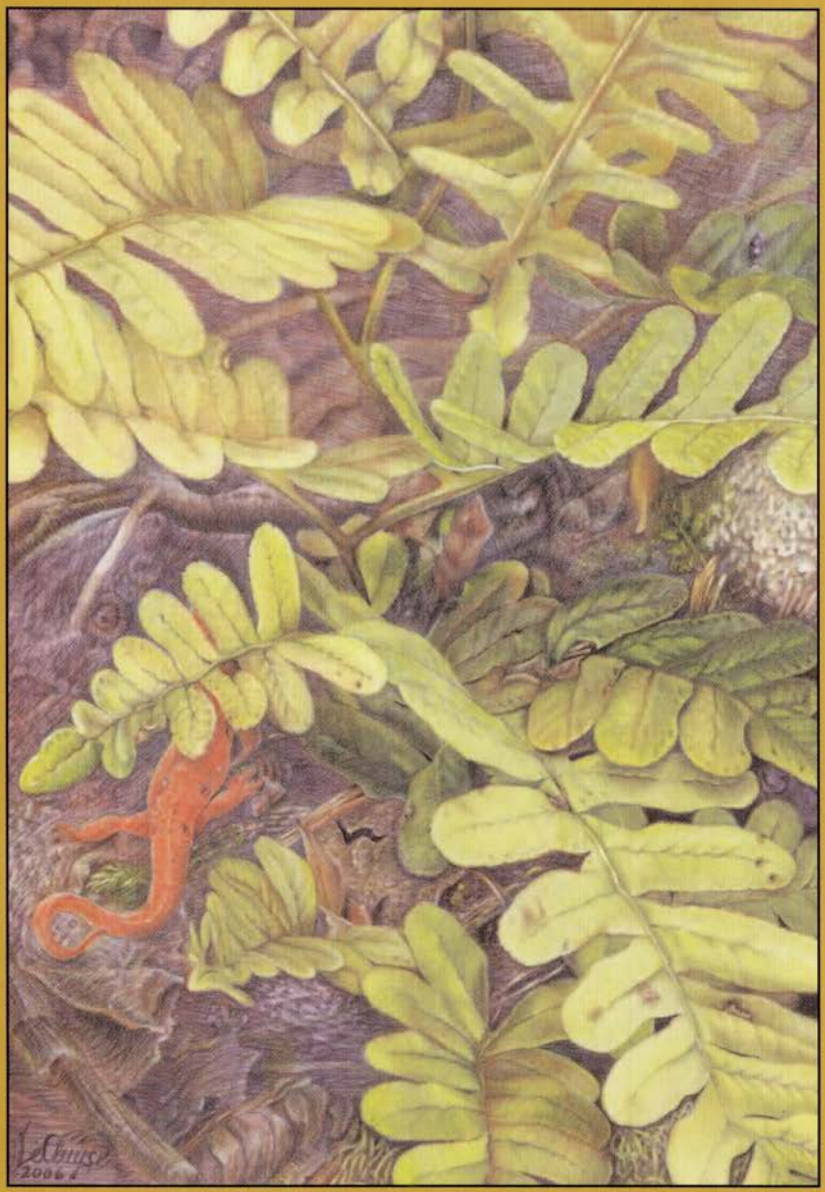
ROCK GARDEN *Quarterly*



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Front cover: *Polypodium* (*Pleopeltis*) *polypodioides*. Painting by Jean LeCluyse.

Back cover: Two color forms of *Corallorhiza maculata*, photographed in Oregon by Tanya Harvey.

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ROCK GARDEN *Quarterly*

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Contents

Editor's Note

What ancient branch of biophilia—humans' purportedly innate love of other living things—wakens in our response to ferns? I think it must be the places they evoke: places of shelter, coolth, and the promise of water, places humans and their ancestors must always have sought.

Because we associate ferns with such settings, coming upon them in seemingly inhospitable places is a particular delight. The ferns that peep out from harsh rock outcrops are those that most tempt the rock gardener. My most vivid memory in this regard is of walking up a canyon in the Coast Range of northern Chile in search of *Leontochir ovallei*, a rare, spectacular plant closely related to *Alstroemeria*. Before I found *Leontochir*, a speck of bright green in a rock crevice caught my eye, the most verdant hue in this baking place. It proved to be a minute *Adiantum* or maidenhair fern (photo, p. 282). Somewhere deep in the red cliff, its roots were finding moisture.

My first encounter with the rustyback fern, *Asplenium ceterach* (syn. *Ceterach officinarum*), was equally picturesque. We had stopped by a cemetery in Crete to see a chapel with well-known murals. In the corner of the cemetery was an ossuary, where, in a time-honored Mediterranean practice, bones removed to make room for new burials were laid in a deep pit. In pockets worn into the lime plaster of the domed structure grew neat little golden-brown ferns (p. 282). I'd love to grow it someday, if I can find a substrate limy enough to satisfy it. Its curling, velvety little fronds are irresistible.

On a trip to Australia a couple of years ago, I found myself most attracted to watching birds and checking out ferns. On Wilson's Promontory on the south coast I walked from the high point, Mt. Oberon, across the peninsula to lovely Sealers Cove, then back up. There were big ferns perched on rocks, lacy ferns climbing cliffs, and a tree fern forest traversed by a boardwalk (p. 264) as the trail neared the sea. A trip across the water to Tasmania introduced me to more ferns; especially impressive was a moorland near Cradle Mountain where a *Gleichenia* species covered acres like a green lava flow.

Here in the foothills of the Oregon Cascades, only ferns tolerant of summer drought and fast-draining soils can be grown easily. Our most common native rock fern is *Polypodium glycyrrhiza* or licorice fern, which goes dormant in summer unless artificially watered and springs back into growth with the arrival of the fall rains, carrying on through frost and snowfall. To bring it into the garden, I find rocks in my woodland that it has colonized, spreading its rhizomes beneath the ubiquitous Northwest moss, and I move rock, moss, and fern together. This fern also colonizes neglected, mossy roofs and would be a good choice for "eco-roofs" in shady situations.

Searching for Saxifrages: A Journey through the American West

Part 2: Northwest and Rocky Mountains

Malcolm McGregor

In the first of these two articles (published in the summer 2006 issue) I wrote about the Alaskan leg of a four-week trip I made in 2005, with the support of a generous award from the NARGS Norman Singer Endowment Fund. Although that was not the first part of my trip chronologically, an understanding of the rich variety of saxifrage species found in Alaska provides a valuable underpinning for making sense of the species found farther south in the Rocky, Cascade, and Olympic mountains.

The Saxifrage Family in North America

Anyone surveying the saxifrages of North America will end up recognizing the fantastic diversity of the family. Alongside the classical saxifrages of genus *Saxifraga* is a whole back story of foamflowers (*Tiarella*), woodland stars (*Lithophragma*), alumroots and coralbells (*Heuchera*), Indian rhubarb (*Darmera*), and others. As much as in the eponymous genus, it is in these others that the glory of the saxifrage family is found in the Americas. From Mexico to Alaska, from Greenland to damp lands in the South, in every U.S. state and every Canadian province, there are saxifrages to find and grow. And then there are plants which have in the past been considered as belonging to the family but have been rezoned by botanists. A wonderful range of shrubby genera such as the currants (*Ribes*) and mockoranges (*Philadelphus*), both good North Americans, and introduced genera such as *Escallonia* and *Hydrangea* were once included in the family.

Of the 22 or 23 genera that make up the saxifrage family in North America, seven have five or more North American species. This might make the smaller genera sound fairly insignificant, but these include *Astilbe, Darmera, Elmera, Leptarrhena, Telesonix, Tellima, Tiarella*, and *Tolmiea*, all of which might well find a place in the garden. The remainder are perhaps less obviously plants that most gardeners might try—*Bensoniella, Bolandra, Conimitella, Jepsonia, Lepuropetalon,*

Saxifragopsis, Suksdorfia, Sullivantia—although I have tried a number of them myself, and the beautiful *Suksdorfia violacea* is definitely on my "wants" list. Already we have a great basis for a collection in the garden. But what of the larger genera? *Chrysosplenium* has another five species, *Boykinia* six, *Lithophragma* nine, and *Mitella* eleven. Even today the USDA website treats *Parnassia* as belonging to the saxifrage family (Saxifragaceae), and since they are plants I love I would like to include them—there are nine species—but they really belong in a family of their own (Parnassiaceae).

The broad taxonomic framework of the saxifrage family has three arms. One supergroup encompasses many of the smaller American genera: *Astilbe, Saxifragopsis, Bolandra, Boykinia, Sullivantia, Jepsonia, Telesonix,* and *Leptarrhena*. The second broad group has a number of exclusively American genera such *Heuchera, Elmera, Darmera, Tellima,* and *Tolmiea*, along with more widespread *Tiarella, Chrysosplenium, Rodgersia, Bergenia, Mukdenia*, and the Micranthes and Merkianae sections of genus *Saxifraga*. The last of the three broad groups has the remaining thirteen sections of the genus *Saxifraga* (for an overview of these sections, see Part 1). These three groups, explored by genetic analysis, match our morphological analysis of the various plants. Only two of these genera have more than a dozen species: *Heuchera* and *Saxifraga*, with around 36 and 60 North American species, respectively. Of those 60 *Saxifraga* species, 40 are Micranthes saxifrages.

Compare the situation in North America (22 or 23 genera) with that of Europe, where the family as a whole is represented by only three of these genera: *Chrysosplenium* with 5 species, *Saxifraga* (112), and *Micranthes* (7). The saxifrages of Europe do include some beautiful species that are amenable to being grown in the rock garden, but the New World saxifrages are a far more diverse group of plants, and their ubiquity across the continent makes them much easier for many gardeners who otherwise might believe they are unable to grow saxifrages.

The Micranthes Saxifrages of Yellowstone

While searching for saxifrages in the mountains of the interior West, I had no local contact in Montana, but my son, who is based in Washington, D.C. with Greenpeace US, flew out to join me in Bozeman, Montana. Bozeman is around 90 miles north of the West Entrance to Yellowstone National Park and slightly closer to the North Entrance—either way a couple of hours, stretching to four or five with stops to look at the plants.

The main species for which this is a prime location are Micranthes saxifrages such as *Saxifraga subapetala*, the Yellowstone saxifrage. This is closely allied to *S. oregana*, also found in the area, usually in a form that used to be called *S. montanensis*, and I was particularly keen to clarify these, in my own head if nowhere else, as well as to look for other species such as *S. rhomboidea*, the snowball saxifrage, and *S. nidifica*. Had time allowed I would have liked to cross from Anaconda up to Lost Trail Pass and then down the Bitterroot Valley and on to Lewiston, Idaho, to look for *S. tempestiva* in the Anaconda Range and *S. idahoensis* above Lewiston.

For saxifrages in the Middle Rocky Mountains, the Yellowstone region looms large among the locations recorded on the herbarium sheets used by botanists from Engler on. Engler's early-1900s citations in *Das Pflanzenreich* provide the plant hunter, even today, with an invaluable trail; this was particularly important because I had no companion with detailed local knowledge. The Yellowstone is important in part because there were expeditions recording the flora from the time that Lewis and Clark first crossed the Continental Divide. In particular, Frank Tweedy, Per Axel Rydberg, Charles Bessey, Aven Nelson, and Elias Nelson (a student of Aven but no relation) all collected specimens of Micranthes in the region. The old records mention saxifrages found, notably in the Spanish Peaks, Gallatin County, just south of Bozeman, but a number of attempts we made to find appropriate and unspoiled habitat proved abortive. Parts of this general area look great in films like *The Horse Whisperer* or *Brokeback Mountain*, but the land is now mostly farmland rather than wildland. In Yellowstone itself, the bear population doesn't make it the most appropriate spot for hiking. Nevertheless, although it took us the whole week, we did find most of the plants for which this was the key location, in particular *Saxifraga subapetala* and *S. oregana* var. *montanensis*, both of which have a dense column of flowers tight to the main stem. This is a form shared with few other species of *Saxifraga* or *Micranthes* but not unlike the general form of some *Heuchera* species.

Saxifraga oregana (sometimes called *S. arnoglossa*) is a widespread species in the West, found from the Cascades in Washington down to the Sierra Nevada, east into Idaho and western Montana, and also in Colorado. With such a wide distribution, its variability is not surprising. In the Cascades variety *oregana* is found, with white petals up to about 5 mm long (0.2 inches); the clusters of flowers are at the ends of branches up to 5 cm (2 inches) long. In the Rocky Mountains, things are more complicated. The typical variety is found, but much more common in the Yellowstone region is *S. oregana* var. *montanensis*, which in the past was sometimes separated as *S. montanensis* (the Montana saxifrage). This has a much more congested inflorescence, with the clusters of flowers on shorter, less widely branched stems, and the individual flowers have much smaller petals.

Separated from these is a third taxon, sometimes regarded as a third variety of *S. oregana* but more generally accepted as a separate species, ***Saxifraga subapetala*** (p. 259). In this species, confined to Montana and Wyoming, the flowers lack petals and are tightly crowded on very short branches; the filaments are tinged purple, and the fruits and sepals are often so. This seems clear enough, but things are rarely so simple in the field.

We found four populations that could be attributed to either *Saxifraga oregana* var. *montanensis* or *S. subapetala*. The first was at the side of the highway at Clay Butte on the way to the Absaroka-Beartooth Wilderness. This is a great spot for botanizing, with interesting plants on the bare clay banks on the road up to the fire tower, but as far as saxifrages were concerned it was the area of damp meadow—which had an adult moose grazing in it—that was our focus. Of a group of some dozen plants, just one had flowers that had started to open. In this the sepals were clearly red-purple, as were the filaments carrying the orange

anthers, and the petals were completely absent. The overall effect is similar to *S. hieracifolia*, a species more northerly in distribution, which I photographed in the Alaskan leg of the trip.

