems can survive a year or more of destruction and return when conditions are better. Most of them prefer very loose soils or rock outcrops, and flower over a fairly long period. They’re easy to grow from seed.

*Alstroemeria hookeri*, with three subspecies, is a very small one and is sometimes available in seed lists. This was one that we got to see in the dry year, after we traveled south of Valparaíso to take some walks around the resort town of Algarrobo. *A. hookeri* subsp. *recumbens* grew on slopes and little grassy flats just above a spectacular little beach and precipitous cliffs. Its showy flowers emerge from rosettes of leaves on stems about 15 cm tall at most (p. 103). This was one it was hard to stop photographing; around every corner of the path was a more beautiful specimen, and the depth of the pink varied somewhat. I’ve grown another subspecies, *maculata*, for some years in a bulb frame, but it did not survive when I tried a bit in the open rock garden in Oregon. This is certainly a choice subject for a California rock garden, though. Moreover, the plants we saw did not form spreading colonies, though that’s no guarantee they wouldn’t do so in cultivation.

Our trip to Algarrobo was in the nature of a retreat from the sparse flowering in the drought-stricken north, and it was rewarding. It was pleasant to have a good choice of restaurants (though we’d dined well almost everywhere, mostly on very fresh, simply prepared seafood and lavish salads), and we used the Riedemann and Aldunate guide to the Zona Central (see Further Reading) to identify several good walks. Our favorite was the coastal cliff path from Mirasol beach to El Yeco beach, where we saw *Alstroemeria hookeri*, but we also enjoyed a descent of a steep canyon thick with trees and *Gunnera*. There were several terrestrial orchids, and an irid new to me, *Libertia sessiliflora* with thickly set, bright blue flowers. Especially pretty was the orchid *Gavilea leucantha* (p. 101). Most of the orchids we saw on this trip were greenish, but *Chloraea chrysantha* (p. 101) produces tall stems of brilliant orange flowers.

I hope you'll be inspired to watch the long-range weather forecasts for Chile and find your own opportunity to see the spectacular flowering of the northern coast. The books mentioned below will help you, as will Internet searches. Chilean books are hard to acquire, mostly because the publishers insist on being paid by wire transfer (a common practice in Chile but very expensive for North Americans). Your best chance of getting them is through an Internet search or a visit in Santiago to the tiny but excellent bookstore Australis <librosaustralis.com>, which also sells a good selection of maps.

## Further Reading

- Hoffman J., Adriana. 1998. *Flora silvestre de Chile, Zona Central*. 4th ed. Santiago: Fundacion Claudio Gay. The most readily available botanical guide, useful for some plants farther north (a Zona Norte volume was planned but has not appeared); fairly technical descriptions in Spanish, with good color paintings.
- Muñoz Schick, Mélica, and Andrés Moreira Muñoz. 2003. *Alstroemerias de Chile: Diversidad, distribución y conservación*. Santiago: Taller La Era. Indispensable for identifying this complex genus in the field and garden, with color photos, range maps, and precise descriptions.
- Riedemann, Paulina, Gustavo Aldunate, and Sebastián Teillier. 2006. *Flora nativa de valor ornamental, Identificación y propagación: Chile Zona Norte*. Santiago: Privately printed. A wonderful book of more than 400 pages, color illustrated throughout, accompanied by a small "Rutas y senderos" (Roads and trails) guidebook to parks, drives, and hikes. Available only in a few Chilean bookstores; ordering from the publisher is difficult. Jane McGary can provide, via e-mail (janemcgary@earthlink.net), an English translation of the guidebook. Riedemann and Aldunate are the authors of two equally desirable books in the same series, *Zona Centro* (2nd ed., 2004, privately printed) and *Zona Sur* (2003, Editorial Andres Bello).
- Teillier Arredondo, Sebastián, Herman Zepeda Flores, and Patricia García Villarroel. 1998. *Flores del desierto de Chile*. Valdivia: Marisa Cuneo Ediciones. A small photographic flower guide with keys employing graphic symbols, hard to use but helpful to those who don't read Spanish. Available in many Chilean bookstores.

# The Incredible Lightness of Aspect

David Sellars

Growing alpine in the open garden is an exercise in experimentation and patience. We give a lot of thought to soil types, rock placement, mulch, and watering, but, apart from avoiding overhanging trees, options are generally limited for siting a rock garden to optimize the light conditions. We purchased our treed and sloping one-acre lot about 20 years ago and excavated the slope to create a level area on the upslope side of the house. This resulted in the formation of a steep bank above the level area. A number of glacial boulders had emerged during the land clearing and excavation, so the bulldozer pushed them over the bank to create—what? A rock garden?

Not knowing much about rock gardening then, we stuck a few plants in the bank, most of which promptly perished in the sticky clay soil. Our interests turned to developing a rhododendron landscape in other areas of the garden, though we found a way to create terraces in the steep rocky bank and encourage a few dwarf rhododendrons and heathers to grow quite happily (photo, p. 106).

About eight years later, I was still somewhat intrigued by the possibility of creating a rock garden on the slope because it would fit so well into the overall landscape concept. However, I was discouraged by books on rock garden design that recommended that a rock garden should be situated with a southwestern aspect to enjoy full sun (one such recommendation is by Will Ingwersen in his 1983 book *Alpine and Rock Plants*). Our lot slopes to the north, and the steep bank is quite shaded for much of the year. That was our lot, so the rock garden concept was again shelved.

Another five years passed, and having filled our garden with rhododendrons and specimen trees, we had nothing left to do but turn the rocky bank into a real rock garden, regardless of its unsuitable aspect. The rehabilitation procedure was straightforward, but it took about seven years to reconstruct and plant the entire bank. I dumped a sandy soil mix as a new layer on the clay bank and pried rocks out of the bank to form crevices and pockets in the sandy mix.

Alpine plants generally liked the conditions I had created, and now we had a proper rock garden. As we got to know the plants better, we came to realize that a number of our favorite alpine actually preferred the north slope conditions.



For example, *Saxifraga oppositifolia* needs to be shaded in the summer and seems quite happy on a moist north slope in the winter. We now have all our *Saxifraga oppositifolia* forms (about 30 plants) contentedly growing and flowering in carefully selected shady crevices with very sharp drainage. We have had no losses except for some plants that we had placed earlier in sunnier locations. The hot, dry summer of 2003 was their undoing.

In the current edition of the *Saxifrage Magazine* (No. 15, Autumn 2007) there are a number of comments on the difficulties of coping with the recent hot summers in the United Kingdom, particularly for those growing saxifrages in the Kabschia subsection. Slat shading is recommended because some direct sunlight is important for growing saxifrages. Our north-facing slope emulates slat shading to a degree because the sun's rays are intercepted by trees, given the relatively low angle of the sun in the morning and evening. The hours of direct sun on the rock garden are thus limited, and as a result, *Saxifraga burseriana* (a species in the Kabschia subsection) and our collection of Kabschia hybrids, including 'Cranbourne', 'Allendale Charm', 'Allendale Grace', 'Ariel', and 'Pearl Rose', have been quite content for years. I have also found other alpinists that benefit from good light conditions and not too much direct sunlight, such as *Lewisia*, *Primula*, and *Claytonia*.

While searching for the original reference on the recommended southwestern aspect to quote for this article, I came across a perceptive observation in Lincoln Foster's book *Rock Gardening*. Regarding sites suitable for the rock garden, Foster notes that "A north facing slope in the open is ideal." So maybe 12 years ago I had just read the wrong book. While some alpinists need maximum sunlight, north slope rock gardening has advantages that should be more widely recognized. In the mountains, many interesting alpine plants are often found on north-facing slopes where the snow lies longer, there is some shade during part of the day, and the air is cooler. Nature is, once again, pointing the way.

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David Sellars of Surrey, British Columbia, is a frequent contributor of articles and photographs. This essay is reprinted with permission from the bulletin of the Alpine Garden Club of British Columbia, fall 2007.

# Forum: Three Keepers

Compiled by the Editor

Lately two activities came together in my planning material for our magazine. I've been reading early issues of the *Bulletin of the ARGS* (predecessor to the *Rock Garden Quarterly*), which include many articles in which gardeners discuss a miscellany of favorite plants. And I've been looking at houses closer to the city, planning to buy one to rent out for a few years and then move to, lock, stock, and an edited selection of plants. What will I take with me?

This seemed like an interesting question to pose to other gardeners, so I asked it on the internet rock gardening forum Alpine-L: "Think about your present garden, and contemplate having to move to another property within your present climatic area. Choose three plants you'd need to have in the new garden (as transplants, propagated material, or newly purchased nursery plants)." These correspondents answered.

PAUL BOWDEN of Pittsburgh, Pennsylvania, the artist who created the 2007 volume's covers, writes: It's a difficult choice. I wish I had three favorites to span all four seasons, but in my garden at the moment, three ericaceous plants are the ones I wait for and dote on.

*Cassiope* 'Stormbird'. I ordered from Mt. Tahoma Nursery a few years ago and Rick Lupp kindly sent this as a bonus plant to complement the *Cassiope* 'Muirhead' that I ordered. 'Stormbird' flowers abundantly every spring and has grown twice as big, about 12 inches/30 cm across, as the other one, which has yet to produce even one flower. I did not try this genus for so long due to its reputation for difficulty, but this one is quite easy here in western Pennsylvania.

*Menziesia ciliicalyx* is an unusual and quite hardy small shrub. The dangling, narrowly bell-shaped flowers are a pale grey-pink that is not quite showy, but subtly beautiful. I ordered it from Bovees' Nursery in Portland, Oregon. [This shrub, native to the Pacific Northwest, is closely related to *Enkianthus*, which it resembles in flower; some selections have blue-green leaves. -Ed.]

*Rhododendron yakushimanum* × *williamsianum*, an unnamed cross I bought 12 years ago from Betty Cummins in New Jersey. I don't know if her nursery, The Cummins Garden, is still open, but this is a plant I treasure, as it seems to

combine the beauty of the two parents. It also possesses the small, delicate stature of *R. williamsianum* and the hardiness of *R. yakushimanum*.

DAVID NELSON gardens in Richland, Washington, in the cold, dry eastern part of the state just north of the Columbia River. His articles on *Castilleja* have appeared in several recent issues. He writes: Thanks for giving me something to look forward to in the middle of a cold snap.

*Penstemon speciosus* is a long-lasting, xeric perennial that has done quite well in eastern Washington state. This area receives no more than 7 inches of rain per year due to a rain shadow effect from the Cascade Mountains. *P. speciosus* provides a large amount of exceptionally blue flowers in April and May with minimal water. Of course, it helps that the plant is native to coulees in this region. I grow it in a sandy loam with a considerable amount of compost, but still with excellent drainage. It gets minimal water from micro-sprayers during our hot summer. It is adjacent to *Penstemon strictus*, which is definitely purple with smaller floral trumpets.

For those of you in much wetter areas, *Penstemon ovatus* is another pale blue bloomer. It survives in an eco-niche in my yard (morning sun only and regular lawn watering schedule). It also is a mid-spring bloomer. Both penstemons have survived 4 or more years in the same spots with minimal replanting. Both were obtained from northwestern seed companies. The seed sprouts quite readily using Norman Deno's method. I have obtained *P. ovatus* recently from the plant sales sponsored by the Hardy Plant Society of Oregon, but have not noted *P. speciosus* plants for sale. Both penstemons are about 25–35 cm tall.

*Agastache* species are a favorite of mine because they are midsummer to fall bloomers. *Agastache cana* and *A. rupestris* with their hybrids appear to be quite xeric under my conditions. They are hummingbird magnets with their gorgeous pink-orange elongated flowers. My area is USDA Zone 5 to 6, depending upon whoever is the current expert on weather modification. Some of the more desirable hybrids don't always survive our bare-ground winters, but it's a joy just to have them for a single season. Those two species, which I have had luck growing from seed, are quite hardy with our weird weather. I have obtained plants from southwestern nurseries with good blooming results. These plants generally are about 50 cm or more tall.

*Erigeron speciosus* is native in the Cascade Mountains, and as such requires a bit more water than my xerics. However, this pale blue-flowered composite has replanted itself in the center of gravel paths and rock patios where hot sun and no water ought to exterminate it.

Regardless, it appears to have a survivalist background. It blooms in May and June with a wonderful fullness. I have massed it between a 'Hopa' crabapple and a spruce, which I know drain every bit of moisture and nutrients from the ground between yet it has persisted and multiplied. *E. speciosus* is about 25 to 35 cm high and draws honeybees to our yard.

ELIN JOHNSON, of Sweetwater, Tennessee (USDA Zone 6) has an interesting way with troughs and other containers. She writes: Deciding which to move would be

difficult. I thought about this awhile and decided that I would move favorite pots. It's likely if I were to move it would be to a very small place, so pots would be a good idea.

I have a large trough with *Cryptomeria japonica* 'Tansu' in the middle. It's around 10 years old and is 15 inches high and 18 inches wide (37.5 by 45 cm) I have had more pleasure watching this beauty grow than almost anything else in my garden. It has an *Aquilegia discolor* on each side. I would have to locate a couple of stout men to help move this one.

Since hostas are my great love and I don't have a lot of room, I have a lot of small varieties in pots. In a large green ceramic bowl I have *Hosta* 'Cookie Crumbs', which I bought from Bob Solberg when he spoke in Knoxville, *H. venusta* which I grew from NARGS seed donated by a German member, and *H. 'Masquerade'*, which I have had for many years. This bowl would have to go anywhere I went.

When I got where I was going, I would have to add another big pot and start a new *Acer palmatum* var. *dissectum* 'Tamukeyama'. I have two growing in my garden (along with several other Japanese maples), and these maples are another of my great passions. All my trees were started in pots with inexpensive little beginnings, so I would just have to start again.

BOB NOLD, gardener and author, writes from a bad midwinter in Denver: I would never consider moving to another property unless it could be one where I never saw snow again, but anyway . . .

*Paeonia rockii*. The plant here is 4 feet high by 7 feet wide [about 1 by 2 meters], but I'd still try to move it. [For a discussion of McLewin and Chen's recent book on this peony and its connections, see the review in our fall 2007 issue. -Ed.]

*Jasminum nudiflorum*. I second Jim McKenney's choice of this plant. If I had to pick again because this was already chosen, I'd pick *Cupressus bakeri* or *C. arizonica* or *Calocedrus decurrens*, all coniferous trees.

*Viburnum farreri*. [This species, normally an upright shrub to 3 meters or more, has a dwarf form, 'Nanum', which grows only 50 cm (less than 2 feet) tall; its light pink flowers are fragrant. -Ed.]

My non-rock-gardening spouse [Cindy Nelson Nold, whose cover art has graced several volumes of this magazine], when she heard of this, took no time at all in responding.

Her choices: *Physoplexis comosa* (p. 109), *Crocus medius*, and *Asclepias asperula*. The curious "bottle" flowers of the first, formerly called *Phyteuma comosum*, are fascinating. *Crocus medius* is a fall-blooming species with rich purple flowers. Of the desert milkweed, William Weber (*Flora of Colorado, Eastern Slope*) says it is "common on the outwash mesas of the outer foothills." That would mean right around our house, but I've never seen it around here—there isn't much native vegetation left. It's 6-8 inches (15-20 cm) high, with 4-inch (10-cm) long, narrowly oblanceolate leaves, and heads of greenish flowers with purple centers. I think of it as a Great Plains plant but it gets as far west as California (there's a good drawing in the *Jepson Manual*, p.173). I grow it in a raised bed, never watered,

with *Oenothera howardii* and *O. neomexicana*, *Agave parryi*, various *Echinocereus*, *Lewisia rediviva*, and species tulips.

JIM MCKENNEY gardens in Montgomery County, Maryland (USDA Zone 7) and likes to write—which is what *we* like. He responded: This one is easy for me: it's something I think about often. My three must-have plants are not likely to be regarded as rock garden plants by many (I certainly don't think of them as such), but they are definitely plants I would not want to be without.

The three are *Buxus sempervirens* 'Suffruticosa', *Jasminum nudiflorum*, and *Helleborus foetidus*. I could easily design and be happy in a garden with just these three. To my mind (and please keep in mind that I am East Coast born and bred), a garden without boxwood is not really a garden. The jasmine is as valuable for its growth form as it is for its flowers. And the hellebore, beautiful or at least interesting at all seasons, is the best winter-blooming plant I know for our climate.

Give me a south- or west-facing brick wall on which is trained the jasmine, with in front of it an arc of boxwood opening into the sun and embracing a gray, weather-stained hardwood chair or bench, the hellebore spreading in broad masses in front of the boxwood: that's a composition I'll be happy to enjoy for the rest of my life.

TOM STUART of Croton Falls, New York, has a large garden set in woodland. He writes: All three plants are woodlanders of rock garden dimensions. All three are five-star plants in the knock-out looks department. All are hardy in zones 3–6 and perhaps zones 2 and 7, plus zone 8 for the west coast. Most important, all are easy if you look at the details.

*Corydalis ornata* leaves me gasping. There are a lot of *Corydalis*. Some would say too many. Magnus Lidén and Henrik Zetterlund named this, certainly appropriately, in 1986. Their material originates from one collection of several color forms in the Russian Far East, about 150 km northeast of Vladivostok. Google shows the area as heavily forested. They claim a white form is “one of the most beautiful plants in existence.” Given its provenance, one is guaranteed hardiness in zone 3.

My sky-blue form, no sluggard in the looks department, came from Jānis Rukšāns, who obtained further collections. His book *Buried Treasures* (Timber Press, 2007) calls the inflorescences “Christmas trees” for their conical form. These tree-racemes rise 20 cm with a cone of 15 to 20 spurred flowers, each about 2 cm long. The leaves are somewhat glaucous. Rukšāns takes a contrary view on the best forms: “I generally grow this species as a mixed color population because in my opinion it is the secret of its beauty—all the color forms blooming at the same time make a beautiful blue carpet resembling the sea, with the white foam above blue and violet waves.”

*Corydalis* is filled with ephemeral species, but *C. ornata* has to have one of the shortest periods above ground. From its emergence to senescence is little more than three weeks, but what a glorious three weeks! How does it renew its tuber in so short a time? How do ruby-throated hummingbirds cross the Gulf of Mexico?

I grow it in woodland, but that is deceptive in terms of shade/sun, because the trees' leafing out takes place after its season is over. Shade may be important in

preserving some soil moisture during the summer. Tubers in this section of *Corydalis* are said to be divisible frequently, but I have not done so. It self-seeds prolifically. Could it become a weed? One can only hope. The progeny are expected to bloom first this year or in 2009. I await my wave.

*Jeffersonia dubia* (photo, p. 110) graces the garden in April. Though a flower lasts not much more than a day, older plants produce for ten days; a stand of them is a source of pleasure for nearly a month. The first flower in 2006 was on March 31. In 2007 it ran from April 20 for three weeks. Color varies from white (rare) through light to dark violet blue, amethyst predominating. Dark purple flower buds sit upon the purple stems, with purplish reniform [kidney-shaped] leaves following. They soon become green, glaucous on the reverse, and expand to 7 or 8 cm. Later, the leaves elongate to 20–25 cm and hide the odd pear-shaped capsules with pop-tops, creamy-white at maturity. They ripen in July/August, and the shiny brown seeds attached to starchy arils are shaken out by wind and carried off by ants.