In the same general area we also found another member of the family, a woodland star or prairie star, *Lithophragma parviflora*. Like other members of its genus, this has elegantly divided petals and intricately lobed leaves. The lithophragmas are delightful plants for the dry rock garden, although I admit that I have not yet succeeded in maintaining purchased plants for more than a year or so. It's interesting that the name *Lithophragma* is essentially a Greek version of Latin *Saxifraga*, both meaning "stone-breaker," which harks back to the medieval herbal tradition in which saxifrages were used to treat urinary stones. The lithophragmas are one of the members of the saxifrage family that *Orobanche uniflora* parasitizes (it is also found on members of the aster family), and it would have been nice to have found the two in this association, which is recorded from this general area; unfortunately, I was able to find the parasite only on the Switchback Trail in the Olympics, and not in association with any saxifrage.

The third place where we found plants was at Beaver Creek by Highway 287 near West Yellowstone, in a lakeside area of damp, boggy ground. Here the plants clearly belonged within *Saxifraga oregana*, with the clusters of flowers on upward-pointing though short branches and with the flowers clearly having small white petals. Compared with the typical form of the species, the branches are much shorter, and these plants fit very nicely into *S. oregana* var. *montanensis*. This leaves the plants at the fourth site (on the east side of Highway 191 between miles 20 and 25), within Yellowstone National Park. The large area of damp coarse grassland by the upper Gallatin River would be very boggy at times, and there were large stands of saxifrages. Compared with the plants at other sites, these were often larger clumps with more flower stems. The flowers had no petals and the branching of the inflorescence was much more restricted, which matches well with descriptions of *S. subapetala*. Identification seems secure, but it has to be said that the filaments were not purple-tinged and the sepals were pale green, although the disc of the ovaries was clearly turning red in pollinated flowers. It seems that these plants should be identified as *S. subapetala*.

So what else did we find in this area from the saxifrage family? Our main targets had been the plants already described, but there were other Micranthes saxifrages I had hoped to see. The most notable failure was at finding *Saxifraga nidifica*, which is often grouped with *S. integrifolia*, although we were not at the center of its range and I had seen it previously in the Cascades. We did find a few specimens of the snowball saxifrage, ***Saxifraga rhomboidea***, not yet in flower, by the Beartooth Highway, but the main goal was to see these in Colorado. The other important saxifrage I hoped to find was ***Saxifraga occidentalis***. This Micranthes saxifrage has a fairly extensive range down the Cascades from British Columbia through Oregon and east into Montana and south to northern Nevada. This was one of the plants I had hoped to find in the Spanish Peaks area, but by the penultimate day of our one-week stay I had started to lose hope. One last push into the mountains, this time from Ennis in the Madison River valley, found us

in an unspoiled wooded gully down which ran a stream (p. 260). On the shaded, slightly damp rocky slopes above the road we found a few specimens in fruit. This slope was one of those lovely habitats which are so pleasurable to find. Alongside *S. occidentalis* were three other family members: the Trachyphyllum saxifrage *S. bronchialis* subsp. *austromontana*; *Heuchera cylindrica* (poker alumroot), a splendid plant with large flowers of off-white to pale yellow-green, sometimes delightfully shaded pink, which we saw in largest numbers in Hyalite Canyon just south of Bozeman; and another heuchera I have not been able to name. This sort of grouping is one that any of us would be glad to have in our gardens, and for a saxifrage enthusiast it is truly delightful.

The Cascades

The Cascade Mountains are the middle part of the highest mountain chain of far western North America, between the Coastal Range of British Columbia and the Sierra Nevada of California. The Cascades are the home of many endemic plants, saxifrages among them. I first visited these mountains in 2001 during a lecture tour of NARGS chapters which Sheila Paulson in Calgary had organized. This was enormous fun, but also a great opportunity to get an introduction to the wildflowers of the northern Rockies around Calgary, and of the Cascades from Mt. Rainier down to northern California. In Canada I was able to find *Saxifraga aizoides* in the mountains overlooking the Bow River north of Calgary near Mt. Rundle, a species well known to me in Britain and Europe but always nice to see in a new context.

But it was in the Cascades, in side trips from Seattle, Portland, and Medford, that I was able to find a good representative sample of the saxifrages. From Seattle I got taken up to Mt. Rainier and over the Cascades on the Old Blewett Highway to Wenatchee; from Portland, Oregon, to areas around Mt. Hood; and in southern Oregon and northern California, with Phyllis Gustafson and other members of the Siskiyou Chapter, to Crater Lake, Kangaroo Lake, and Camp Creek. Of these localities, Old Blewett Highway contributed the Trachyphyllum species *Saxifraga bronchialis* subsp. *austromontana*, Crater Lake *S. tolmiei*, Kangaroo Lake *S. integrifolia*, and Camp Creek *Tolmiea menziesii*. But two places were more significant: Mt. Rainier, which I revisited on my later journey, and the Mt. Hood area. In three field trips around northern Oregon, Jane McGary—who had just taken over the NARGS editorship as I was taking over the equivalent for the Scottish Rock Garden Club—took me out to the Columbia River Gorge as far east as The Dalles, to Mt. Hood where we met up with botanist Christine Ebrahimi, and to Lolo Pass and Bald Mountain on the western slope of Mt. Hood (not to be confused with the identically named pass in Idaho). All these field trips allowed me to get a good introduction to the local saxifrages and to identify a number of the key species, but it is the last two locations that are worth talking about in detail because they provided a wonderful selection of saxifrages.

In the Cascades, there is a great imbalance between the number of Micranthes saxifrages, of which there are 14 (15 with *Saxifraga tolmiei*) and the other *Saxifraga*

species, of which only three are widespread: *S. mertensiana*, *S. vespertina*, and *S. bronchialis* subsp. *austromontana*. There are also small populations of *S. cespitosa* in Washington and Oregon, and an isolated population of *S. rivularis* in the coastal mountains of California; I discuss these species elsewhere in these articles, as well as the Trachyphyllum species *S. bronchialis* subsp. *austromontana*, also found in the Rocky Mountains.

Micranthes Species in the Cascades

In discussing the Micranthes species in Alaska, I pointed out five groups of species that would be placed into a genus *Micranthes* if that is established: section Merkianae of genus *Saxifraga* and the four subsections of section Micranthes—Cuneifoliatae, Micranthes, Stellares, and Rotundifoliatae. The species found in the Cascades are not evenly spread across these five groups. There are 15 species recorded in the Cascades, one each from section Merkianae (*S. tolmiei*) and from subsection Stellares (*S. ferruginea*) and two, *S. odontoloma* and *S. nelsoniana*, from subsection Rotundifoliatae.

The remainder are from subsection Micranthes, and these 11 species are generally more restricted in range. I was able to find and identify some of these during my 2001 visit to the Cascades, and in 2003, when I was in Washington, D.C., I was able to search through the herbarium of the Smithsonian Museum of Natural History and photograph many of their pressed specimens of these species, which helped greatly in clarifying my understanding of the plants. Two of these species are noticeably larger than the rest (*S. oregana* and *S. californica*), and *Saxifraga oregana* has already been discussed above. In general, it has a flower stem up to 24 inches (60 cm) tall, with clusters of small flowers tight to the main stem or on upwardly pointing branches. The leaves are up to 10 inches (25 cm) long, entire (no separate blade and stem), and the margin is at most very slightly toothed. *Saxifraga californica*, in contrast, has a much more loosely branched stem of flowers up to 12 inches (30 cm) or so tall, with only one or two flowers at the end of each branch, and its leaves have a distinct blade, about twice as long as broad, which has a distinctly toothed margin, and a stem about the same length as the blade. The remaining nine species can be divided between those four that are close to *S. integrifolia*, with a capitate inflorescence, and another five that are close to *S. occidentalis*, with a much more branched inflorescence. We found examples of each group: *S. integrifolia* and *S. nidifica* from the first group at Bald Mountain, and *S. rufidula* from the second at Lolo Pass, Oregon.

Lolo Pass and Bald Mountain, Oregon

The particular area Jane took me to in 2001 is a section of the Pacific Crest Trail where it crosses the Lolo Pass Road, which leaves Oregon Highway 26 at Zigzag. It's not a long walk from a road, but the sort of place that you would not come

across by accident. So many of the great places that NARGS members have taken me in the East as well as the West are exactly that sort: local treasures. What made this area exceptional for me was the range of saxifrages we found on a short stretch of cliff. The cliff itself had both sunny and much damper, shady areas, which added to the variety. Parts of the cliff had large mats of *Saxifraga vespertina*, often with *Penstemon rupicola*, and on a particularly shaded part above us, on steeply sloping but inaccessible ledges where the sun was just catching them, were quite a number of *S. mertensiana*, which I had already grown.

These two saxifrages were a great find. The Trachyphyllum species *S. vespertina* is restricted to the Pacific coast from the Olympic Mountains down through the Cascades into Oregon. It is easy to distinguish from *S. bronchialis* subsp. *austromontana*, which has finely pointed leaves, as the former's mats of foliage are formed of much more rounded rosettes of slightly spathulate leaves which may have small teeth either side of the tip. The flowers are not dissimilar to those of other Trachyphyllum species, with both of these taxa having white flowers with red and yellow spots. *Saxifraga bronchialis* subsp. *austromontana* can be found in flower from May through to July at higher altitudes, but *S. vespertina* tends to flower later.

Saxifraga taylorii, the Trachyphyllum species endemic to the Queen Charlotte Islands, has foliage similar to that of *S. vespertina* and is also reported as not flowering until July and August. Together, *S. taylorii* and *S. vespertina* seem to represent an earlier colonization of the Cascades, which was then isolated further inland and at higher altitudes by ice age glaciation, to be followed by recolonization by *S. bronchialis*.

The remaining non-Micranthes species, *Saxifraga mertensiana*, is an intriguing one. From the leaves, which have rounded, toothed blades on longish hairy stalks, this species might be assumed to be closely allied to the Micranthes species so widespread in North America. Indeed, this was the assumption of most botanists prior to the DNA work of Soltis and others, which revealed the surprising result that *S. mertensiana* is most closely related to the Irregulares saxifrages of eastern Asia, typified by *S. fortunei*, none of which cross over into North America. It is typically found on damp, shady cliffs, often with other saxifrage species; at Lolo Pass in Oregon it was growing in mats of *S. vespertina*, and in the Olympics it was growing directly with *S. nelsoniana* subsp. *cascadensis*. In cultivation it is easy in a shady part of the garden, dying down completely in winter and reappearing once spring comes. It has sprays of small, widely spaced white flowers and is marked by clusters of pinkish-red bulbils in the axils of all the branches of the complex inflorescence. These fall off once the flowering stem starts to die and readily root in surrounding pots or in the ground. It is these copiously produced bulbils that are available every year from the seed exchanges of NARGS, the Scottish Rock Garden Club, and the Alpine Garden Society. While this makes it very easy to grow a lot of plants, it also means that every plant you grow from one parent's bulbils will be genetically identical.

At Lolo Pass, the other saxifrage we found was *Saxifraga rufidula*, one of the Micranthes species close to *S. occidentalis*, growing on the bare rock of the more exposed cliff. It has rather thick, smooth, somewhat leathery leaves with clearly

toothed margins. The flower stem has distinct branches; each splits so that every flower is carried on a separate little stem. The whole head of flowers is flat-topped, which helps distinguish it from the closely related *S. occidentalis* with its more pyramidal or rounded inflorescence. *Saxifraga occidentalis* is the more widespread, found across into the Rockies, but *S. rufidula* is restricted to the Cascades, the Coast Ranges, and the Olympics. Two other species are closely related: *S. howellii*, which is smaller and restricted to northern California and southwestern Oregon, and *S. marshallii*, which grows in shady, damp places in the Coast Ranges of Oregon and northern California. The remaining species that should be mentioned here is *S. hitchcockiana*, perhaps a natural hybrid (according to Elvander) between *S. rufidula* and *S. oregana*; it is rather like a looser version of *S. rufidula* and is found in similar habitats in northwestern Oregon.

The other Micranthes species, at nearby Bald Mountain, were *Saxifraga nidifica* and *S. integrifolia*, growing on shallow rocky slopes which were home to a whole variety of typical Cascades flowers: small delphiniums, paintbrushes (*Castilleja*), and lomatiums, among which were scattered both the saxifrages. This is the sort of mix of small native wildflowers that any rock gardener might want to emulate, but they would have difficulties, foremost of which would be the fact that without the stalwart efforts of one or two collectors—notably Loren Russell, who has collected a wonderful number of species for the NARGS seed exchange and whose seeds I am gleefully germinating at the moment—many of the less showy native flowers would be completely unavailable. Unfortunately for me, *S. nidifica* remains among the great mass of the uncollected. Both these species share many features with the closely related *S. aprica* and *S. apetala*. Their leaves have a more or less entire, untoothed margin; the leaf blade and the leaf stalk are distinct; and the flowers are generally in a tight cluster at the top of the stem. It is in the shape and texture of the leaves that the most obvious differences can be found.

In *Saxifraga nidifica* the smooth, thin, leaf blade is a diamond or shield shape and the narrow petiole about the same length as the blade; the flowers are white to creamy yellow. The plants of *S. integrifolia* I have seen both in the wild and in cultivation have had shinier, slightly more glossy leaves with broader blades; again the flowers (white in this species) are clustered in a small head. Two very similar species have more restricted ranges. In *S. apetala*, from the eastern side of the Cascades, the petals are pale greenish yellow if they are not absent altogether. *Saxifraga aprica* is also very similar but is restricted to southern Oregon and California.

It was the difficulty I had in identifying all these Micranthes species and in trying to track down authoritative photographs and the joyful complexity of their relationships that led me on to try to photograph and make sense of them for myself.

Mt. Rainier

When I'd visited Seattle previously on a lecture tour, one of the marvelous trips I was lucky enough to have organized for me was to Mt. Rainier, around 50 miles

away. So this time, Judith Jones of Fancy Fronds Nursery was one of the people I contacted, and it was she who picked me up at SeaTac Airport around 6:30 in the morning, after my four-hour red-eye flight from Anchorage, so that we could spend a day botanizing. Our previous visit was rather earlier in the year and the road up Sunrise had been closed, but this time we were going farther up. It was a fun day again—almost a day off from saxifrage hunting, if there ever is such a thing.

During a great day's botanizing in perfect conditions, with perhaps the highlight plant being the dwarf, silver-leafed *Lupinus lyallii*, we did manage to find a number of saxifrages. On the ridge up above Sunrise we found patches of *Saxifraga tolmiei* in flower among the slabs and scree at a saddle, and the leaves of what was probably *Elmera racemosa* (sometimes classified as *Heuchera*) in a rock wall. *Saxifraga tolmiei* (p. 261) is an intriguing saxifrage, distributed from southern Alaska down to southern Oregon, belonging genetically with the Micranthes rather than the Saxifraga section, with mats of succulent leaves rather like those of a small sedum. The flowers have five pure white petals and ten pure white petalloid filaments, with black anthers at their tips. These filaments are one of the characteristics that show the connection with the Micranthes species. The surfaces of the petals and filaments are coarsely crystalline, reflecting a lot of light, which makes it difficult to get good pictures in bright sun. This mat-forming plant would seem like a good subject for the rock garden, but in fact it is extremely difficult to maintain for even a short time, perhaps a heritage of its snowmelt habitat. Toward its southern limit in southern Oregon, it is at home among the snow patches at the rim of the caldera in which lies Crater Lake.

On the way down we stopped at the lower parking lot, where there was a large patch of *Saxifraga odontoloma* (closely related to *S. nelsoniana*) at the edge of what must be called a brook, since its colloquial name is "brook saxifrage," intermingled with *Equisetum* (mare's tail). *Saxifraga odontoloma* is another Micranthes saxifrage, distributed from British Columbia into Washington and then in the Rockies down to Arizona and New Mexico as well as in the Sierra Nevada in California. It has particular similarities to *S. nelsoniana*, but the most obvious difference is in the much more loosely branched inflorescence. The individual flowers are perhaps smaller than those of *S. nelsoniana*, and the petals, white with two yellow spots, are typically swept back. Its sites are always damp, usually beside running water. Another family member which was easy to find alongside *S. odontoloma* was *Mitella pentandra* with its very small flowers only showing their particular complexity in close-up, when the intricately divided petals give the pale green and red flowers the quality of some strange marine organism.

The Olympics: Searching for *Saxifraga tischii*

There are two remarkably rare saxifrages in small areas of coastal Washington and British Columbia: *Saxifraga taylorii* in a small part of the Queen Charlotte Islands, and *Saxifraga tischii*. Both these species seem to be remnant populations

of plants which survived the last ice age at higher altitudes near the ocean. When the ice retreated, they were left behind in high, cold sites. With global warming *S. tischii*, which has already retreated up the mountains of the Olympic Peninsula and a tiny part of Vancouver Island, has little farther to go.

Planning a trip always involves trading off one thing against another, so although I would like to have taken a trip up to look for *Saxifraga taylorii*, I settled on the higher Olympics to search for *S. tischii*, of which I could find no photograph. As a bonus, I discovered that *S. taylorii* was listed by Rick Lupp at Mt. Tahoma Nursery, so I've been able to get a plant from him which is still growing fine nearly a year later.

The Olympic Mountains, on the peninsula between Puget Sound and the Pacific Ocean, have an incredibly varied range of conditions, with cold, wet rain forest in the west, alpine habitat in the center, and to the east, in the rain shadow, a low-rainfall belt suitable for growing lavender. It was in fact the Lavender Festival that forced us into slightly more expensive accommodation than we had intended in Port Angeles, which was to be the base for Carla and George Lankow and me. Carla Lankow, for whom the Olympics are a specialty, and her husband George are both famous for hybridizing dwarf bearded irises. They hosted me round and, along with Judith Jones, involved others: Ed Schreiner, a botanist connected to the Olympic National Park, who had done a lot of research specifically for us on the more recent reports of the species and helped advise us on the most likely and accessible sites; Kelly Dodson and Sue Milliken, proprietors of a nursery in nearby Port Townsend; and, we hoped, Steve Doonan, long a saxifrage enthusiast, one of the good guys, and someone with whom I'd had a wonderful day with in the Cascades when I'd visited Seattle before. It was only when we lined up for the ferry from Seattle and found Steve was four cars in front that we finally knew that he was on board for the trip.

Saxifraga tischii is a small, extremely rare Micranthes saxifrage, first described by Rick Skelly in 1988, and it provided a real challenge. The records of specimens examined by Skelly came from a number of different locations in the Olympics (and one from Vancouver Island), but the most promising was on Klahhane Ridge, which is most easily reached on the Switchback Trail (a 1600-vertical-foot climb in 1.5 miles) from Hurricane Ridge Road.

Klahhane Ridge runs more or less east-west, and its sunny south-facing slope is what you walk up to on the Switchback Trail; its north slope is very steep. Most of the saxifrages in the Olympic National Park can be found on this hike. From the road, where the tall *Delphinium glaucum* grows in the roadside bank and there is *Saxifraga odontoloma* scattered in a rocky stream, the lower part of the trail is wooded, but as it works its way up it emerges into areas of grassy meadow and bare scree. Finally we reached the outcrops of heavy, dark volcanic rock and true alpine flora, where *Penstemon davidsonii* rubbed shoulders with a couple of saxifrages: *Saxifraga bronchialis* subsp. *austromontana* and particularly attractive specimens of *S. cespitosa* subsp. *cespitosa* (p. 258). Above on the open top of the ridge are *Erigeron compositus* and *Phacelia sericea,* and among the more shaded rocky clefts, the Olympic endemic *Viola flettii.*

Saxifraga tischii, according to Skelly's article, grows on damp, permanently shaded ledges at high altitudes in the Olympics as well as at one site in central Vancouver Island. Although the niches in which *Viola flettii* were growing seemed initially to hold out some promise, it was soon clear that the saxifrage was not so easily satisfied, so it was the north face of the ridge to which we turned. On the north side of the saddle there is, essentially, a 3000-foot scree, but on either side there are more stable rocky areas. This saddle is below Mt. Angeles (6454 feet/1986 m) at 5900 feet, and since it is only some 8 miles north to the Strait of Juan de Fuca, the view on a good day is wonderful, north over Port Angeles, the Strait, and a further 25 miles over to Vancouver Island. Usually such a lead-in is preparatory to an admission that in fact the weather was bad and visibility next to zero—but not this time. With near-perfect visibility we could see the ancient volcano of 10,778-foot Mt. Baker, a staggering 100 miles distant.

Deciding that our only hope was on the ledges on the northern cliffs, Steve Doonan and I started looking for ways down. I edged my way down a narrow, more or less vertical gully hosting *Romanzoffia sitchensis, Saxifraga cespitosa, S. nelsoniana* subsp. *cascadensis*, and *S. mertensiana*, and across the sloping ledges below the outcrop of rock while, independently, Steve worked round from the other side. More or less where we met up was a population of *Saxifraga tischii* (p. 257). The ledges on which we found it face due north; they are overhung by the rock walls, and the plants grow toward the backs of these ledges. Admittedly it is not a dramatic plant, being no more than 1.25–1.5 inches (c. 3–4 cm) across the rosette, which is very like that of the more northerly *S. nivalis* with leathery, toothed leaves, green above and red below. The flower stem had five flowers and was about the same height as the diameter of the rosette (1.25 in.); the flowers have narrow greenish-yellow petals little longer than the sepals, set off by the prominent red-stained ovaries and filaments. Sue Milliken came down to the ledge to join us, excited by our excitement as much as anything else. But if the plant is not dramatic, drama was provided both by its rarity and its spectacular and difficult location, and my pleasure was made complete by the fact that it was shared with Steve, whose enthusiasm for saxifrages and acerbic political views accord with my own. On the ledges we could reach, we counted ten plants, one in flower; another evidently had flowered the previous year.

After we got back down to the road to rejoin Carla and George and share our excitement, we set off to visit Ed Schreiner to talk over our day, have a few beers, and then dine in celebratory mode in Port Angeles, obviously high from our day and not dressed in quite the style to which the restaurant was accustomed.

Since we'd been immediately successful in our search for *Saxifraga tischii*, my remaining two days in the Olympics with Carla and George were a bit freer, and we took a trip to the west coast's Hoh River rain forest, where Carla instructed me in the nature of the ecosystem, with its nurse logs and stumps. Although the drive is long and a stayover is really needed, we had quite a bit of saxifrage success, the rainforest providing us with *Tiarella trifoliata* growing both on the ground but also on a fallen log, and on the road out, large stands of *Boykinia occidentalis* among the lush roadside grass.

Our final day took us back up the Hurricane Ridge road, this time on past the visitor center to the end of the road at Obstruction Point (6100 feet). As we drove up we managed to find both a ptarmigan and a marmot, both happy to let us stop next to them and take photographs. Carla was particularly pleased because the marmot is an endemic form restricted to the Olympics. Obstruction Point provides great high-altitude access, and again we were able to find some excellent rocky habitats. In particular, on the outcrops above the path we found the sort of natural rock garden which could be the model for any gardener, with three saxifrages in among sedums, *Douglasia*, *Phacelia*, and *Phlox*: *Saxifraga cespitosa* (p. 258), *S. bronchialis* subsp. *austromontrana*, and *Elmera racemosa,* which is like an oddball heuchera with five intricately divided petals protruding from the calyx. Having never seen it in cultivation over here in England, I've obtained seed of it from the NARGS seed exchange and have got good germination. Trying to traverse the ledges as I'd done on Klahhane Ridge was impossible because the shale broke away as I put my weight on it. It looks a possible site for *Saxifraga tischii*, but I could find no way to get round on the north side.

Across the bowl below the path, looking back toward the trailhead, are some cliffs below an area of scree on which snow patches persisted. This area proved fruitful, with *Saxifraga tolmiei* in flower near the snow patches and very nice specimens of *S. nelsoniana* subsp. *cascadensis* on the cliffs. Compared to the Alaskan subspecies, this is a much looser, freer plant, with the flowers on much longer branches and thinner leaves.

Another notable find was a large group of *Saxifraga ferruginea* (p. 258) by the roadside between the visitor center and the Hurricane Ridge trailhead. These plants had flower stems up to 24 inches (60 cm), much taller than plants I've seen elsewhere, and as many as 120 flowers per stem on a couple of plants I counted. This is a widespread and rather variable species, but this group had pretty typical flowers with three petals having yellow spots on them and very narrow "clawed" bases, while the other two petals were unmarked and not narrowed. It is revealing to contrast these with plants I'd been shown in Alaska from the Chugach Mountains, which were no more than 4 inches (10 cm) tall with each stem having no more than 24 flowers, and which had all five petals "clawed" and yellow-spotted.

Our final stop before the run back to the ferry was on the lower part of the road down, where Carla was finally able to show me that famous endemic of the Olympics, *Campanula piperi*, whose clear pale blue flowers show up beautifully against the massy pinkish-gray slabs where it grows in the cracks. On the same cliffs in the more overgrown areas was *Heuchera glabra.* It was a long run back to the ferry, particularly since we were held up in a jam for more than an hour, and we decided to make a break for the Kingston ferry rather than the one back to the center of Seattle. We got to the ferry terminal as the evening was just coming on; the water was still and the light perfect. Behind us the mass of the Olympics was silhouetted by the setting sun, and to the northeast we could see Mt. Baker. But it was Mt. Rainier that stopped the breath, hanging over Seattle in the limpid northern evening, the 60 miles between them foreshortened as in a print of Mt. Fuji by Hiroshige or Hokusai.

With Panayoti around Denver

The Rocky Mountains around Denver provide wonderful opportunities for the plant hunter, with great access to high mountains; in my case, Mt. Evans, just outside Denver, and Pike's Peak, a bit farther away, were the twin objectives. I'd been in touch with Panayoti Kelaidis of the Denver Botanic Gardens at an early stage of my planning and, after checking me out to see if I was safe to have around the house, he offered me their spare room for my stay, the run of the Botanic Gardens, a trip to Denver's independent bookshop (not quite up to Powell's in Portland but pretty good), where we bought each other some novels we felt the other should read, conversations about the nature of America and the West, among so much else. And Gwen Kelaidis, who used to edit this bulletin, and I had great late-night conversations ranging across pottery, art, and the rest of life.

Farther north I had seen a couple of heucheras, but Colorado is where the number of heuchera species starts to proliferate, although you have to go much farther south to find the most spectacular of the genus, *Heuchera sanguinea*. We found *H. bracteata* on Mt. Evans (it also occurs in Montana), and the very restricted *H. hallii* on the lower slopes of Pike's Peak, growing on and around cliffs of the distinctive large-crystal Pike's Peak granite.

Mt. Evans is 14,264 feet (4390 m) high and, like 14,110-foot Pike's Peak, you can drive all the way to the top. Denver itself is already at nearly 5300 feet (1630 m), so for locals, well acclimatized to that altitude, it's rather less of a jump, but I'd arrived from the coast, and a day around Denver and the gardens helped settle me in. Panayoti, being unable to manage the day out of the gardens, was coming to Pike's Peak the following day; he arranged for the young superintendent of the rock garden at the Botanic Gardens, Mike Kintgen, to take me up Mt. Evans. We had three distinct spots in mind: Echo Lake, Summit Lake, and the summit itself. But no visit to Mt Evans with a botanist would be complete without seeing the bristlecone pines, and we spent a while looking around the Botanic Gardens outpost centered on these ancient trees. My main purpose was to look for two particular saxifrages: the Micranthes *Saxifraga rhomboidea* and the Ciliatae *S. chrysantha*.

Echo Lake is the lower of the lakes and provided a useful staging post in altitude terms. The damp, boggy ground attracted our attention with scattered specimens of *Saxifraga hirculus* and a very few *S. rhomboidea*, well past their best. Of equal interest were the low cliffs above the road, on which I was surprised to find a few cushions of *S. bronchialis* subsp. *austromontana* (p. 258) flowering well, and on the cliffs themselves a small heuchera with a rather lopsided head of creamy flowers, *Heuchera bracteata*.