This is found in far eastern Russia in the same location as *Corydalis ornata*, but has a much wider range in Siberia and into China (Manchuria/Jilin) and Korea. Its habitat is deciduous broadleaved forests on humus-rich soil, in shade. In Russia it is called *Plagiorhegma dubium*, no slight to President Jefferson intended.

Hardy to zone 3, at least, it self-seeds here in acid soil. Fresh seed germinates hypogeally [without a cotyledon above ground], roots the first year, emerges in the second spring; dried seed is more likely dead seed. Linc Foster (1906–1989) swore seeds would only germinate under the mother's skirts; I cannot contradict him. It takes three more years to bloom. The rhizome is quite small, but the root system is composed of numerous thick, white ropes. *J. dubia* somewhat resents disturbance, but can best be transplanted before growth starts in early spring. Division is possible, but losses are reported. Three original plants here have produced a range of shades in the numerous progeny, so division seems justifiable only for experimental curiosity.

*Polygala paucifolia* (Gaywings; photo, p. 109) is a May delight. In April the so-called evergreen leaves all shrivel up, and then new growth commences with ascending stems sporting scale-like leaves in the lower part, larger above, terminating in a whorl of ovate 2-cm leaves and purple or pink flowers. They are intricate, with two sepal-derived "wings," a smaller tube composed of two fused petals, and a third petal emerging from the center with a frilly terminus and enclosing the reproductive structures. All this complexity produces only one seed. Collecting it is tedious. In 2007 the only contribution to the NARGS Seed Exchange came from Barbara van Achterberg; in many years there are no more than one or two packets available. I have not seen plants for sale.

There is one other seed source: plants form cleistogamous [non-opening] flowers and subsequently produce seeds along the subterranean creeping rhizomes, perhaps not easier to collect. Even if this underground mechanism for reproduction lacks some of the benefits of sexual, visible flowers, it is a remarkably efficient one for ensuring the planting of the seed without any threat of predation or distribution to inappropriate locations. Are there any other examples of this evolutionary path?

Division is easy; reestablishment difficult. Pot divisions in similar soil or media to the intended site, keep under moist care in shade, plant the entire pot in fall or in spring before growth begins. I failed three times to establish plants before I succeeded. They creep along the woodland floor, just on the surface or just below, and their roots do not delve deeply. It is imperative to keep transplants moist. Once established, they are tolerant of drought. They also spread vigorously, though no one has ever called them weedy.

Found mainly in northeastern North America in moist woods, its range extends south to Georgia in the Appalachians and westward into northeastern Alberta in the boreal forest. It is rare at both extremities. A white form is rare everywhere. The species is hardy to Zone 2.

NATHAN MILLER writes from Newberg, Oregon (just south of Portland, in Zone 7–8): *Sedum oregonum* is my favorite of our Pacific Northwest native sedums. Although *S. spathulifolium* seems to have received more press and greater availability in garden centers, *S. oregonum* seems to be tolerant of a wider array of conditions and a bit more floriferous. It also looks great cascading down walls.

*Penstemon richardsonii* var. *curtiflorus* I grew from seed I collected from plants growing in basalt walls along the Deschutes River in central Oregon. One wouldn't expect a plant native to the continental climatic conditions there to do well here on the wet side of the Cascades, but it just goes nuts here! It starts blooming in June and keeps going all summer. In fall, its leaves turn red.

I don't find *Lewisia cotyledon* nearly as hard to grow as some of the literature suggests. I have strains of it in bloom from May well into autumn, even as late as December last year.

ALAN GRAINGER gardens in Versailles, Kentucky (USDA Zone 6). He writes: When I moved from England two years ago, I did not have the luxury of being able to bring anything with me. But what would I have brought had I been allowed?

1. *Kalmiopsis leachiana*; 2. *Primula bhutanica*; 3. *Celmisia dallii*

Of course, none of these would have survived in Kentucky anyway, but I can dream, can't I?

[Alan is likely right about *Primula bhutanica*, a member of the notoriously difficult Petiolares section, and *Celmisia dallii*, a New Zealand composite described in the AGS *Encyclopaedia of Alpines* as "rare in cultivation, and apparently difficult and not persisting in the U.K." *Kalmiopsis*, however, is likely to give him a pleasant surprise if he tries it; it has proven fairly adaptable in various parts of North America. —Ed.]

ANNE SPIEGEL, who grows a remarkable array of plants in upstate New York, mentions *Daphne arbuscula* (photo, p. 111) and related hybrids; penstemons (*Penstemon hallii*, *P. davidsonii*, and a *P. fruticosus* dwarf I've had almost 30 years); *Oxytropis multiceps* and almost every pea I've grown; eriogonums (*Eriogonum caespitosum*, *E. kennedyi*, *E. umbellatum* subsp. *porteri*, *E. ovalifolium*). But she adds, "No way could I limit myself to these few genera."

MICHAEL PEDEN is another member in upstate New York. His thoughts: I'm coming up with only two: a **double white** *Trillium grandiflorum* given to me once on a memorable adventure at a time when I needed the gift; and *Loiseleuria procumbens* (photo, p. 109), in a sense also a gift, but also an important part of my current inquiries—which are not entirely forthcoming as to their nature! These are both wonderful plants, the trillium tractable and the *Loiseleuria* utterly “alpine.” *Primula* ‘Peter Klein’ keeps coming to mind, so maybe that’s a third choice. It is one of my first alpine plant purchases and also one of the first to bloom each year.

JANE MCGARY gardens southeast of Portland, Oregon, in the western foothills of the Cascade Mountains, in a summer-dry, winter-very-wet climate. Her choices:

*Pieris nana*, formerly known as *Arcterica nana*, is the quintessential rock garden shrub: dwarf and slow-growing (about 2 inches/5 cm tall and spreading to about 18 inches/45 cm in 10 years), thickly set with thick, shiny little evergreen leaves that often take on a red tint in winter, and covering itself with little white bell flowers on red pedicels in early spring. I bought it from Steve Doonan about 1992 and had it in a rather shady spot for a few years, where it didn't flourish. Then I built a peat-soil raised bed that is fairly sunny and moved the *Pieris* to it, settling it in a nook among basalt rocks. This more “alpine” exposure suits it perfectly. It needs irrigation in our dry summers.

*Daphne* ‘Leila Haines’ looks like a small, more prostrate form of *D. cneorum*. Harvey Wrightman and Rick Lupp have offered it in their catalogs. In the Wrightman catalog and several references it's said to be a hybrid between *D. cneorum* and *D. striata*, but Jerry Flintoff writes me that recent research has established that it is not a hybrid but a selection of *D. cneorum* itself. My plant, about five years old, flowers so heavily that every year I fear it may be committing suicide, but it grows on—though very slowly. This would be my choice if I could have only one daphne in a small rock garden. It grows in full sun and tolerates some summer irrigation in a very well-drained but not too lean soil.

*Penstemon newberryi* subsp. *sonomensis*, sometimes called *P. sonomensis*, is one I grew from seed (Ron Ratko's list, I think). It's a shrubby penstemon that grows slowly and never seems to get “leggy” or suffer dieback in our wet, freezing winters (it comes from northern California). Its star turn is the flower color: a peculiarly appealing pure ruby red, different from the rosy-purple of *P. newberryi* subsp. *newberryi*. *Sonomensis* enjoys life in a tight, nearly vertical crevice bed of basalt rocks, with an eastern exposure and a little summer water, a situation also favored by *Lewisia columbiana* subsp. *rupicola*. I've tried to propagate this penstemon, without much success, and I don't think it would produce true seed because of the nearby presence of subsp. *newberryi* and other closely related penstemons. Nonetheless, I will persevere with the cuttings! Everyone needs this penstemon.



# Two Gardeners in One Garden

Andrew Osyany

We can't even agree on the right speed for the windshield wiper, so why did we think that we could garden together?

We did garden before there was each other: Sue in a succession of places in Toronto, and then finally on the banks of the Sheldon Creek, where she had a lovely spot, with lots of sun around the house and shade in the gently rolling wooded area down to the water. The property was gardenless when she took it over. She started to clear the undergrowth in the woods, made some beds around the house, planted rhododendrons, built arbors, laid stone for a path (assisted by a helper), and in general was well along the way to creating a magic place in the English cottage garden style.

My awakening to gardening was gradual and started in middle age on a half-acre lot on the edge of Shelburne, Ontario. The soil was clay loam and bulbs were very easy to grow. In fact, everything seemed to be easy, except ericaceous and woodland plants. By the time I met Sue, a large berm above a shallow pool had been converted to a rock garden, and I had several perennial beds which were themed, though not *laine pure* by any means. The theming meant that the #1 bed was whites, pinks and blues, the #2 bed was oranges and browns, the dog run was daylilies and clematis, and so on. All the beds were edged by an in-ground concrete curb, allowing the lawnmower to do the complete grass-cutting and trimming. Our gardening styles were very distinct from each other. Sue thought concrete curbing was "blecchh."

We were about 15 minutes from each other, and in the first heat of passion this 51-year-old thought that was pretty good. I would go down to Sue's place and work in her garden; she would come up to my place and work in my garden. Shortly after retirement, however, Sue chucked her own place and moved in with me, bringing some of her plants.