Summit Lake is a high-altitude lake in a glacial cwm (or coombe), surrounded by a semicircle of cliffs and scree. The timing was perfect. On the flat, rocky ground between the road and the lake, large numbers of *Saxifraga rhomboidea* in peak condition showed off the reason for their demotic name of snowball saxifrage, with their balls of white flowers held on stiff stems 4–6 inches (10–15 cm)

high. A nice plant, and one that I added to my list to try and get from the seed exchange in the winter. *Saxifraga rhomboidea* belongs in the same group of Micranthes saxifrages as the Yellowstone saxifrages, but although it is much smaller, the pure white flowers, wide distribution in the Middle Rocky Mountains, and typical high-alpine habitat make it seem much more promising for the general rock gardener than many others in this group.

The other species we found in perfect condition at Summit Lake was *Saxifraga chrysantha* (p. 257). Closely allied to the Alaskan *S. serpyllifolia* and often treated as a subspecies of it, this has very similar solitary yellow flowers on 2- to 3-inch (5–7.5 cm) stems. It forms small mats of small rosettes of slightly flattened, hairless leaves, each rosette being smaller than the individual flowers, which are cup-shaped with rich yellow petals, spotted with orange at the bases. The petals are quite round, but the base of the petal is narrowed dramatically where it attaches to the base of the ovary. This leaves a distinctive ring of gaps around the ovary which emphasize the target for insects. As well as having larger flowers of richer yellow, it is distinct from *S. serpyllifolia* in having sharply reflexed sepals. It's a very pretty little species and, although it can be grown by the dedicated enthusiast, like many snowmelt plants it presents real difficulties in cultivation. The only time I had seed I got no germination. At Summit Lake there was also a reasonable population of *S. flagellaris* subsp. *crandallii*, mostly past flowering.

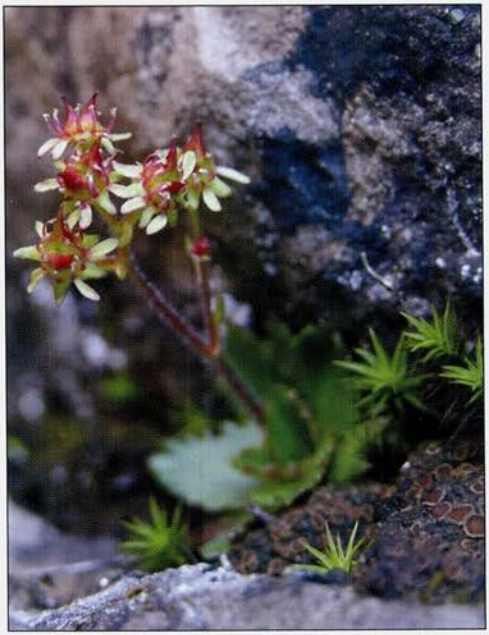
Farther toward the summit we found more of the same, though not the expected *Saxifraga adscendens* subsp. *oregana*. In its place we were able to identify the very reduced subspecies of a closely related mossy saxifrage, *S. cespitosa* subsp. *delicatula*. Just as the smallest Mesogyne saxifrages shelter under rocks, this was growing well tucked under a shelf, and like them it was no more than an inch high.

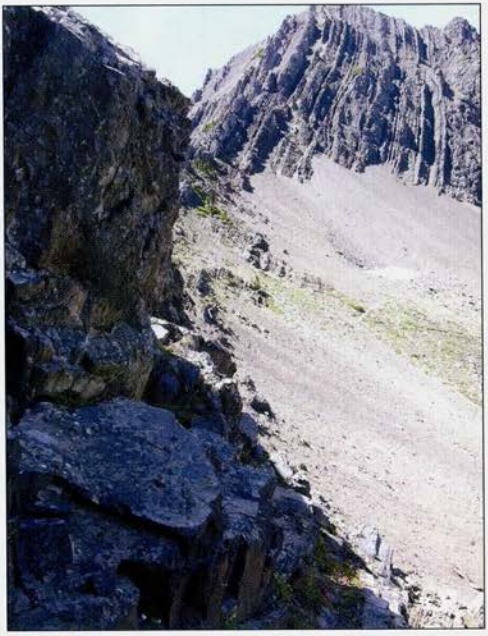
On a very long trip packed with separate elements it is not easy to find the right thing to crown the journey, but Pike's Peak did pretty well as a climax. Having been unable to find the insignificant but local *S. adscendens*, we held out hope for it on Pike's Peak, though our prime target was the spectacular *Telesonix* (or *Boykinia*) *jamesii*. This truly beautiful alpine plant, unlike the equally seductive *Boykinia richardsonii* from western Alaska, is amenable to cultivation, easy to grow from seed and possible in the rock garden or in a pot. As so often, being hosted by a local expert makes a great deal of difference in finding the best sites, and Panayoti produced the local specialties with the flourish of a true performer, keeping some of the best specimens for last. *Telesonix jamesii* can be found either in the granite screes, where it grows alongside occasional large mats of *Saxifraga bronchialis* subsp. *austromontana*, or as a chasmophyte growing in crevices in the granite cliffs or between boulders. The screes are very interesting, with the granite breaking down into very large separated granules like gigantically coarse sand, but the best-flowered plants were those growing in crevices, usually somewhat shaded, where they have far more of the rich carmine-pink flowers.

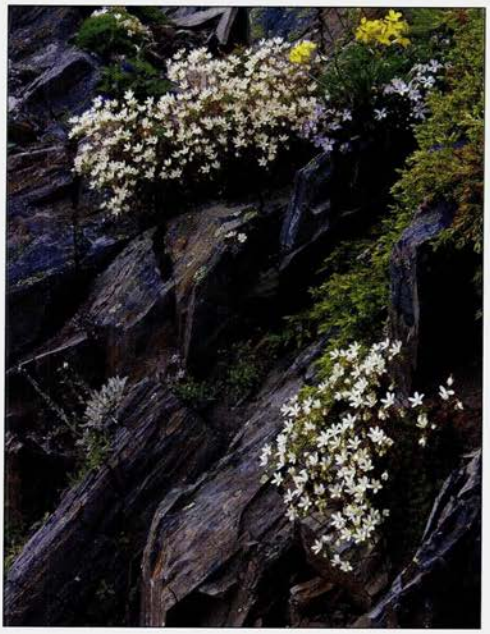
Again, on the upper slopes *Saxifraga chrysantha* was easily found, as were some excellent groups of *S. rhomboidea*, but there were a couple of other saxifrages still to show their faces: two of the Mesogyne saxifrages, for which Alaska is the great

Saxifraga chrysantha (p. 256) in Colorado. (photos, M. McGregor)

Saxifraga tischii (p. 253) and its north-facing cliff habitat in the Olympic Mountains of Washington.





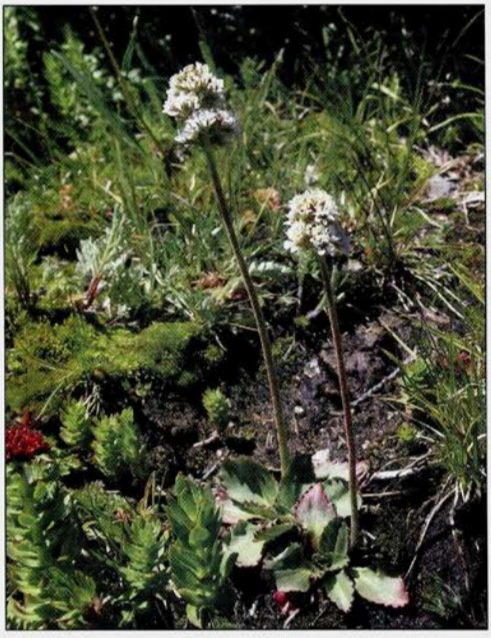


Left, *Saxifraga bronchialis* (p. 255); right, *S. ferruginea*(p. 254). (M. McGregor)

Saxifraga cespitosa (p. 254); this photo by Dianne Huling received an Honorable Mention in the 2005 Photo Contest.

Saxifraga subapetala (p. 245) near Yellowstone National Park. (M. McGregor)

Left, *S. subapetala* from another population; right, *S. rhomboidea*.



In a canyon in Colorado, *Saxifraga occidentalis* (p. 247; large leaves) and *S. bronchialis* (p. 247; mat in crevice) grow with *Heuchera* and rock ferns. (M. McGregor)

Saxifraga tolmiei (p. 251). (M. McGregor)

Pleopeltis macrocarpa and *Pleopeltis* (*Polypodium*) *polypodioides* (p. 289) on Cathedral Peak, KwaZulu Natal, photographed by Dianne Huling on the NARGS South Africa tour.

Adiantum sp. (p. 242) in a crevice, Pan de Azucar National Park, northern Chile. (J. McGary)

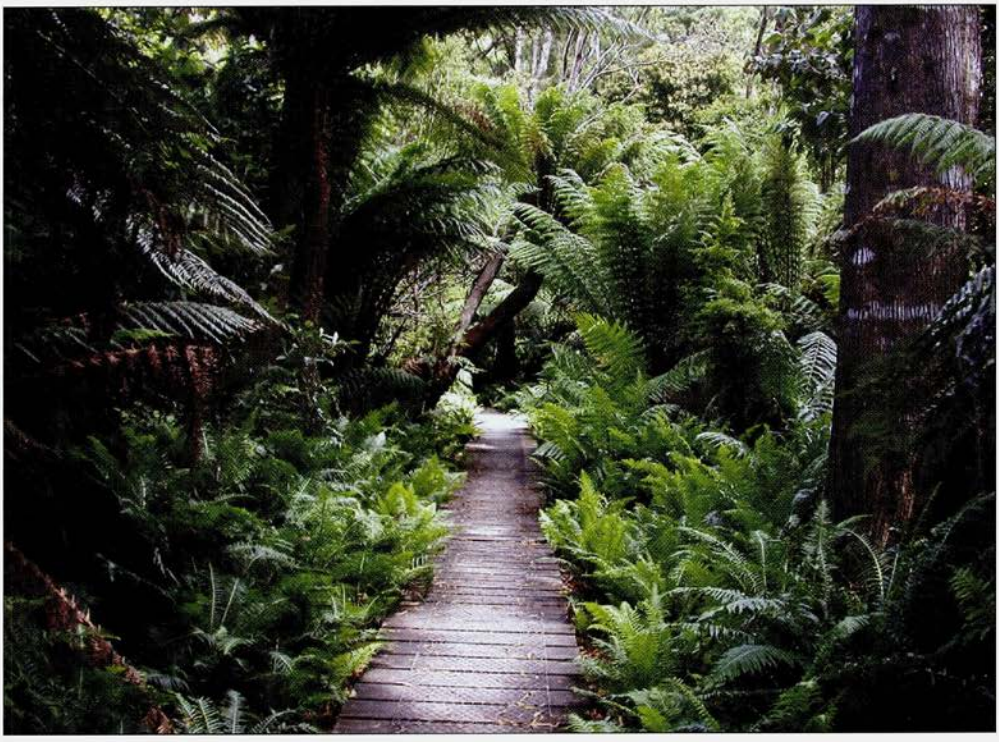
Asplenium ceterach (p. 242) growing in mortar on an ossuary, Crete. (J. McGary)

Asplenium trichomanes subsp. *quadrivalens* and *Cystopteris tenuis* (p. 291) in an old mortared wall, Pennsylvania. (M. Slater)

Cheilanthes maderensis in a limestone crevice, Crete. (J. McGary)

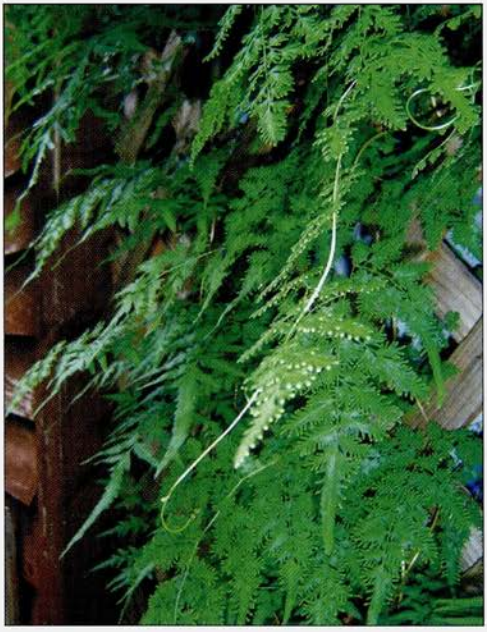
Ferns and other shade plants in a Polish rock garden; Stefania Wajgert's photo received 4th place, class 4, in the 2005 Photo Contest.

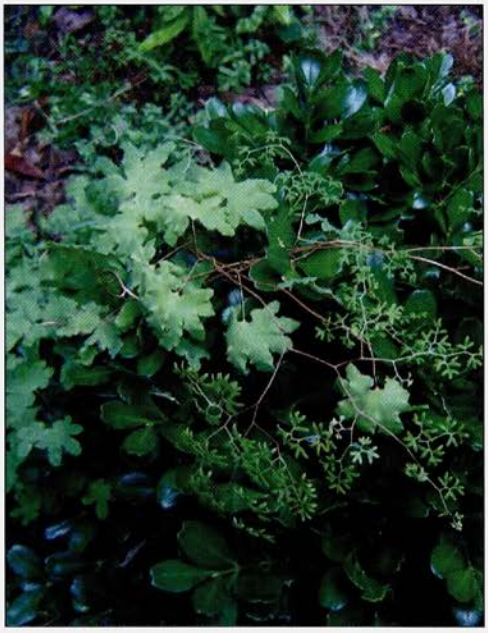
Trail through a natural fern garden, Wilson's Promontory near Melbourne, Australia. (J. McGary)



Camptosorus rhizophyllus (p. 284) in a trough. (Nancy Robinson)

Two climbing ferns in the Robinson garden (p. 285): left, *Lygodium japonicum*; right, *Lygodium palmatum*.





Ferns favoring old mortared walls (p. 290): above, *Pellaea glabella* subsp. *glabella*; below, *Pellaea atropurpurea*, sterile fronds. (Mike Slater)

Rosa spithamea (p. 291) in the wild in Oregon. (Tanya Harvey)

The xeric fern bed at Fancy Fronds Nursery, newly planted (p. 277). (J. Jones)

A *Selaginella* species tentatively identified as *S. watsonii* (p. 280). (J. Jones)

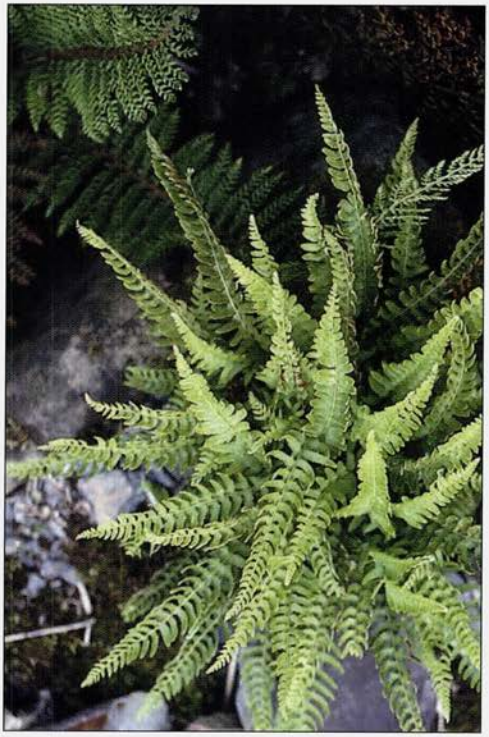
A large colony of *Cheilanthes lindheimeri* at the University of California, Berkeley, Botanic Garden (p. 281).

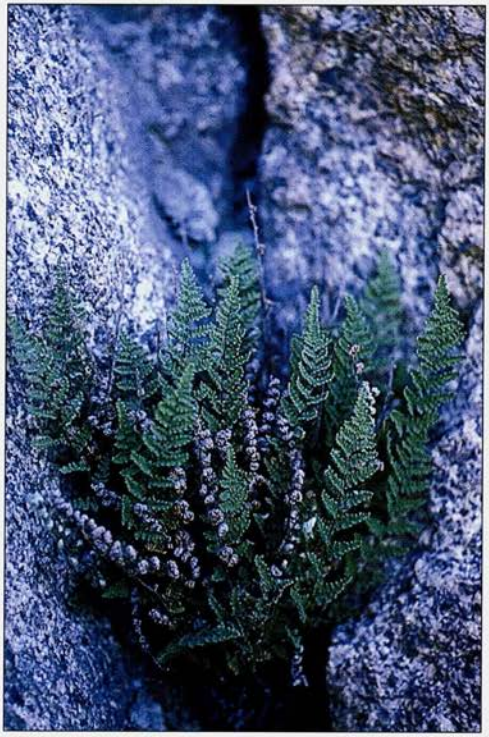
Left, *Asplenium scolopendrium* 'Marginatum'; right, *Cheilanthes eatonii* (p. 281). (J, Jones)

The original plant of *Athyrium filix-femina* 'Fancy Fronds' with miniature hostas (p. 277).

Dryopteris affinis 'Crispa Gracilis' with *Ranunculus ficaria* 'Flore Pleno' and *Viola* foliage in Judith Jones's garden. (J. Jones)

Left, *Woodsia polystichoides* (p. 279); right, *Cheilanthes fendleri* (p. 281) on Flagstaff Summit near Boulder, Colorado.





Blue beauties in the Alps feature in these two 2005 Photo Contest award images. Above, *Eritrichium nanum* by David Sellars; below, *Gentiana verna* by Matt Mattus.

Nature's surpassing art: *Juniperus communis* at Cape St. Mary's, Newfoundland, photographed by Dianne Huling, received an Honorable Mention in 2005.

center of diversity. One was *S. cernua*, up among the boulders in shady, windy nooks, and the other was a species which had probably eluded us in Alaska: *S. flexuosa* (syn. *S. hyperborea* subsp. *debilis*), an extremely small plant which grew under overhanging rocks and proved extremely difficult to photograph. This is a feature of these very high mountains in Colorado: they are the southernmost outpost for a number of mostly boreal plant species. So I'd followed some of these plants down from near their northern limits to their southern ones, from sea level near Nome to 14,000 feet up Pike's Peak and Mt. Evans, where higher altitude becomes an equivalent to the higher latitudes of Alaska and the Arctic.

My farewell to Denver was a presentation to the gardens staff and volunteers. A report on the Denver Botanic Gardens is out of place here, but I have to celebrate the sheer variety and ambition that the gardens display. My favorite area is the joyously unconventional Prairie Garden, where ratibidas, like miniature, small-petaled rudbeckias, were scattered through the drifts of prairie grasses. I've rarely been in such an interesting position, in that the event was timed so that I could do my presentation, answer questions, and be swept off to the airport for my flight back to Chicago and on to Manchester. Having loved Panayoti's closing presentation at Alpines 2001, and his chutzpah as the speaker whom everyone would remember, I was well on my mettle; there's nothing like having such an audience. I could fly out with a warm glow.

Growing American Saxifrages

Before I finish, it is worth bringing together a few notes on growing American saxifrages. Although most are fairly straightforward to grow if you can get them, the Alaskan saxifrages tend to be difficult for me. First, germination can be what is referred to as a "challenge," which usually means that it is nearly impossible. Those I have failed to germinate include *Saxifraga calycina* and *S. nelsoniana*, although it has not stopped me trying again.

It is not too difficult to grow many of the Micranthes species from the Rockies and the Cascades to flowering size. The biggest limitation is that the seed of most species is rarely collected. This is not to say that I am advocating large-scale collection of seed from the wild, which would be pointless given the lack of demand. In general, seed of the Cascades and Rocky Mountain species is easier to germinate than that of the Alaskan Micranthes saxifrages, and at the moment I have *S. integrifolia* and *S. occidentalis* getting ready to flower; I am going to try and establish these on a rockery with a number of other smaller American alpines.

Saxifraga tolmiei is one plant that most rock gardeners would love to grow. Seed is often collected and will germinate, but I have failed to get any plant beyond about ¼ inch in diameter before it has died. Dry conditions are a killer for this, like so many other snowmelt plants.

The Trachyphyllum saxifrages are quite widely cultivated. The easiest species are probably *Saxifraga cherlerioides* and *S. tricuspidata*, both of which grow well in a pot, or on a rockery in a cool northern climate. Of the other taxa, *S. vespertina*

has consistently proved difficult for me, tending not to persist well from year to year. I have not had material of *S. bronchialis* subsp. *austromontana*, but I currently have seed germinating of *S. funstonii* and a number of the other taxa from eastern Russia. Sources include the NARGS seed exchange, and the Russian Trachyphyllum species are collected by and can be bought from Dr. Alexandra Berkutenko of Magadan, whose seedlist can be found on the Internet (http://www.meconopsis.st/Berkutenko.html). *Saxifraga taylorii* from Rick Lupp has come through the winter well outside in a deep pot.

I have found the eastern American saxifrages equally amenable, but they are outside the scope of this article.

The Ciliatae species are desirable, and *Saxifraga eschscholtzii* would be a glorious thing to grow, but the only time I have had seed it did not germinate. *Saxifraga chrysantha* is often available in seed lists and is now in very limited circulation in the U.K. Unfortunately, the plants I have seen in cultivation are not a patch on those in the wild.

Other members of the saxifrage family are often very tractable—or at least the ones I have got my hands on. The advantage of many of these other genera is that they add to the range of climatic conditions in which saxifrages in the broadest sense can be grown. *Telesonix jamesii* happily grows for me in pots and on the rock garden. *Heuchera* species are not harder than the hybrids once you have them, and they are generally smaller and neater; seed is regularly in the seed exchanges. Likewise, *Tiarella* and *Tolmiea* are quite easily grown, as are astilbes, but I have not had or seen *Suksdorfia* (particularly *S. violacea*) in cultivation. *Lithophragma* species must be easy for somebody, since I see them for sale, but I have never managed to establish them in the garden.

In Conclusion

At the end of such a trip there's so much material, so many pictures and notes to absorb and evaluate! I'd seen innumerable plants, grizzly and black bears, buffalo and mountain goats and yellow-necked weasels and loons and tundra swans, and trumpeter swans and Wilson's phalaropes and red-necked phalaropes. I'd met up with old friends and made a whole lot of new ones. And then there was what I'd come for—the saxifrages—and I'd pretty much got to where I had planned. In four weeks I'd seen around about half of all the North American native *Saxifraga* species: 32 taxa from about 27 species (13 Micranthes and 14 Saxifraga), and another 14 members of the family. And there are still other places: Idaho, back to Oregon and on into California, back to North Carolina to photograph *Saxifraga caroliniana*. And then there's the Queen Charlotte Islands and on up to the Yukon. And then there's the Ozarks—now that would be good!

Further Information

Around 100 of the photographs of saxifrages which came out of this trip can be found on the Saxifrage Society Web site <*www.saxifraga.org*> in their online database of saxifrages, Saxbase.

A bibliography for this series of articles appears with Part 1 in the Summer 2006 issue of the *Rock Garden Quarterly*.

Postscript: Since the publication of the first part of this account I have found that Prof. Luc Brouillet of the Université de Montréal has taken on the task of seeing through the work for volume 8 of the *Flora of North America* that the late Patrick Elvander had started.

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Fronds through the Tufa

Judith Jones

It is curious what circuitous paths life's pleasures and passions can lead to. My fondness for ferns arose from a simple biology requirement while I was pursuing studies in children's theater and theater history. From one elementary botany course I was sucked in by the allure of the Victorian fern craze, to emerge some years later growing ferns as an avocation. Factor in a beguiling group of Pacific Northwest rock gardeners, and I was well on the way to a new horizon.

Developing a specialty fern nursery is certainly a full-time occupation; however, my penchant for things theatrical eventually lured me into designing landscape displays for the Seattle Northwest Flower and Garden Show. Building fantasy settings in order to captivate and entice show attendees to view gardening as an integral part of daily life helps me to satisfy my dramatic leanings while promoting my daily passion for plants—especially ferns.

Garden theater is particularly rewarding when the plants and props come home to become part of one's own garden and home décor. In 2003 we created a prehistoric garden, "Outback in Time: Gardening with the Fernstones," for which we purchased two tons of tufa to create a volcanic pavement below our fire-and-smoke-belching, 17-foot volcano. The nesting pterodactyls now reside in the house, since they are not weather-proof. Momma Dactyl sits atop my file cabinet next to the computer, while Papa Dactyl is lashed to the log balcony overhead. A quick glance to the east out the door discloses their nest, secured in a low-limbed Sitka spruce. I have been contemplating a whole new type of epiphytic gardening up there—but back to ground level! The tufa matched a pair of concrete griffins from a Victorian graveyard exhibit I did in 1995, so the first tufa went in on the shaded northwest corner of my log house.

It should be a boon to be a grower and a show-garden maker: plants, props, and occasionally stone in quantity. Alas, being a grower means I spend less time being a gardener than my customers do. All the wonderful show bits languish in an unorganized jumble until family and friends are cajoled into helping me relocate the items, or, with some extra coercion, stage new garden settings. I am fortunate that my children can still say "ferns" and "fun" in the same sentence.

The tufa bed on the northwestern corner is a triangle with its narrow apex in deep shade, then widening as it meets the long, sunny 3-foot-wide rectangular bed between house and sidewalk facing due west (photo, p. 267). The northwestern bed stays moist year round with very little irrigation and has been in place since 2004. The dry, sunny western bed was just thrown together last summer and has yet to be planted and have its tufa arranged properly. I have been testing a few plants in pots there this summer, and they seem agreeable to the long days of baking sun that they receive. In the winter, the roof overhang 25 feet above will provide some degree of cover against excessive rain. The potential for this wraparound bed extending from dense shade to blazing sun, from consistent moisture to dusty dryness, has me considering many possible fern candidates.

The moist, shady bed was my first focus because I use that walkway more often. It is always cool there in the summer, and it's closer for scooting inside during the inclement winter months. Lingering on the cool side on a glorious summer day, I can see that our native *Athyrium filix-femina* var. *cyclosorum*, a wanton trollop of a lady fern, finds this area a much too favorable habitat. Ah, but one can eliminate the errant progeny and encourage such delicious delights as the smaller cultivars of the European lady fern, *Athyrium filix-femina* var. *filix-femina*. One of its most beloved and charming cultivars was originally found in Ireland in 1857: 'Frizelliae', a charmer of minute, quarter-inch rounded fans. The pinnae are reduced to the basal pinnules, which ruffle over one another like a frilled, beaded necklace. Not all of its spore-grown or tissue-cultured progeny are reliably true to form, so care should be taken to check for irregularities in outline and reversions along normal lines. Even more demure is a dwarf fimbriate strain known since 1991 as 'Fancy Fronds' (p. 269). I selected this strain over 25 years ago from a batch of sporelings raised from Philip Coke's lady fern collection in England. Mature plants under ideal conditions can have fronds that are 6 inches (15 cm) high by 3 inches wide at the center of the densely congested, lance-shaped blades. The original selection named 'Fancy Fronds' was uncrested, but the sporelings grown from it range from having barely forked tips and apex to a second distinctive selection with exquisitely fan-shaped frills similar to cotillion petticoats, which I call the Frilly Fronds strain. All the sporeling progeny from both these selections are keepers, or have "blue blood," as my mentor Jimmy Dyce would say. Except for the small number of reversions along full-size crested setigerate lines, the sporelings from these strains take about 10 years to mature fully.

For those purists who disdain any monstrous variation in their ferns, no matter how many variations they allow in their flowering plants, there is a perfectly minature version of the European lady fern. *Athyrium filix-femina* 'Minutissimum' is variable from spores, but it also varies with culture and with the growing zone. The size can range from barely 3 inches (7.5 cm) to a foot (30 cm) or more. The beauty of this small form is that it bulks up rapidly and makes lovely full mounds of fresh yellow-green fronds quite fast.