Gardening together was a new experience for both of us, and since the early days we have searched out jointly gardening couples to find out how others do it. The pithiest comment came from Jan Slater from Pennsylvania, talking about her and Mike in the garden: "It's war." At the other extreme and the other side of the continent, Ernie O'Byrne in Oregon claims that he and Marietta are in perfect har-

mony, have the same tastes, and do everything together. Well, maybe every once in a while he might suggest that a plant be taken out, but if she resists, he drops the suggestion, only to have her bring up the idea a couple of weeks later as her own.

A famous gardening couple, Geoffrey Charlesworth and Norman Singer, created an extraordinary garden in the Berkshires in Massachusetts. Primarily a collection of 60 rock gardens, with many thousands of seedlings in pots and troughs, it also had woodland areas, shrubs, and alpine lawns. They were fiercely possessive, sharing the overall space but not the individual beds. There was an elaborate quadrille to garden visits. Norman would take me for a walk, and Geoffrey would take Sue. After a suitable interval there would be a do-si-do and we would continue the walkabouts until the next change in partners. Each one would show only his own plantings. The first time I visited I was not aware of the arrangement, and I complimented Geoffrey on one of the beds we were passing, only to have the brusque reply: "Oh, that's Norman's." On the same visit, they were opening a shipment of choice rock garden plants from a well-known nursery. Two separate orders, two separate shipments, but some of the plants one had ordered were species the other one already had in his gardens.

Gardeners are passionate people by nature, so it's no wonder that we have seen mostly very dynamic situations with jointly gardening couples. We are still working on ours, but here is an external insight. I was reporting to my 90-year-old mother about a talk that Sue and I had just given. It was about gardening jointly—whether it is easier together or not. "For you it is easier," she said.

"Why?"

"Because you get along so well together, and you don't mind when Sue does more than her share."

In fact, Sue does not have a lazy bone in her body, and she worked in the Shelburne garden all the time. She made some changes, built a higgledy-piggledy cobblestone wall, colonized a new, large, curving berm that I wheelbarrowed for her into the back yard, charmed a huge boulder out of a bulldozer operator working on the construction across the road, and in general she was putting her stamp on the place. One day she was chatting to the neighbor over the back fence and told her that we were getting married and would have the reception in our back yard. The neighbour was quite excited by the news and shouted to her husband by their house: "Guess what! Andrew is marrying the gardener!"

However, it seems every woman needs her own nest, uncontaminated by her man's pre-nesting. Sue said that she didn't leave Toronto to live in a suburban environment, so we drew up a list of our ideal parameters and then set a deadline of two years to find it.

## Torqsted

Our corner of paradise is six acres at the north end of Mono. It is rolling land, with woods and fields on top of sand and gravel. Except in hollows, the topsoil is exceedingly thin. One of the headwaters of Sheldon Creek runs through it in

one direction, and the Bruce Trail in another. Why is it called Torqsted? We had a naming session in the family, which threw up a lot of names, some undistinguished, some inappropriate, some too long (“Old Hearts’ Fancy Fantasy Farm”—in a more alliterative version), and some just not to our liking. A 1996 tornado had gone through this property, damaging the house and destroying a lot of the woods. While the previous owner had the house repaired, the woods were in a sad state. When the woodcutters came to clean up, they discovered that the trees had been twisted by the tornado. Hence the name, which is not intended to reflect on the personalities of the owners.

Moving gardens in relatively quick order is not great fun, though the chipmunks blessed us for bringing those many dozens of pots planted with delicious bulbs and corms. We were starting from scratch here, and we regarded that as an extra gift. But how do you design a new place? Our friends Jacqueline and Paul acquired their place at much the same time as we got to Torqsted, and I asked them about their approach. Jacqueline is very organized and feels comfortable with working on graph paper. Paul, however, just wants to go outside and let the spirit of the place guide him in what he does. My approach is more like Jacqueline’s, I thought, but we really ended up largely on the spirit side. Or maybe it’s in the genes, as with spiders and insects—we beaver away without consciously adverting to the overall design that emerges from our little bits and pieces. We did want certain things to be part of our lives, like rock gardens and vegetable gardens. We did need to deal with “problems,” like a smallish ledge of lawn on the west side of the house and a steep transition area between the septic-field lawn and the lawn on the south side of the house. Out of all these emerged what we have now, which couldn’t and didn’t exist on our preliminary sketches.

The final test of the design is whether the whole is greater than the sum of its parts, whether the spirit of the place has been captured, whether visitors resonate with what we have tried to do. And it turns out that what we subconsciously aimed for is an informal, comfortable place with generally blurred edges between what nature did and what we have done. Of course, Sue and I have not agreed on everything. The east side of our property is a field, bounded by an almost invisible wire fence, and we have had a great vista of the rolling topography to the east and southeast. So I have been against planting trees along the fence. While there would still be a view in our lifetime, the artificial straight line detracts from the natural harmony of the scene and destroys the seamless integration of the distant with the close.

## A Quick Tour

The front of the house faces north. Between the walkway and the house there is a courtyard of irregular paving stones, with various low plants tucked in the occasional spaces. The other side of the walkway borders on a rhododendron bed against the north wall of the house. The rhododendron bed is raised; on the

existing soil we dumped sand mixed with peat and seasoned with sulphur to increase acidity. There are about 20 rhododendrons and azaleas here, giving a great show each spring. This bed is also planted with lilies for later color. A clematis with small urn-shaped flowers clammers through all this for even later color. *Lewisia cotyledon* is also in the bed, doing very well.

A small grassed area to the north borders on the "premier bed." This is chock full of spring bulbs, followed by perennials and annuals, and ending up with *Phlox decussata* hybrids, *Lavatera cachemeriana*, and late-summer *Cimicifuga*. The spring plantings are generally in drifts, and they include merenderas, spring crocus, hyacinths, species and hybrid tulips, and various ornamental onions. As the season progresses, the area gets messier, but there is always something of interest. The premier bed is bisected by a path leading into the deciduous woods. This "premier woodland" is heavily planted with spring flowers, including *Cyclamen*, *Corydalis*, and *Hepatica*. Perhaps the chief moment of glory comes when *Phlox stolonifera* is in bloom. This plant is native to Ontario, though it was not on the property when we came. I brought several different clones that had done modestly well at my previous place. Here, in the sandy soil, they just took off, spreading with great enthusiasm and creating large, brightly colored mats in spring. This has been our experience with some other plants as well; if they are native to Ontario, though not found on this property, they do marvelously well when we bring them in.

*Trillium grandiflorum* is native to Torqued, and it dots the beds as well as providing a groundcover in most of the woods. This of course is a world-class plant that should be in almost every Ontario garden. It is adapted to sun and shade, glorious in bloom, and neat in foliage. In late summer the foliage dies down, so you do want something to follow it.

Coming back to the house, on the east side is the "piano bed," mostly in spring bulbs and roses, then the rock gardens, while the west side of the house looks on to the scree area. Our scree is a lot of gravel dumped over clay subsoil, this being one of the few areas on the site that have clay. Huge boulders edge the two scree terraces descending to the natural ground level. The scree is populated by small plants, and we have been tucking saxifrages and sempervivums in the cracks in the boulders. The scree has very good growing conditions. Fragrant cyclamen and tiny treasures are closer to nose and eye level. We can also look up easily into pendant flowers like epimediums. Here we are close to the edge of the woods, and the grassy path snakes into a woodland path down the hill, where there is a meadow. The meadow is anchored in the middle by a large, irregularly shaped perennial bed, bisected by a deck tucked between two clumps of trees. This is where everyone gathers, watching the children play in the pond or on the grass.

Heading up from here to the field on the other side, you unexpectedly come upon the huge streamside primula plantation, which is hidden by the stream-bank from even a little distance away. This is one of Sue's triumphs. The season starts in the spring with *Primula denticulata* in small cabbages of various intense colors, which are overtaken by tall, multi-storied hundreds of *Primula japonica* in

white, pink, and crimson. Later yet, the hues change to yellow and orange with tall *P. bulleyana*, *P. burmanica*, and *P. sikkimensis*. It just doesn't get any better than this.

If you choose not to come down to the water this way, then from the front of the house you pass through the eastern arbor into a good-sized dell, surrounded by woods on two sides and opening up into the rolling countryside in the east, with great distant views. The woods change into shrubby beds and perennials as they come to the grass.

## Naming Names

Much of our general conversation is about the property, which means that features and parts have to be named, because a query about "the chokecherry on the hillside" is totally nonspecific. Some of the 40 or so names, like "scree," "north vegetable garden," or "west crescent bed," are precisely geographic and descriptive. Others are historic or contextual. When the tree cutters were clearing up the tornado damage, Sue wanted a beech tree taken down so that it would fall on the lawn and not back toward younger trees and shrubs. She quizzed the man, and he assured her that oh, yes, he could do it the right way. No problem at all. But the tree fell into the shrubs, as she had feared. When Sue saw this, she raced out of the house and addressed the man at the top of her voice, in the plummiest English accent that she reserves for similar occasions, almost in exactly these words: "You fumbling moron! Don't you ever touch anything else on this property!" Sue gained a lot of face with the tree cutters, and the area is still referred to as the "moron bed."

The rock garden west of the pool has been designed, planted and maintained by me. Sue called it the "quarry" because she thinks the rocks are far too many and far too intrusive. The rock garden east of the pool has been designed, planted and maintained by Sue. I christened it "plum pudding" because I think it resembles those rock gardens described in English books that have a few rocks stuck into them (and mostly not deeply buried), like a plum pudding with a few fruits and nuts scattered throughout.