Athyrium nipponicum, its ubiquitous 'Pictum' selections, and its hybrids, true and putative, are too aggressive for the choice tufa bed; they would soon be not only galloping over slower-growing neighbors but also self-sowing with the same

abandon as the *Anemonella thalictroides* I injudiciously introduced into this bed. There are a couple of little-known and seldom-grown athyriums, however, that should grace this bed. An *Athyrium* species I thought might be *A. frangulum* and which I dubbed the "shiny lady fern" has proven to be that species, so at long last I can point at the luminous bell-pepper-green, 12-inch lacy triangles on glowing rhubarb-colored stipes and declare its identity with some confidence. *Athyrium shearei* is a colonizer with long, creeping rhizomes that send up 6-inch-long, halberd-shaped, deep reddish-black-green fronds at 2- to 3-inch intervals, making it a suitable companion for irresistible spring bulbs such as *Muscari* 'Valerie Finnis"or wee daffodils. Planting less aggressive deciduous colonizers, such as any of the *Gymnocarpium* species, is a sure-fire way to avoid inadvertently digging up one's spring bulbs when they are resting! The long, creeping rhizomes allow bulb foliage to emerge while the ferns are resting, and then gracefully to wither away while the new fronds emerge to flourish over them for the summer season.

The smaller cristate (crested), lacerate (cut-leaf), marginate (indented), and undulate (wavy) forms of the European hart's-tongue fern, *Asplenium scolopendrium* (p. 269), have yet to be nestled in among the lovely ladies in this bed. I well remember the pumice beds in Lawrence Crocker's Medford, Oregon garden when he was co-owner of Siskiyou Rare Plant Nursery. The hart's-tongue ferns self-sowed with great regularity on large pieces of pumice scattered in his beds. Not only are there many crevices for spores to lodge in and germinate in my new tufa bed, but the tufa also wicks moisture up as pumice does, and the fern and moss spores happily germinate on the moist surfaces. I think the petite mix of the lacy deciduous ferns with the shiny whirled, twirled, and crimped blades of the "scollies" will give me year-round pleasure.

It would be lovely if more of the temperate alpine and rock-dwelling *Asplenium* species and hybrids were more easily grown and available. *Asplenium trichomanes* (p. 263), its various subspecies, and the hybrids it makes with various other *Asplenium* species (e.g., *septentrionale, ruta-muraria, viride, adiantum-nigrum*), and with each other are all excellent and highly desirable evergreen ferns for planting with other slow-growing rock garden subjects. They grow in a range of substrates from alkaline to acidic to serpentine, and in exposures from light shade to full sun. Unfortunately, they are difficult to come by unless you grow them from spores or know someone willing to winkle a piece off their stock.

The most commonly available *Asplenium* species are *A. platyneuron*, the ebony spleenwort, and the various subspecies of *A. trichomanes*, the maidenhair spleenwort. The latter group are definite favorites that are never produced in enough abundance to satisfy rock gardeners. The two subspecies most often sold are *A. trichomanes* subsp. *quadrivalens*, found on basic soils, and *A. trichomanes* subsp. *trichomanes*, which occurs in more acidic conditions. Superficially these subspecies appear quite similar, and for this article I am going to describe their overall appearance without delving into the details that distinguish them from each other. For those who want to seek these details I recommend C. N. Page's excellent comparison in *The Ferns of Britain and Ireland*. They both have very dark brownish-black supporting structures with oval to rounded, somewhat squared-

off pinnae that rarely exceed half an inch (about 1.2 cm) in breadth. The largest maidenhair spleenwort I have ever seen came to me from Tony Avent of Plant Delights, who obtained it in China. It has pinnae that are easily twice the size of any I have seen in either the United States or England. Of course, rock gardeners like them as small as possible, so the wee ones that we normally grow should suit the most Lilliputian settings.

Lewisia cotyledon hybrids seem to find this semi-shady end and the end nearest the deck in the west-facing bed the most desirable. *Woodsia* species like these same niches, and their tight, upright habit mixes well with the bold, fleshy rosettes of the lewisias. The most distinctive and sought-after is *Woodsia polystichoides* (p. 270), the holly fern woodsia. It stands out from many of the other woodsias that are two to nearly three times divided, or bipinnate to bipinnate-pinnatifid, because it has a pinnate, or once divided, blade. Each simple pinna bears an enlarged or acroscopic auricle at the base of the upper side of the pinna next to the rachis (central stem). The pinnae of *W. polystichoides* bear a striking resemblance to various *Polystichum* species, or holly ferns, that have an enlarged acroscopic auricle. The best comparison is with the well-known *Polystichum acrostichoides*, or Christmas fern. Northwest growers have been cultivating two different populations of *W. polystichoides*, one with fronds nearly a foot tall, rather glabrous, and one with fronds half that size but sporting soft, light gray hairs. German fern growers differentiate the two and refer to the latter as the "Kamchatka form." I haven't had an opportunity to verify this, but the differences are distinct to a keen gardener's eye.

A couple of "new" woodsias that have entered the collectors' market recently have turned out to be ferns I have been growing as unidentified species for a number of years. *Woodsia subcordata* (syn. *W. kitakadensis*), and *W. pseudopolystichoides* both resemble a pinnate-pinnatifid, or not quite two times divided, *W. polystichoides*. I have a key only for the former species, so I am not sure what separates them from one another. They add a nice contrast to the undivided *W. polystichoides* and bi- to tri-pinnate woodsias such as *W. ilvensis*, the lovely rusty woodsia. One of the lacier ones that I am lusting after is *Woodsia fragilis*, which I encountered in nearly all the German fern gardens I visited this summer. It has lovely arching, attenuate fronds that spill elegantly over rocks.

Alpine and xeric spikemosses (*Selaginella*) have been tugging at my heartstrings for quite some time now, and the few that I have experimented with in this bed have been an unqualified success. Some of the moisture-loving species that are common in the commercial market, such as *Selaginella kraussiana* and cultivars 'Aurea' and 'Gold Tips', are a menace if let loose, but *S. kraussiana* 'Brownii' is a nice dense, congested form that mounds.

Rock gardeners turn peculiar at the sight of buns, especially tight buns, with or without blooms. At long last I have found a fern ally that comes as close to a mythical "Domiticus perfectus" (the name of a plant featured in the melodrama "Who's Got The Buns?" written and performed for the 2005 NARGS Western Study Weekend, sponsored by the Northwestern Chapter)) as any floriferous domed subject. *Selaginella sanguinolenta* var. *compressa* forms a mounding, tightly intertwined

network of twiggy, segmented branches. This Japanese treasure grows excruciatingly slowly, rarely engulfs its neighbors, and is hardy in Zone 5. Although I have grown it in the Northwest in full sun, I would recommend partial shade for it in hotter, drier parts of the country. There are some very dense cushion-forming North American selaginellas that will take full sun, such as *S. densa, S. rupestris,* and *S. watsonii* (p. 268), which are hardy to at least Zone 5. They are not sold commercially, but they all have a sizable distribution throughout the United States and are easily rooted from just a small piece of stem. The stems of these species bear rhizophores, aerial roots that reach out and root the growing stems. Wallace's spikemoss, *Selaginella wallacei*, is the most common spikemoss in the Pacific Northwest and is found on rock ledges from shady forest sites to fully exposed ones. It has trailing stems that branch and overlap as it moves along, finding debris to root in. Think of a *Cassiope lycopoidiodes* growing in a cascading, trailing fashion, and you have the image of this versatile spikemoss. If you are fastidiously Victorian and can't abide seeing naked limbs, you might want to stick with the cushion species and not the trailing types. The older sections of the trailing species do lose the green color of their scale-like leaves, which bothers some gardeners. Since this is what they look like in the wild, though, I find it quite right.

Some of the smaller daphnes find the transitional end of this bed their favored niche. 'Lawrence Crocker' and 'Wilhelm Schacht' look lovely with spikemosses swathing their toe space. *Jasminum parkeri* has become quite a lovely shrublet here, growing with a form of *Blechnum penna-marina* that is never more than 4 inches tall and has a chocolate tint to its foliage. I suspect that it is a form of *B. penna-marina* subsp. *alpina*, but I found this form labeled 'Purpurascens' in German fern gardens. It is a fiercely dedicated colonizer, but bulbs are able to penetrate its network of branching rhizomes, and the evergreen fronds keep weeds and nasty liverworts from getting too exuberant. I received this fern from a wonderful and much-missed alpine grower, Robert Putnam, who I was told got his start from Roy Davidson. Where or how Roy came by it is a mystery. If anyone can add to the story on this, I would be grateful.

The colonizing, cascading evergreen penstemons, such as *P. davidsonii* and *P. rupicola*, are fine transition companions as the tufa bed wraps around to the west and the sun-loving xeric ferns begin their southward trek through the small agaves and drought-loving bulbs. At long last I have a bed for fritillarias despite living in a near-rain forest setting where nearly 100 inches (c. 2.5 m) of rain falls annually, mainly in the winter months. I am eager to see if young tubers of *Tropaeolum polyphyllum* will flourish against the foundation of the house, protected from winter cold and excessive wet. I can imagine the plush gray foliage with its bright yellow trumpets winding through bold agaves and the upright fronds of the dryland ferns. At present, the ever-reliable *Asarina procumbens*, with its velvety leaves and yellow snapdragon flowers, is working its way from under the deck, so there is at least one scrambler working some wall disguise.

Speaking of disguise, I often think of the xeric ferns as living life incognito. "That's a fern?" This query is to be expected when desert ferns are placed alongside their more recognizable woodland relatives at a show or sale. They can be

green, but they can also be gray-green, tawny-green, or blue-green; they can be densely hairy or downright woolly, top or bottom; they can have stark white, silver, or gold farina (powder or meal) on the flipside or the topside; their frond shapes may appear fairly typical or may not meet preconceptions. Growing xerics is a roller-coaster ride, with the thrill of success at the top and the distress of the fast decline when they fail. More growers and botanic gardens are growing and evaluating as many dryland species as they can. In the western United States, the Berkeley Botanic Garden has had a number of wild collections in the garden for years. More recently, the Georgia Perimeter Botanic Garden in Decatur has been testing xeric ferns gathered from many sources in a full-sun bed. Tony Avent of Plant Delights has been trialing xerics in North Carolina from wild collections he has made or others have shared with him. I am fortunate in having a close xeric-fiend friend in Bakersfield, CA – David Schwartz, whose main interest in ferns is the xerics. David grows spore of every xeric fern he can find worldwide, and the fruits of his success are shared with like-minded fiends.

At present there is only a handful of xeric ferns and fern allies available commercially, but as more are introduced and gardeners begin to understand their needs, growers will feel more confident in offering them. The largest and most commonly offered genera are *Cheilanthes* and *Pellaea*. Other genera to consider when perusing spore lists are *Argyrochosma*, *Astrolepis*, *Bommeria*, *Mildella*, *Notholaena*, and *Pentagramma*. If you want to check out some more possibilities, take a gander at the recently published book *The Pteridophytes of Mexico* by John T. Mickel and Alan R. Smith. This book weighs 8 pounds, and quite a number of those pounds are made up by xeric ferns.

The most common green-foliaged *Cheilanthes*, or lip fern, in the commercial trade is *C. lanosa*, but I find *C. fendleri* (p. 270) much more to my taste and would recommend it to beginning growers of xeric ferns as relatively easy to please and cold-hardy. It has minute, beadlike segments on upright, tightly clustered fronds and is one of the most cold-hardy of the *Cheilanthes*. I have seen it growing quite happily 5 feet (1.6 m) off the ground in a narrow crack in a granite boulder on Flagstaff Summit near Boulder, Colorado.

The easiest of the gray-foliaged lip ferns is *Cheilanthes tomentosa*. It can vary in size depending on its origin and somewhat on culture and growing zone, from nearly 24 inches (60 cm) down to a little under 12 inches (30 cm). The upper (or adaxial) side of the three- to almost-four-times divided blade is dusky gray-green with barely visible, fine pubescent hairs. The reverse or underside starts out whitish and matures to a nice tawny gold covered with woolly hairs. *Cheilanthes eatonii* (p. 269) is an even grayer and smaller species with a northernmost population near Golden, Colorado, but it can be less easy to please. Many cultivated *Cheilanthes* labeled "*eatonii*" turn out to be *C. tomentosa*. They are closely related and hybridize with each other, but *C. tomentosa* is distinguished by its narrower, less prominent costal scales.

One of the most beautiful of the gray-foliaged lip ferns is *Cheilanthes lindheimeri* (p. 268), known colloquially as "fairy swords." The color is really more like creamed jade, with the gray tones coming from the fine, curly cilia of the costal

scales that cover the round to slightly oblong, minute ultimate segments. The blade's reverse side also starts out whitish in color, maturing to light fawn with age. The Berkeley Botanic Garden has a colony planted in the 1950s that is at least 2 or 3 feet wide and at least 10 feet in length on a moderate slope in full sun. I always run there first to kneel down and commune with this magnificent specimen.

Sean Hogan of Cistus Design Nursery has a mouth-watering array of agaves for me to play with in this bed. Although agaves the size of small Volkswagen Beetles are admirable, I have chosen smaller types to use with the xeric ferns. Sean offered me some scintillating selections of cold-hardy *Opuntia*, but having grown up helping to build and maintain my parents' cactus garden in Yuma, Arizona, I decided that a few good pokes from the agaves are the limit of my pain tolerance when I'm weeding the bed. I have several *Agave neo-mexicana*, which, according to Sean, "is best planted in white quartzite and red lava rock with the accompanying plaster burro." Alas, the agaves in this bed will have to make do with some picturesque rusty iron wheelbarrow wheels. I am quite fond of *Agave parryi* and have chosen subspecies *huachucensis* for its childhood memories and a form new to me that Sean equates to a "giant pine cone," *A. parryi* var. *truncata* (Gentry Form). It has the same glorious blue color but the leaves are even more truncated than the type. A wonderful contrast to these very bold forms is *Agave multifilifera*. It is stiff, short, and sturdy; Sean's description of it as a "hairy fire hydrant" fails to convey the beauty of its prickly symmetry. Xeric ferns are often found nestled under various sticky, prickly characters in nature, so the agaves should lend an air of authenticity to this bed.

It would take many pages to fully explore all the successes and failures I have had with various xeric ferns over the years. I have grown most of them as container plants, trying only a few in my previous garden in a raised bed against the house. My advice on planting them in the ground is very similar to what I have learned from container growing. They absolutely need to be watered the first two to three years while they are getting established. They don't mind being sprinkled overhead as long as they are actively growing and the nights are not too cool. The agaves are quite happy with this watering regime also. Once the weather begins to cool down, I water those in pots in the morning and do not wet the foliage. Nearly all my losses are among plants that are too wet when the temperature goes below freezing. There are several species that just object to frost, dry or wet, when grown in pots, but I may give them a try in the ground and see if this changes their opinion on life in the rain forest.

Now that I have written about what I am planning to do in this bed, I have great hopes that I can find the time actually to plunk all the waiting pots into the bed before winter sends me scurrying inside to crank up the CD player with everything from the Muppets to Mozart—and make more ferns!

Judith Jones is the proprietor of Fancy Fronds Nursery (www.fancyfronds.com) near Seattle, Washington. She lectures frequently throughout North America on her passion for ferns. Her Seattle Flower Show displays and her theatrical productions at NARGS Winter Study Weekends are legendary.

Nancy's Garden

Elin Johnson

About 12 winding miles east of Maryville on the shoulder of Chilhowee Mountain in Blount County, Tennessee, there is a magical place for wildflower enthusiasts and plant collectors. It is the garden of Nancy and Hal Robinson—ten acres of mountain habitat where hundreds of wildflowers grow. Some grew naturally on the site, others were rescued from areas where development was going on, and many others (not only woodland flowers from Tennessee but plants from similar areas all over the world) have been purchased and naturalized.

I first visited the garden one year in August—not an ideal time for wildflowers, but I was entranced by what I saw. Every step revealed both new and familiar things. It was hard to leave, and I overstayed my welcome by some hours, asking questions. Nancy and Hal were wonderfully gracious to put up with me, and I have been back to visit several times since.

Nancy's specialist collections are so numerous that many articles could be written about them: arisaemas (her precious "jacks"), asarums, countless wildflowers. But this time I'll concentrate on her ferns. In Nancy's forest it's hard to tell which ones are native and which ones are introductions and hybrids, because her ferns are so happy that they have naturalized widely. This is wonderful fern habitat, and little new ones peep out from under rocks and appear beside (and in) the pathways everywhere.

Nancy said that some 40 years ago she read about a garden on Lookout Mountain in Chattanooga where a lady had about 75 hardy fern varieties. This really intrigued her, and she immediately began searching her family's farm in Benton County, western Tennessee, for native ferns. None of the garden centers sold ferns then. She tried growing ferns from spores, and then she discovered mail-order sources and began ordering as many as she could afford. Many of her favorite ferns were purchased from Sue Olsen in Washington. She told me it had been a source of frustration to her that she had trouble finding anyone with similar interests to talk to. So when the Internet became available she made contact with a number of people, some of whom have swapped plants with her.

This visit in early July began at the cabin. I asked which ferns were native to the property when they bought it and was told that Christmas ferns (*Polystichum*

acrostichoides) were all over the place, and ebony spleenworts (*Asplenium platyneuron*) were also numerous. Rattlesnake ferns (*Botrychium virginianum*) were abundant. There was one maidenhair fern (*Adiantum pedatum*), but the original plant has since disappeared. *Pellaea atropurpurea*, the cliff brake fern, was there, hugging the rocks (photo, p. 266). Broad beech ferns (*Thelypteris hexagonoptera*) and wooly lip ferns (*Cheilanthes tomentosa*) were also resident, not to mention several *Dryopteris* species.

Nancy told me that many of the ferns she found on the property are limestone lovers. She said, "If you see a limestone outcrop beside a country road where moss is growing, you will also find wildflowers and ferns." She pointed out that the native ferns have to be able to survive the extreme heat and occasional drought conditions of our region. (Native Tennesseans have to be tough!) She showed me a very happy walking fern (*Camptosorus* [syn. *Asplenium*] *rhizophyllus*) growing in a trough near the cabin where she can keep it watered (p. 265). This fern *must* have lime, and the trough environment suits it very well. Two nearby troughs contained beautiful lip ferns (*Cheilanthes alabamensis*).

We went on to a moss-covered area where a large tree had fallen some years ago, and where its roots pushed up out of the ground a berm was formed. Nancy said she decided to take advantage of this natural raised bed and planted it with an assortment of mosses brought in from other parts of the property. It is now carpeted with satiny bun mosses, lush sphagnum, and several large clumps of reindeer "moss," actually a beautiful white lichen (*Cladonia* sp.). The native woodland sedum (*Sedum ternatum*) grows here, and a wonderful 'Jeddeloh' dwarf hemlock crowns the top, draping the mound with its silver-green branches. Purple cliff brake ferns (*Pellaea atropurpurea*) stand upright in the moss, and ebony spleenworts (*Asplenium platyneuron*) "wanted to be there," Nancy said. And, of course, this area is covered in the spring with bluets (*Houstonia caerulea*).

We walked along the paths that crisscross the hillside. Bushel-basket-size boulders line the upper side, and moss is busy filling the crevices and carpeting the sides. Among the ferns wildflowers have been planted—asarums, sedges, heucheras, hostas, phloxes, bloodroot (*Sanguinaria canadensis*), and foamflowers (*Tiarella*). At the upper edge of the path where seeds and spores fall between the rocks, their progeny peep from beneath. We looked at a tiny spleenwort, and Nancy told me she grew it from spores she obtained in 1994. (She is the only person I know who has the patience to be able to say "I grew it from spores.")

She estimates there are some 100 varieties of ferns on the site, and I don't believe this is an exaggeration. Here is a clump of northern maidenhair (*Adiantum pedatum*); over there on the remains of a log is a colony of resurrection fern (*Polypodium polypodioides*, p. 261). Spikemosses love this place! They encroach on the path in several locations: peacock moss (*Selaginella uncinata*), rock moss (*S. rupestris*), and gemmiferous spikemoss (*S. moellendorffii*). We came across a clump of hart's tongue fern (*Asplenium scolopendrium*) and beside it a crested form (*P. s.* 'Cristata'). Interrupted ferns (*Osmunda claytoniana)* grow on top of the hill and on the back hillside; they like it here and have been very drought-tolerant.

Edging one part of the path is a group of old concrete blocks, an early type with uneven edges that can be laid in curves. The holes in their centers made a perfect nest for tiny plants, including *Dryopteris affinis* 'Crispa Gracilis', a true miniature ferm Nancy ordered from Sue Olsen.

You may be thinking, "Why has more of the *Dryopteris* clan not been mentioned?" Well, there are so many of them in Nancy's garden that I was completely overwhelmed. There are literally hundreds of them—huge specimens, crested specimens—so many, so much alike that someone like me cannot possibly tell the difference. But Nancy knows them all and tried to introduce me to all of them, including *Dryopteris celsa*, *D. erythrosora*, *D. goldiana*, *D. ludoviciana*, *D. marginalis, D. sieboldii,* and the male ferns *D. affinis* and *D. filix-mas*, as well as many of their crested versions.

One of the most beautiful areas contains a colony of Himalayan maidenhair ferns (*Adiantum venustum*). These evergreen ferns are obviously happy here and have carpeted the ground on a slope above the path. Handsome boulders and various wildflowers punctuate the lacy network where dappled light through the canopy reaches the ground. This fern tends to grow taller at another location in the garden where there is heavier shade. It is an excellent fern for the South. While we were observing this colony, a huge yellow-and-black centipede crawled across the path, a charming ornament for the ferns.

On the downside of the path here is a handsome Smith & Hawken trellis covered by the graceful native climbing fern *Lygodium palmatum* (*L. japonicum* grows in another location in the garden as well as other *L. palmatum,* but this is the finest specimen; photos, p. 265). I was fascinated by the differing types of foliage on this plant—the hand-shaped sterile pinnae and the lacy fertile segments. Many of the more finely divided fertile fronds appeared at the top of the trellis as if reaching for the light, and the larger green "hands" were lower down. This fern has been provided with the sandy, acid soil it needs.

A little farther down the path in an area where seersucker sedges (*Carex platyphylla*) have naturalized, Nancy showed me her "experimental bed" of asarums. She has planted a variety of cultivars here and is hoping that hybrids will be generated when the beetles pollinate the different species. Several hybrids have already appeared. Along this path, about halfway down the hill, many plants abound where rain runoff carries seeds and spores downhill. She showed me one stretch of path where last summer a friend of hers dug up "everything in the path" to take to her garden. You would never know it—this year's offerings have already begun recolonizing the path.

During our walk down the mountainside we were treated to a concert of bird song. At one point I heard the distinctive call of a pileated woodpecker, a treat not often heard these days. We couldn't see him, but the sound was a real gift.

Down at the foot of the hill is the "Fern Sanctuary." A stream rambles between the tall banks on both sides. Here grow myriad ferns—*Dryopteris, Polystichum, Athyrium* (many are crested varieties)—among low-growing clumps of *Danae racemosa* and carpets of blue woodland phlox in the spring. Yellow trout lilies (*Erythronium americanum*), Virginia bluebells (*Mertensia virginica*), and many,

many *Cyclamen* of various species inhabit the forest floor, but are dormant in July. Princess pine clubmoss (*Lycopodium dendroideum*) grows here, as well as colonies of bladder ferns (*Cystopteris bulbifera*). Adder's tongue ferns (*Ophioglossum vulgatum*), originally started with transplants from a friend's nearby property, have formed a colony a little further down. Huge clumps of *Osmunda regalis*, *O. regalis* 'Crispa', and *O. cinnamomea* grow beside the stream. Hal has placed a group of very large boulders along one area, creating a place to sit among the ferns and listen to the murmur of the water, and small footbridges provide access to both banks.

Close to the place where the stream exits the Robinson property a bog has been created, inhabited by Japanese candelabra primroses, skunk cabbage, and various wildflowers. Here there is more sunlight, and a huge tub has been sunk to accommodate breeding frogs in case the little stream goes dry during a drought. As we drew near we heard several "thunks"—frogs diving in, anticipating our approach. We found the water alive with little black tadpoles. Then we climbed up to the road and started back up the hill. On the way we passed a box turtle busy laying eggs in a dusty area. We tried not to bother her.

Discussing the practicalities of maintaining this garden, Nancy told me that cloches are sometimes placed directly below desirable fern specimens to protect their offspring from slugs and other predators. There are many things in this completely natural garden that cause problems; mice are a particular nuisance, along with squirrels and raccoons that love to dig things up, wild turkeys that scratch around, and occasional intrusions from deer. No pesticides are used in this garden, but Nancy confesses to trapping mice on occasion, and her gray cat sometimes presents her with a mouse or shrew.

To visit Nancy's garden is to experience nature at its best, and I hope to be able to visit many more times. Each time I go, I form memories that will stay with me always. And I learn and learn!

Elin Johnson is a lifelong resident of Sweetwater, Tennessee in the foothills of the Smoky Mountains. After working for 33 years at Bowater, Inc., a large paper mill, she is now involved in a second career—gardening. She has been newsletter editor for the East Tennessee Hosta Society for several years.

Turning the Chinese Grab Bag Inside-Out

David Rankin

We all delight in something new. Jim McClements, in his article "The Chinese Grab Bag" (*Rock Garden Quarterly*, fall 2005, vol. 63, p. 276), conveyed to us the excitement of finding something unexpected, possibly rare or even hitherto undescribed, among plants bought from a Chinese "nursery." The main such source of plants is Chen Yi, a woman who operates also under the name of Kaichen Nursery. As Jim explains, purchasing from this source makes gardening life a roller-coaster. The same plants appear under different names from year to year, even in the same year, while the same name may produce quite different plants in consecutive years. You may get a common species when expecting something special, but equally you may receive a wonderful surprise. If we can "set aside for the moment the question of whether some, most, or all of these plants are collected in the wild," how can we fail to relish the delights that may appear? But can we set such a fundamental question aside, even for a moment?

On a lovely September day we slowly worked our way round a lake, enjoying the warmth, although we were 3500 meters (over 11,000 feet) above sea level. Our guide was a Chinese professor of botany who had been studying the distribution of *Omphalogramma* species (*Primula* relatives). We were looking for *Omphalogramma forrestii*, for which only two sites were known. The last time she had seen them by this lake there had been 40 flowering plants, each with a tall stem carrying the distinctively shaped purple flower, but at the other known site there had been just six mature plants. By the lakeside we photographed the first *Gentiana sino-ornata* coming into bloom and a few late flowers of *Primula amethystina*, but our guide kept disappearing into the surrounding *Rhododendron* scrub under the fir (*Abies*) forest. At last she called, "Come, come; it's here!" We scrambled in the direction of the voice, eventually locating her in some heavily shaded, very wet ground, with magnificent *Rheum alexandrae* at the more open edge of the wood. There she pointed out to us two fruiting stems of the *Omphalogramma*, nearly a meter tall, each with a single seed capsule, just opening in the relative warmth and dryness of the post-monsoon weather. "But why only two?" she

said. Had the other stems been eaten by yaks? No; there was no sign of the foliage of other mature plants. We searched high and low, but the few other plants we found were not of flowering size. The rest had gone.

I cannot and do not say that any specific Chinese nursery is responsible for the disappearance of the majority of the world's population of *Omphalogramma forrestii*, but I do know the following:

- *Omphalogramma forrestii* has been advertised for sale for several years.
- A very large proportion of plants of all species bought from China are dug from the wild.
- A high proportion of the plants, particularly those without robust root systems, are dead on arrival. And let's be honest, a lot die in our hands!
- Any plants you buy as *Omphalogramma forrestii* may well not be that species, or even that genus. (In the circumstances, is that good or bad?)
- Plants you buy under another name may turn out to be *Omphalogramma forrestii*, or something equally rare or threatened.