This is the story behind the "contentious bed." At my Shelburne house, on the back patio I had a self-designed and -built 8-foot-diameter Lazy Susan table. After 15 years, it was getting decrepit, so I had it rebuilt professionally. The table was much used there. At Torqsted, however, we have a deck, so there was no handy location for it and it ended up between two beds in an existing little dell some distance from the house. It was neither practical nor attractive here. A seriously contentious matter: we could not agree what to do with the area, but Sue definitely wanted the table gone.

In return, I objected to a corkscrew hazel Sue had put at the top of the scree, by a path to the house where, to my eyes, it blighted the neighboring plantings. We made a deal. If I got rid of the table, Sue would have the corkscrew hazel moved to a less prominent spot. This left the problem of what to do with the place where the table used to be. Well, we couldn't agree on the shape of the bed, the composition of the soil, the plants that were going to go into it, and so on. That's why it's

called the “contentious bed,” and true to its name, it’s full of variegated plants, dreadful to my eyes but pleasing to Sue—who was victorious on this one!

## Fie on Bambi

One son of a neighbor feeds deer, the other shoots deer; the deer express thanks and take revenge by outreproducing the shooter. In eastern North America deer have eradicated trilliums in huge areas, and not just trilliums. They don’t confine their diets to “native” plants, either. While I don’t begrudge them hostas, tulips are another matter. When we first came here nine years ago, deer were not a problem, but they are now. Along one of their principal paths the trilliums have diminished. The deer have destroyed young trees, asserted ownership of the vegetable garden, inhaled lilies, azalea and fruit tree flower buds and twigs, and generally wreaked havoc on the gentility of our language. Of course we live in harmony with nature, of course we are naturalists, of course we are “green,” of course we are in favor of motherhood, but we have our limits! Tithing we can live with, confiscation no.

After finding out that we can’t have an electric fence because they do not work in woods, Sue designed and oversaw the construction of a Rube Goldberg deer fence. Our wire fence’s posts are extended by about three feet and strung with three lines of wire. It’s a huge success keeping out elephants, less so with deer. Of course, the deer can and do simply stroll up our driveway or cross where the fencing is not installed yet.

One not-so-ugly method that Sue discovered and that has worked for two winters consists of planting 6-foot bamboo stakes around the perimeter of the vegetable garden and the seedling bed, and stringing these with four levels of fishing line. My contribution to the anti-Bambi campaign has been helping with the bamboosing, and imprecations against the vermin.

## Whose Bed Is It, Anyway?

Sharing beds is the ultimate test. From the beginning, we were determined to share in the planning, planting, and maintenance, and it turns out that each of these is progressively more difficult. With a few exceptions, we have had no problem generally in the joint planning. Planting is a little more problematic. Sue’s style is islands-in-the-Pacific, while mine is euphemistically called Persian-carpet, meaning that plantings are close and interwoven. But there is also a race for the planting spot. The person clearing a good spot must immediately plant it, for the other one will be subconsciously and irresistibly drawn to it in the next half-hour, with a plant in one hand and a trowel in the other. On one occasion I was getting a segment of the seedling bed worked up for a flat that needed planting out and I stuck in a little sign: “Keep out!” Later on, Sue laughingly asked me if I thought that rabbits could read. Just in case they could, she left the sign in for

them. The other problem is that the inviting little spot may be anchored by a dormant bulb recently tucked in by the other person, just a little forkful away from your own planting-in-process.

The most controversial part is maintenance. We are both deeply committed to maintenance. However, Sue notices all kinds of things needing attention that escape my vigilant oversight and accordingly, she is endlessly tivating the beds and plants. This is very generous of her, of course, but it also mistakenly leads her to think that I am shirking my responsibilities, so she constantly moves around a little sign (so it's in my way) which shouts at me: "Don't just stand there, weed!" I should mention that Sue does all the grass cutting and all the major maintenance of mulching, fertilizing, pruning, and trimming.

Deadheading is another issue. Received wisdom is that if you keep deadheading, the plant will retain more vigor, will continue to flower longer, will look neater, and so on. But I want to collect seeds! The inelegant solution to date is that I tie tags to the plants I don't want deadheaded. The solution works, sometimes.

All this has led to a modified military system. There are two beds each with a single commander-in-chief, while the others are under modified joint command with ill-defined rules of precedence.

## Ask Us for Advice

This is our *forte*. We love giving advice. Most especially to each other, and it doesn't even have to be asked for! Sue is so engrossed in it that sometimes she does her chores while telling herself what she should be doing. Giving advice is an art, and ideally it benefits both the volcano and the recipient.

Admittedly, sometimes it is better not to give advice. Sue has planted lavender in the shade and in fairly moist circumstances. I didn't stop her with advice and it was just as well, because the lavender still thrives in those spots after many years.

Bits of gardening advice that we want to pass on to those gardening nearby include the recommendation to plant a lot of things that are originally native to this part of the country, because they do exceptionally well. Phlox and trillium have been already mentioned, but among the many others I also want to mention *Gillenia trifoliata*, a member of the rose family that thrives in shade and in sun. Substantial white flowers cover the shrub-sized perennial in June, and in the fall the seed pods and small leaves turn red. Visitors always ask for seeds or some of the self-sown seedlings.

Of course, you should also plant a lot of things that are not native to your area. We have excellent gardening conditions and most plants do very well. Keep in mind that not just Bambi but smaller critters as well like exotics. Sue and I do not agree on exotic "non-native" plant recommendations. She likes hellebores (escaped pests in New England) and hostas, while I push bulbs and daisies.

More of a warning than advice: the dynamics of joint gardening will make your faces terribly wrinkled—from all the smiling and laughing.

And since you wanted to know, we resolved the windshield wiper issue by the application of the driver's rules. The driver makes all decisions, picks the route, decides on the speed, the temperature in the car, the radio station to be listened to, and Sue sets the speed of the windshield wiper.

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When not gardening, Sue Osyany helps with the Dufferin Arts Council fund raising; Andrew Osyany practices law with Shepherd, Osyany & King LLP in Shelburne, Ontario. This article is based on a talk given several years ago at an Eastern Winter Study Weekend.



*Iris cristata*. Drawing by Doretta Klaber.



# Growing Small Species of *Tropaeolum*

Bill Dijk, Tauranga, New Zealand

**Editor's note:** Western South America has a number of species in the genus *Tropaeolum*, including the familiar *T. majus*, the “nasturtium” grown in temperate gardens as an annual. Most “trops” have tuberous storage organs and annually produce long, leafy flowering stems. In alpine species these stems usually trail on the ground, but species from lower elevations typically climb through shrubs, supported by the clasping pedicels of the leaves. *Tropaeolum speciosum* of the southern Chilean woodlands is a large species often grown in mild gardens and colonizes by spreading roots. The most commonly grown alpine species is *T. polyphyllum*; *T. sessifolium* is rather similar, both being rather large plants that can form extensive colonies by spreading underground.

From drier areas farther north in Chile come such species as *T. azureum* (which can climb more than 6 feet/2 m into shrubs), *T. tricolor* (usually 3–4 feet/1 m; photos, p. 98), *T. brachyceras* (usually 1–2 feet/30–60 cm), and *T. hookerianum* (around 1 foot/30 cm). These smaller species have tubers that rarely increase of their own accord and cannot be divided successfully by cutting them into pieces. Some success is reported with stem cuttings, both tip and internodal, taken before flowering.

The climbing species appreciate some support for their delicate stems and seem to flower much better when they are not left trailing on the ground. Those mentioned tolerate temperatures down to about 20° F under glass in my unheated bulb frames in Oregon, flowering in late winter over a long period. *T. tricolor* and *T. brachyceras* are available commercially as tubers; seed of other species has been offered by Jim and Jenny Archibald ([www.jjaseeds.com](http://www.jjaseeds.com)). Here Bill Dijk describes how he propagates and manages these fascinating plants. —Jane McGary

I have been reasonably successful in germinating and growing these charming, delicate, often temperamental and unpredictable *Tropaeolum* species, especially the exquisite *T. azureum*.

I don't think that I am doing anything special as far as the cultivation of the “trops” is concerned, apart from a sensible application of horticultural practice. Perhaps our climate on the coast of New Zealand's North Island may be more congenial to growing these sometimes difficult species.

I usually sow the seed in late winter or early spring, in a seed tray 10 cm deep, in a free-draining seed compost, with perhaps extra pumice added, covering the seeds with 5 to 10 mm of coarse horticultural sand to keep the weeds down. I keep the seed boxes outside (rather cool, around 5–10° C) on open but covered benches, away from the frost and heavy rain, to reduce the damage to the delicate, threadlike seedlings once they're up. The seeds should germinate quickly under cool but frost-free conditions.

As the plants grow, water them freely and grow them on in a cool greenhouse or conservatory with plenty of ventilation. It's important to make sure that the young seedlings don't get waterlogged, or too hot, or both, which could result in rotting or damping off. Keep them growing as long as possible, until they go dormant naturally, then keep the little tubers dryish (not bone-dry) until new growth appears.

Generally they are best left undisturbed once established. To replant mature (freshly sprouted) tubers again, sometimes during autumn, I usually select a suitable deep container.

I plant them in a well-drained, slightly acid potting mix, 10 cm. deep, in a sunny position.

I usually attach wire netting around the container for support at planting time to avoid damage to the delicate new shoots later on; their emerging threads are almost invisible. I place the tubers near the outside of the container so that their shoots will get immediate support from the wire netting, which is vital for a good start.

*Tropaeolums* require sufficient moisture during the growing season, but don't overwater, which could result in rotting of the tubers. As the foliage dies and the plants go dormant, the pots or containers should be stored in a dry but cool place. Gradually withhold water until the compost is nearly dry. The tubers can then be carefully shaken out and repotted or split up if required. Restart them into growth next spring by gradually increasing watering.

# Verbascum: Not Your Typical Alpine Plant

Panayoti Kelaidis

I know, I know: you all think I grow plants that are too big in the rock garden. Well, doesn't the legendary *Puya raimondii* tower to several dozen feet on the highest plateaus of the Andes? Hooker's thistle and Parry's primrose can grow to several feet in our Colorado tundra, and let's not even begin to talk about *Meconopsis*.

But in fact, there are some very small mulleins. The prize for the tiniest one I have grown thus far definitely goes to *Verbascum acaule* (formerly *Celsia acaulis*) from the high mountains of the Peloponnese in Greece. This short-lived perennial produces very primula-like basal rosettes of foliage a few inches across, with a constant succession of single, stemless flowers on scapes perhaps 2 inches (5 cm) tall, if not actually sessile. I first obtained this from seed collected in the wild by David Hale of Portland, Oregon. I was thrilled a few years ago to be able to give him seed back (he had lost the plant), and after many attempts, it is now self-sowing moderately in our choicest rock garden.

The next step up from this is the various compact, shrubby verbascums from Turkey and Iran—*Verbascum dumulosum* (photo, p. 108) from the former, *V. pestalozzae* from the latter. They form dense mounts generally under 4 inches (10 cm) tall, with compact clusters of yellow flowers just above the foliage. Properly situated, they can grow very wide: I remember one specimen clambering nearly a yard (1 m) over the face of a wall on the trough patio of the Royal Botanic Garden, Edinburgh. A true chasmophyte (cliff-dweller) is *Verbascum arcturus* (formerly *Celsia arcturus*; photo, p. 108), which favors vertical limestone crevices in nature but can be grown in less extreme sites in the rock garden.

There are alluring hybrids between these miniature shrubby mulleins and other, purple-flowered species, which are unfortunately sterile but fortunately quite beautiful. Their flowers come in shades of umber, burnt sienna, and other evocative Tuscan tints. They are likely to volunteer in gardens where *V. acaule* and *V. phoeniceum* are grown in proximity, and some have been named and are in commerce, propagated from root cuttings. I grew a particularly nice group of these for almost a decade before losing them entirely. (A miniature form of *V. phoeniceum*, with stems only about 8 inches/20 cm tall, circulates under the name

*V. atrovioleaceum* (photo, p. 108), and it would be fascinating to make deliberate crosses between this and a small yellow-flowered species.)

Probably the hybrid most often grown in rock gardens is *Verbascum* 'Letitia', a shrubby offspring of *V. dumulosum* and *V. spinosum*. Sterile and propagated by stem cuttings, it grows about 8 inches (20 cm) tall and perhaps 2 feet (60 cm) wide, producing many stems of light yellow flowers over a long period in summer. It can be long-lived even in humid climates, if given perfect drainage and a lean soil.

But when most of us think "mullein," we think of plants with vast fuzzy rosettes and tall, tall stalks. I recall the first time I saw the best of these, *Verbascum bombyciferum*. It must have been in the early 1980s, at Faith and Frank Mackanness's astonishing garden near Corbett in Oregon's Columbia River Gorge. How could one overlook the immense white rosettes growing in the midst of their impeccable perennial border, a perfect picture framed by a neatly trimmed conifer hedge. I had never seen a mullein so wonderful, all the plants grown to perfection and looking as fluffy in February as they would in high spring. I simply had to have it. In the meantime I settled for various imposters and pretenders from the seedlists that would pass over my desk.

Europeans, and perhaps Germans in particular, have a weakness for mulleins. I found one or two botanic gardens that listed dozens of species. Who could resist? Soon a parade of giant-leaved, variable mulleins began to show up in the Rock Alpine Garden of the Denver Botanic Gardens—in the "wild garden" portions, incidentally. By the early 1990s we had grown several dozen species and selections, and had barely tested the waters. Greece and Turkey are the epicenter of the genus, and literally hundreds of species have been described from these countries; dozens more radiate thence all the way to Spain in the west and to Central Asia in the east. The common mullein, *V. thapsus*, has naturalized practically throughout the globe.

The archetypal mullein forms an immense rosette of silver, or more often downy yellow, leaves (the deeply lobed leaves of *V. sinuatum* are seen on p. 108). The rosettes may occupy a circle almost a meter in diameter; these are emphatically not plants for intimate spaces like troughs, or most of our rock gardens. And the flowering stems can tower to 2 meters or more if the soil is rich and the season benign. You will probably be relieved to hear that most mulleins are monocarpic—that is, they die after flowering. You may be distraught to learn that a healthy stand of a few mulleins can produce tens if not hundreds of thousands of seeds, and each one of these has a lust for life that Falstaff would have envied.

If you have grown more than one species of mullein, you very likely have had hybrids appear in your garden. The hybrids are often intermediate in character between the parents, and often show considerable heterosis ("hybrid vigor"), growing taller than either parent. Many of these hybrids, like those mentioned above, are quite desirable, and if one of the parents is perennial, it often passes this trait on to its offspring. Fortunately, perhaps, the great bulk of hybrid mulleins are sterile, and a desirable hybrid must be propagated by stem or root cuttings,

not easily done without greenhouse facilities. Very rarely, a hybrid can be fertile, and this appears to have happened in the Watersmart Garden at DBG with a hybrid between *V. rorippifolium* and *V. pyramidatum*. The intermediate progeny seeded true, forming an extensive colony. When this freakish event occurs, some botanists would regard the new, stable cross as a viable species. This is undoubtedly what has occurred over time immemorial in nature, accounting in part for the hundreds of species of mulleins in Asia Minor, in particular.

Mulleins are largely not for intimate spaces of miniature gardens, but most of us in the Rocky Mountain region also have dry gardens, which we insist on calling “xeriscapes.” Here mingle the best Eurasian and African drylanders with penstemons, eriogonums, and other gems of the North American West. Verbascums can blend in perfectly here, often stealing the show. Rare indeed is the Colorado garden where verbascums haven’t charmed their way in—and there are wonders in the genus yet to be discovered.

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# Bulbs for the Rock Garden

Gerald Taaffe

The first sight of spring meadow saffron (*Bulbocodium vernum*; photo, p. 112) in my garden was in very early spring, when the raised rock garden was just emerging from its covering of snow and generally still a drab, wintry gray. It was a flash of purple-pink so bright that I bundled up and went out to remove what I thought was surely a candy bar wrapper that had blown in from the street. At that early stage, the wide, strap-shaped petals seem to spring stemless from the ground in a flower midway in appearance between a crocus and a colchicum. The leaves appear only a few weeks later, when they blend in well with the mid-spring riot of new growth.

Thanks to its squirrel-discouraging mulch of small river pebbles, the rock garden is the only place where I can grow meadow saffron, as well as crocus and other small, shallowly planted bulbs. The bushy-tailed little rodents easily sniff out new plantings, but draw the line at risking their precious paws by digging through the stony mulch.

First to bloom after the meadow saffron are the various "snow crocuses," which in fact can push up through lingering patches of snow. Among them are the many forms of *Crocus chrysanthus* and *C. biflorus* and their hybrids. Unlike the larger-flowered *C. vernus* selections, these multiply quickly in the garden. A single bulb soon spreads into a tight and highly attractive cluster of a dozen or more delicate goblets of color. Names to look for are 'Goldilocks', 'Gypsy Girl', 'Cream Beauty', and 'Zwanenburg Bronze.'

Another snow-piercer is the winter aconite (*Eranthis hyemalis*), which sends up cup-shaped flowers of bright yellow on a whorl of narrow green bracts. To get the full effect, I follow the accepted wisdom of planting the little tubers in sizeable clumps. Since it's not always clear which end of the little tuber is up, I hedge my bets by planting them sideways.

Some of the small bulbous irises are almost as early, notably the various lovely species of the netted, or *Reticulata*, section. The various forms of *Iris reticulata* and *Iris histrioides* bloom in shades of pale blue, purple or raspberry. Winogradoff's iris (*I. winogradowii*; photo, p. 112) has large flowers of pale primrose yellow. Crossed with the reticulate or histrioid irises, it has given us some lovely, almost white hybrids, including 'Frank Elder'.

The more meticulous rock gardener will want to put in crane's-bill (*Erodium* sp.) or other small, leafy plants to cover the narrow, 50-cm leaves of these irises, which spring up soon after the flowers.

The same caveat applies to the very early blooming Bokhara iris (*Iris bucharica*), which has exceptionally good-looking flowers, the falls of which have translucent white shafts tipped by blades of the brightest yellow. The leaves start out pretty and glossy but enter a messy-looking process of decay almost immediately after flowering.

Two small tulips that have worked well for me in the rock garden are the various forms of low-growing tulip (*T. humilis*), in its many shades of red, pink, and violet, and the golden lady tulip (*T. clusiana* var. *chrysantha*), a little beauty of clear light yellow, blushed red on the outer side of the tepals. The great advantage they have for the rock garden is narrow, grassy leaves that fit in well even after the flowers have faded.

A final note is for the many lovely little fritillaries, including the tried and true checkered lily (*Fritillaria meleagris*; photo, p. 112) and low-growing, dun-coloured *F. michailovskyi*. Adding to their number are many species in yellows, greens, and purples that I hope to try in the near future, including the rock-garden-sized Kurdish fritillary (*F. crassifolia* subsp. *kurdica*).

As for the big fritillaries, beginning with the widely planted crown imperial, their scent can be strong enough scare off squirrels without the help of a river-pebble mulch.. To my mind at least, this is a good thing.

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Gerald Taaffe gardens in Ottawa. This article previously appeared the Newsletter of the Ottawa Valley Rock Garden Society, November 2007.

# 2007

## Photo Contest Results

The 2007 *Rock Garden Quarterly* photo contest drew a good number of entries, and as usual the judges' task was even more difficult than the year before. This may be due to the increasing familiarity of photographers with the digital medium, though slides and a few prints continued to be entered and receive good marks.

Instructions for entering the 2008 contest appear following this article. We hope many more of you will give it a try. Many of the best photographs are published in this magazine, and all of the digital entries are potentially valuable to illustrate our articles in future years. In addition, there are prizes offered.

### Grand Prize

Jim McClements, *Asarum speciosum* (Class 3)

### Class 1, Portrait of a plant in the wild

1. David Sellars, *Daphne cneorum* in the Pyrenees
2. Bernard Jackson, *Cypripedium acaule* f. *albiflorum*, eastern Canada
3. David Sellars, *Erigeron compositus*, Olympic Mountains, Washington
4. Ian Plenderleith, *Campanula lasiocarpa*, Yukon Territory

Honorable mentions:

Yoko Arakawa, *Bomarea dulcis*, Peru; *Viola* sp., Peru; *Anemone deltoidea*, Oregon; *Luetkea pectinata*, Oregon  
Denis Hardy, *Anemone drummondii*, Oregon; *Lewisia pygmaea*, Wyoming; *Lewisia rediviva*, Idaho  
Bernard Jackson, *Caltha leptosepala*; *Empetrum eamesii*; *Empetrum nigrum*; *Vaccinium vitis-idaea* ssp. *minor*  
Jack Muzatko, *Lewisia rediviva*, California; *Lewisia glandulosa*, California  
Ian Plenderleith, *Penstemon gormannii*, Yukon; *Arctostaphylos alpina*, Yukon  
David Sellars, *Androsace ciliata*, Pyrenees\*; *Androsace laggeri*, Pyrenees\*; *Claytonia lanceolata*, British Columbia; *Daphne cneorum* var. *pygmaea*, Pyrenees; *Dodecatheon cusickii*, British Columbia; *Penstemon davidsonii* ssp. *menziesii* (\*published in our winter 2008 issue)



Doris Taggart, *Penstemon barrettiae*, Washington; *Castilleja rupicola*, Washington  
Stefania Wajgert, *Epilobium fleischeri*, Iceland; *Gentianella* sp., Iceland;  
*Mertensia maritima*, Iceland; *Silene acaulis*, Landmannalaugar  
John Zabkar, *Drosera rotundifolia*

### **Class 2, Plants in a natural scene**

1. Yoko Arakawa, *Aquilegia coerulea* in Wyoming
2. David Sellars, *Anemone narcissiflora*, Pyrenees (published on the back cover, winter 2008)
3. David Sellars, *Campanula piperi*, Olympic Mountains, Washington
4. Stefania Wajgert, *Campanula alpina*, Tatra Mountains

Honorable mentions:

Yoko Arakawa, *Helianthella uniflora*, Wyoming; alpine meadow, Oregon  
David Sellars, *Adonis pyrenaica*, Pyrenees; *Erythronium montanum*, Olympics, Washington  
Doris Taggart, *Erigeron oregonus*, Oregon; natural rock garden, Tronsen Ridge, Washington  
Stefania Wajgert, *Caltha palustris*, Tatra; *Dryas octopetala*, Iceland; *Silene acaulis*, Tatra; *Thymus serpyllum*, Iceland

### **Class 3, Portrait of a plant in cultivation**

1. Jim McClements, *Asarum speciosum*
2. Jack Muzatko, *Lewisia cotyledon* 'Ashwood Strain'
3. Stefania Wajgert, *Synthyris reniformis*
4. Bernard Jackson, *Cypripedium calceolus* var. *planipetalum*

Honorable mentions:

Denis Hardy, *Lysichiton camtschatcense*; *Papaver rhaeticum*  
Jürgen Hornburg, *Penstemon rupicola*; *Edraianthus pumilio*; *Gentiana acaulis*  
Bernard Jackson, *Loiseleuria procumbens*; *Vaccinium macrocarpon*  
Jim McClements, *Arisaema thunbergii* ssp. *urashima*; *Lysichiton camtschatcense*; *Sanguinaria canadensis* 'Betty Casto'  
Jack Muzatko, *Lewisia* hybrid; *Dudleya ingens*; *Mammillaria theresae*  
David Sellars, *Aquilegia bertolonii*; *Edraianthus serpyllifolius*; *Gentiana verna*; *Primula auricula*; *Pulsatilla vulgaris* ssp. *grandis*  
Stefania Wajgert, *Astragalus incanus*; *Callianthemum anemonoides*; *Geranium argenteum* 'Rubrum'; *Ramonda myconi* 'Alba'; *Soldanella alpina* 'Alba'; *Veronica caespitosa*  
Esther Wrightman, *Androsace villosa*; *Haberlea rhodopensis* and *Gentiana*; *Sedum pilosum*  
John Zabkar, *Trillium albidum*; *Delosperma compressum* 'White Nugget'; *Edraianthus pumilio*

### **Class 4, Rock garden scene**

1. David Sellars, waterfall with *Lewisia tweedyi*
2. Jack Muzatko, rock garden with miniature plants (in fall 2007, p. 340)

3. Irene Wrightman, limestone crevice garden
4. Doris Taggart, rock garden at Lake Wilderness Arboretum, Washington

Honorable mentions:

Yoko Arakawa, *Tulipa maximowiczii* at Chanticleer Garden; *Tulipa* 'Lady Jane', Chanticleer

Dick Bartlett, Milan Cepicka garden; garden built by Josef Halda; Bartlett garden in bloom; Ota Vlasak garden

Jürgen Hornburg, Hornburg rock garden

Jack Muzatko, group of succulents

David Sellars, late spring profusion; pond and waterfall

Doris Taggart, Labyrinth Garden, Edgewood, Washington

Stefania Wajgert, three views of Wajgert garden, Poland

John Zabkar, *Amsonia ciliata* and *Aubrieta*



*Gypsophila cerastioides*. Drawing by Doretta Klaber.

# Plants in the Award-winning Photographs

*Asarum speciosum* (photo, p. 107) is a native North American woodlander, endemic to a small range in central Alabama. It has also been called, especially in regional floras, *Hexastylis speciosa*. Jim McClements's photograph shows the early spring flowers, which, like those of most asarums, are borne close to the ground, below the foliage (evergreen in this species), where they are pollinated by ground-crawling insects and slugs. McClements cultivates this specimen, obtained from Woodlanders Nursery in 1989, in several spots in his Delaware woodland garden, along with a great variety of rare and choice plants, many from mild temperate forests around the globe. The plant is growing in deep, well-drained humus and leafmold and experiences rainfall fairly evenly through the year.

*Sanguinaria canadensis* 'Betty Casto' (p. 107), grown and photographed by Jim McClements, was a gift to him from Matt Bishop in 1998. Bishop, an English gardener, received it from Harry and Betty Casto while working as a garden designer in Charleston, West Virginia. He writes, "During a slide show of the many plants they grew I gasped at the sight of a *Sanguinaria* which has petaloid anthers and very narrow petals quite unlike anything I had seen back in England. They later gave me some pieces of this plant which, with their permission, I named 'Betty Casto'." He gave divisions to several growers in both eastern and western North America, whence, it is to be hoped, this striking plant will eventually spread via nurseries.

*Loiseleuria procumbens* (photo by Bernard Jackson, p. 109) is a circumboreal species, the only one in its genus, distributed in far northern regions of Eurasia and North America and also in high mountains farther south in both continental masses. Its common name is Alpine Azalea, reflecting its close relationship to the genus *Rhododendron*. A mat-forming shrub, it grows pressed close to rocky or gravelly surfaces, usually in pockets of acid soil although the rocky substrate itself may be calcareous. Its clusters of tiny deep pink flowers can nearly cover the plant in midsummer. Coveted by rock gardeners, it is most likely to succeed at higher latitudes or elevations where it experiences the long winter dormancy and short, cool growing season to which it is adapted. Propagation is by seed or cuttings.

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# BOOKS

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***Native Ferns, Moss and Grasses: From emerald carpet to amber wave—serene and sensuous plants for the garden***, by William Cullina.

Hardcover, 272 pp. Houghton Mifflin, 2008. ISBN 978-0618531189.  
\$40.00 (\$26.40 at amazon.com).

Reviewed by JOHN SCOTT, Rockland Botanical Garden, Mertztown,  
Pennsylvania

With so many new books dedicated to one group, family, or genus of plants, it is nice to see one book covering several groups without being too general. *Native Ferns, Moss and Grasses* covers foliage plants: “A garden without ferns,” Cullina writes, “is simply incomplete.” The emphasis is on ecological gardening principles that can be applied to any garden and any plant, so even if you don’t like these particular plants, there is a wealth of propagation and growing information. After reading this book you may even be excited about growing mosses. Although ferns are generally thought of as shade plants and the grasses as plants for sunny locations, the treatment here helps you find the right fern for a sunny location and the right grass for shade. There is ample material for the rock gardener!

My review copy is only a black-and-white “advanced uncorrected proof” without most of the photo captions and without the index and final proofing. I assume that the final product will be first-rate. The promotional materials indicate that 85% of the photographs were taken by the author. They should be spectacular in color. There is at least one photograph on each page, illustrating natural habitats, growth, and form rather than just being portraits. The astute gardener will want to reproduce some of these landscape pictures in his or her own garden.

There is an extensive introduction on what is a native plant, understanding plant hardiness, and various aspects of cultivation. There is a lot to consider in trying to grow a plant out of its natural range and habitat. I, for example, have given up trying to grow western American plants in Berks County, Pennsylvania. Also, even though I’m supposed to be in zone 6, only about one-third of plants rated zone 6 have survived here more than a year or two.

Part 1 of the book covers ferns, part 2 mosses, and part 3 grasses, sedges, and rushes. Part 4 covers propagation from spores, seeds, or cuttings. The book concludes with tables of when to sow and when to take cuttings or divisions for each of the three groups of plants, arranged alphabetically by genus. Following this are lists by group for various needs and conditions, an extensive list of sources of native plants, and a list of plant societies, related organizations, botanic gardens, and arboreta specializing in native plant displays and/or conservation, a short bibliography, and a brief glossary—although the author, to his credit, doesn't snow us with a lot of scientific jargon.

Cullina's goal was not an encyclopedia but a presentation of the best species for gardens in temperate North America. He points out that he could choose just several hundred of the 1,500 native sedges and grasses. He chose what he considers the most useful garden plants. A rating of how difficult each is to grow will aid the novice, although one man's "easy" is another's "difficult." My knowledge is greatest in the fern area, so I concentrated on that section.

For each species there is notation for zone, light, soil (moisture and type), native region, height, width, and culture (including difficulty). The sometimes extensive ensuing paragraphs offer more about soils, hybridization, and other idiosyncrasies of a given species. The nomenclature for the most part follows *Flora of North America*. (One unnecessary confusion, especially in a horticulture book, is the use of the subgenus *Parathelypteris* for some of the marsh ferns and the New York fern.)

In summary, this is a useful book for the gardener who has avoided these interesting groups of plants, not recognizing their beauty and usefulness in the garden. The information is detailed enough that you won't have to consult other works to find the right plant for the right site in your garden. Cullina has been applauded for his style, which is both informative and entertaining. This is a book you will want to read for both pleasure and knowledge.

***Garden Bulbs for the South***, by Scott Ogden. 2nd ed. Portland: Timber Press. Available at a discount from NARGS Book Service.

Reviewed by LEE POULSEN, Pasadena, California

For all those who find Thad Howard's *Bulbs for Warm Climates* a must-have reference, Scott Ogden's *Garden Bulbs for the South* will be an indispensable complement. It has not quite twice as many pages as the first edition (1993), and there are many more photos, which are on the pages where the species are described. There also seem to be many more species in each family described, and in greater detail. Those who liked Ogden's almost story-like style of writing in the first edition will be disappointed by the new edition. I, however, am not. That was the one thing about the first edition that made it difficult for me to use: I had to read through the text to find the description of a species I was looking for, and it was often buried in the middle of a narrative about several different species.

This edition is much better at describing each species in a genus, one by one. Ogden has done a good job of incorporating a huge amount of new data and knowledge that he has accumulated over the past 13 years since the first edition appeared, including a greatly increased ability to hunt down many of these little-known species around the world and try them out (in Austin, Texas—of all places, my home town!). I especially love the way he tells the stories and origins of the better-known species or cultivars in each genus, including a best guess as to what the parent species are.

This is also one of the very few books that tells you what bulbous plants will and will not grow in the sometimes difficult conditions of a warm humid climate, as opposed to the warm dry (Mediterranean) regions. And it tells you how to get them to grow and flower.

And it's quite up to date. The source list mentions a number of nurseries and seed merchants well known to bulb enthusiasts, such as those of Kevin Preuss, Kelly Irvin, Bill Welch, Roy Sachs, Russell Stafford, Tony Avent, Ellen Hornig, Jim Shields, Diana Chapman, Cameron and Rhoda McMaster, Dirk Wallace, Lauw De Jager, Dash Geoghegan, Paige Woodward, and Rachel and Rod Saunders, as well as telling how to join the Pacific Bulb Society and subscribe to its active e-mail discussion group.



## NARGS COMING EVENTS

**2008 Annual General Meeting:** June 12–15. Ottawa University, Ottawa, Ontario, with field trips to unique vegetation communities. Hosted by Ottawa Valley Chapter. Registrar: Randy Mason, P.O. Box 9504, STN-T, CSC, Ottawa, ON, Canada K1G 3T7.

**2009 Eastern Winter Study Weekend:** January 30–February 1. “Global Warming and the Rock Garden.” Hosted by the Potomac Valley chapter at Sheraton Reston Hotel near Washington, DC’s Dulles Airport.

**2009 Western Winter Study Weekend:** March 13–15. “Revitalizing the Rock Garden.” Hosted by the Columbia-Willamette chapter at Doubletree Lloyd Center Hotel, Portland, Oregon. Registrar: Jan Dobak, 2921 NE 25th Ave., Portland, OR 97212; [jddobak@pcez.com](mailto:jddobak@pcez.com)

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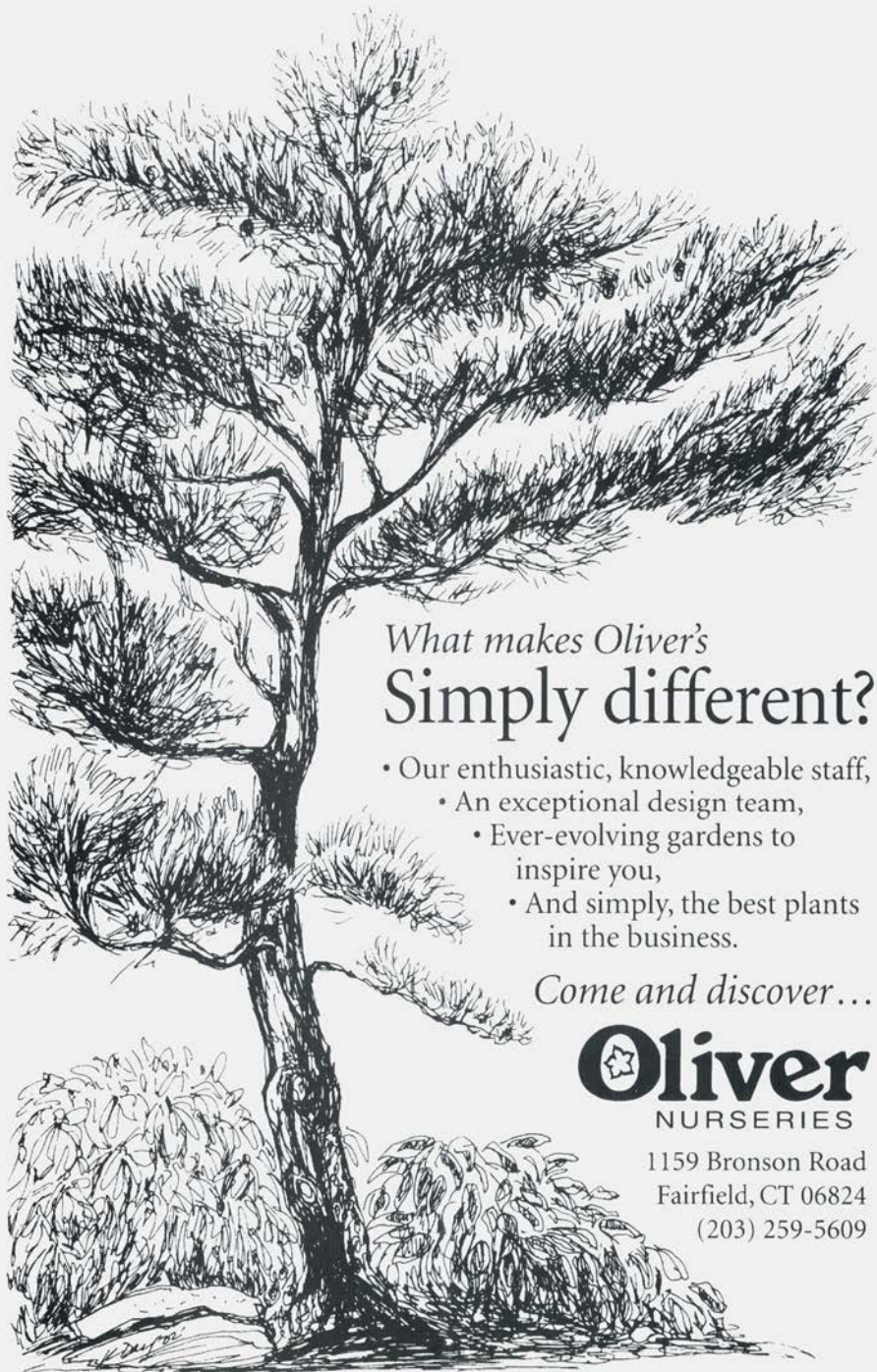
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*Iberis pygmaea*. Drawing by Doretta Klaber.



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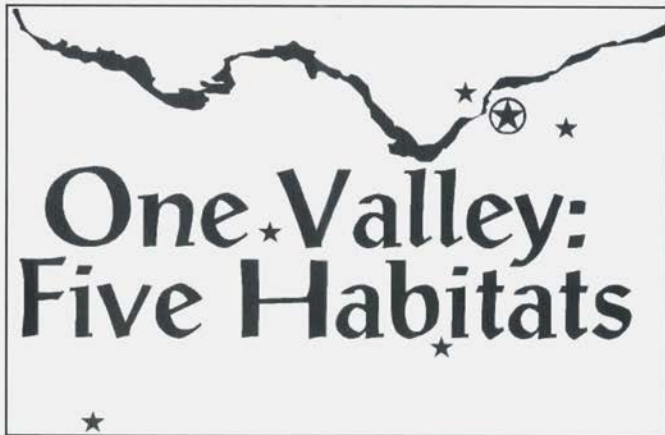
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