What should we do? What should I do? Should I refuse to buy these "nursery" plants from China—knowing that then they will probably still be sold, and to someone who may be even less skilled than I am at keeping them alive? Or is it my moral duty to buy as much as I can, hoping that some rare species will be brought into cultivation and saved from extinction, or identified as a new species or variety? At Kevock Garden Plants, outside Edinburgh in Scotland, we have started working with a real nursery in China, where plants are being grown in a sustainable way for export. We (and our customers) will benefit from a regular source of quality, healthy plants. The nursery benefits by receiving a higher price than they would get selling in the local markets. And the environment benefits by not being exploited. That is one way forward, albeit on a small scale to begin with.

These are difficult issues, and there are no simple, "correct" answers. My aim is to open the subject to debate. I'll leave you with a dilemma that we faced.

> *There were two, just two, fruiting stems of* Omphalogramma forrestii, *with perhaps 60 seeds in each, perfectly ripe. Yaks were grazing nearby. It is good for seed to pass through the gut of a yak, but the area of suitable habitat for* Omphalogramma forrestii *was small, and the chance of seeds being deposited in the right place was small. So should we leave the seeds where they were? Pick them? Take them away? It was unlikely that any of us would be back there for many years. We needed to make a decision in a few minutes.*

I'll tell you what we decided next time. Meanwhile, what would you have done? If you can let me know, by e-mail to david.rankin@ed.ac.uk with the subject line "Chinese dilemma," no later than January 1, 2007, I will include a summary of your responses.

David Rankin and his wife, Sheila, operate Kevock Garden Plants near Edinburgh, Scotland, specializing in species suitable for alpine and rock gardens.

PLANT PORTRAITS

Polypodium (Pleopeltis) polypodioides

TOM STUART, Croton Falls, New York

Resurrection fern, this issue's cover subject, derives its common name from its recovery from a withered state—a characteristic it shares with many temperate members of the genus but in which it excels. Robbin Moran in his *A Natural History of Ferns* (2005) relates the trail of investigations leading to an understanding of resuscitation. In short, the peltate scales on the bottom of the leaf catch the rain and funnel it into the leaf; for details, read the book.

Polypodium polypodioides ("a polypody like a polypody") is surely one of the most uninspired names in the botanical lexicon. However, it did not arise from the taxonomist's lack of imagination. Rather, this species was first christened *Acrostichum polypodioides* by Linnaeus, and by the rules it retained that species epithet as it moved from genus to genus, landing in its namesake genus in 1867. Segregated from *Polypodium*—in part because of the scales—and placed in the mostly tropical genus *Pleopeltis* ("many-scaled") in 1993, this is one of the more widely distributed ferns, found in the United States, Mexico, the West Indies, Central America, South America, and southern Africa (photo, p. 261). In the U.S. it occurs in eastern Texas, extending eastward to the Atlantic and reaching its northern limit in Maryland.

Resurrection fern is largely epiphytic, most commonly on oaks and magnolias, but it is also found on mossy rocks, principally on sandstone or limestone, especially in areas with colder winters. Perhaps it is not pH so much as porosity and water retention that make it happy. As with any long-running fern, propagation by division is easy; just keep it moist for a time to establish in the new site. If you are growing it epiphytically, wire it on with some moss. If you are growing it as a pot plant, perfect drainage is required.

In my zone 6 garden it has departed twice; I have heard of success in Maine. Properly sited, zone 7 gardeners should find it an enthusiastic performer. It is frequently available on eBay, but watch out for confusion with the "resurrection

plant," *Selaginella lepidophylla*; for that matter, watch out for anything sold on eBay.

Pellaea in Eastern Pennsylvania

MIKE SLATER, Mohnton, Pennsylvania

Several ferns that grow naturally on rather dry limestone cliffs are very nice plants for troughs or crevices in a rock garden. My favorite is *Pellaea glabella* subsp. *glabella* (photo, p. 266). Its diminutive, delicate aspect makes it fit in well with other plants in a trough. I have it growing happily in one with *Daphne arbuscula* in a soil mix to which I added about one-quarter by volume of limestone chips. It does best if it doesn't get too much water.

Pellaea glabella subsp. *glabella* has pretty blue-green leaflets and a hairless, dark reddish-black stem. The fertile leaves and the sterile leaves are similar in appearance. The examples I have seen in the wild have leaves about 3 or 4 inches long (7.5–10 cm), but I have seen them up to 6 inches (15 cm). This subspecies is diploid and fertile, and new plants can be easily raised from spores.

Pellaea glabella subsp. *glabella* can be separated from its larger and coarser congener *Pellaea atropurpurea* by several characteristics. *P. atropurpurea* (p. 266) also has a dark stem but has pale hairs on the stem and dimorphic fronds; that is, the sterile fronds appear different from the fertile ones. The sterile fronds tend to be more prostrate but wider than the fertile ones. The fertile fronds are quite erect, 10 inches (25 cm) or more tall, and do not form a compact and pleasing plant for the rock garden like their smaller cousin. In addition (I don't know if this is true in general), the *P. atropurpurea* plants here in southeastern Pennsylvania are more olive-green in color when they are mature, as opposed to the crisp blue-green of *P. glabella*.

Limestone cliffs are relatively rare in humid climates such as we have in the eastern United States, but some of our native ferns have found a good substitute—unfortunately, a substitute that is itself becoming a rare and diminishing habitat. I am speaking of old mortar in the joints of brickwork and stonework built before World War I. Here in Berks County, Pennsylvania, I have found both species of *Pellaea* growing in old mortar, but it is usually one species or the other in a given site. Both species are very tolerant of hot, dry habitats, but the fact that they don't usually grow on free-standing walls but instead on walls with soil or fill behind them indicates that they do like some subterranean moisture.

Before the twentieth century, almost all mortar was made of lime putty and sand, but early in the century a switch was made to using Portland cement in mortar. The old-style lime putty mortar is essentially limestone and thus weathers to form a good habitat for limestone-loving ferns. Portland cement contains minerals other than calcium carbonate, and it is much harder and does not weather easily, so it rarely forms a good habitat for ferns. If you see ferns growing happily in the mortared joints of an old wall, then you can be pretty sure the

wall was laid before 1920, and most likely before 1900. Walls and bridge abutments built for canals and railroads comprise the majority of *Pellaea* habitats I am familiar with.

There are several other nice small ferns that sometimes share limy crevices with the pellaeas if the spot isn't too hot and dry. These include *Woodsia obtusa*, *Cystopteris tenuis*, *Asplenium platyneuron*, and *Asplenium trichomanes* subsp. *quadrivalens* (p. 263).

In the western United States we find *Pellaea breweri* and *P. bridgesii*, even more beautiful little ferns well worth the attempt to cultivate from spores, since plants are rarely available.

Further Reading

Cobb, Farnsworth and Lowe. 2005. *Ferns of Northeastern and Central North America.* Peterson Field Guide Series. 2nd ed.Boston: Houghton Mifflin.

Rosa spithamea and More Roses for the Rock Garden

Loren Russell, Corvallis, Oregon
Robin Hansen, Coos Bay, Oregon

"They're here!" As we fanned out into the dry meadow on the south flank of Abbott Butte in Oregon's southern Cascades, we found first dozens, then hundreds of full-sized roses blooming at ankle height amid flax (*Linum lewisii*) and eriogonums. We had seen many unusual plants on our 3-mile hike, but this was the advertised highlight for the annual Emerald Chapter NARGS camping trip: the "trough-sized" Ground Rose (*Rosa spithamea*), which Tanya Harvey had found and photographed the previous summer here in the Rogue-Umpqua Divide Wilderness in southwestern Oregon (photo, p. 267).

Rosa spithamea ranges from the Cascades and Siskiyous of southwestern Oregon south through the Coast Ranges of California. Though the species is variable over its range, the form we saw at Abbott Butte is perhaps the lowest-growing American rose. The upright, simple or branched stems are sparsely prickly and range from 4 to 9 inches (10 to 22 cm) tall. These stems rise from a short horizontal rhizome. This species may sucker less freely than most low-growing roses; at Abbott Butte we found that neighboring plants usually differed in floral color and other characteristics. Each stem bears one or a corymb of 2 to 3 (occasionally up to 5) proportionately large (1.5–2 inches/3–5 cm), fragrant flowers in colors ranging from deep rose to white. The bases of the flowers and fruits are covered with glandular hairs, which cause them to glisten when side-lit. This characteristic is sufficient to distinguish *R. spithamea* from all other western North American roses. The typical rose foliage is glaucous; in the autumn it turns brilliant red-purple to accompany the small red hips.

What's in the name of this little rose? The unfamiliar epithet *spithamea* is derived from the Greek *spithama*, which means "handspan," the distance between

outstretched thumb and forefinger, an apt reference to this species' low stature. Common names used in floras and wildflower guides for *R. spithamea* are "ground rose," "dwarf rose," and (in California, referring to the very similar variety *sonomensis*) "Sonoma rose." By any name, this little rose is a choice shrub for rock gardens.

In cultivation, *R. spithamea* is easily grown and retains its character. At Hansen Nursery, Robin has been growing this species from a 2002 seed collection by Betsy Becker and Jack Poff (Columbiana Seed). Described by the collectors as a 12- to 18-inch (25 to 50 cm) wild rose, hers may be a larger form than seen at Abbott Butte, but still temptingly small. Robin's seed germinated in spring 2003 from midwinter planting and has grown well in containers at the nursery, with some plants blooming in June 2004.

Loren returned to Abbott Butte in September to collect seed (some donated to the 2005–2006 NARGS seed exchange) and cuttings, some of which were taken from previously marked plants with white or pale pink flowers. Four of the cuttings rooted and were planted on a north-facing slope in heavy clay loam, with minimal irrigation. All grew into 3- or 4-branched shrublets about 15 cm (6 inches) high; one has already produced a sucker an inch from the primary stem.

Both of us think *R. spithamea* is drought-tolerant but also tolerates moderate summer water with good drainage. Though it can grow in full sun in the wild, it should be given protection from afternoon sun. Robin feels that it can be recommended both for containers and for well-drained rock gardens. Since this form, at least, is usually nonsuckering, it can be considered safe to plant in rock work and crevice gardens.

Where Are the Rock Garden Roses?

Rock gardeners are notorious for their appropriation of small, choice species of the most popular genera of garden plants—tiny irises, peonies, hostas, rhododendrons, and many more ornament our rock gardens. But few of us grow roses among our alpines. This is understandable, perhaps, for a race noted for thorniness, ranginess, and suckering. Even Reginald Farrer (*The English Rock Garden*), who advocated roses for the rock garden, thought them (with the exception of "*R. alpina*," mentioned below) to be "adornments for only the largest rock-gardens, and there, though delightful . . . tyrannous shrubs . . . to be set apart in ground apportioned for such." The *AGS Encyclopaedia of Alpines* entry states that "very few rose species are small enough to be suitable for the rock garden . . . if one is not a purist, there are many cultivars of miniature roses which have the right size and attractiveness, but somehow do not really fit in with alpines." In fact, most of the small roses cited in the *AGS Encyclopaedia* are usually 50 cm or more in height.

Still, there are low-growing and distinctive species roses that we can and should try. Some small roses are alpine ecotypes of such wide-ranging species as the circumboreal *R. acicularis*. Often these alpine forms grow as prostrate, weakly trailing shrubs, like the form of *R. pendulina* known as *R. alpina* that Loren saw in the

French Alps, and an equally small form of *R. nutkana* he found in Alaska. Unfortunately for the rock gardener, only larger, lowland forms of these species seem to be commercially available in North America. Even less obtainable are such desirable Asian alpines as *R. hissarica* from the Altai Mountains, and a "really tiny" rose that Jane McGary grows as *R. albertii* from a Joseph Halda seed collection.

Other small roses, like *R. spithamea* and another small rose from central California, *R. pinetorum*, are erect dwarf shrubs. Most are natives of dry habitats (e.g., open pine forests, sand dunes, rock outcrops in semi-desert) at moderate elevation, and so have considerable promise in western American gardens. In North America, the best known of these small roses is *R. arkansana*, which Robin has seen as an 8–10 inch (20–25 cm) plant on the North Dakota prairie. It has huge flowers, pink and fragrant with a distinctive median stripe of darker strawberry down the inside of each petal. In these conditions it is herbaceous, the annual stems dying back to woody bases, and spreads slowly from deep rhizomes. Shrubby, usually larger forms of *R. arkansana* occur elsewhere in its range. Cynthia Reed (in "Bounty of the Grasslands," *Rocky Mountain Alpines*) recommended this "well-behaved and fragrant little jewel" for rock gardens in the Rocky Mountain region. The noted nurseryman Claude Barr found and distributed a double form from the Black Hills of South Dakota that he called the "Fargo Rose" (*R. arkansana* 'J. W. Fargo'). We have not found this cultivar in nursery catalogs, though it has been used extensively by Canadian hybridizers to impart hardiness.

In eastern North America, low-growing forms occur in several species, including *R. carolina*. Perhaps the most intriguing of these small roses is the distinctive *R. nitida*, with bristly stems and outstanding fall color. Some bog ecotypes of this species may be as small as 8–10 inches (20–25 cm).

Is a rose always just another rose? Most small species, including those mentioned above, are conformists with typical rose flowers, foliage, and thorns. Though small, they are otherwise horticulturally interchangeable. There are, however, two distinctive groups of roses from desert regions that might tempt rock gardeners in the drier parts of North America. The first of these is the Western American subgenus *Hesperrhodos* with two small-leaved, intensely spiny species: *Rosa stellata*, ranging from Texas to Arizona, and *R. minutifolia*, from the coastal scrub of western Baja California, with a single population in southern California. The former is quite showy, but in cultivation it usually forms a medium-sized shrub around 4 feet (1.3 m) high. In the wild, *R. stellata* is quite variable, often growing to no more than 18 inches (50 cm), so it may be possible to find small forms suitable for a dry rock garden. *Rosa minutifolia*, in contrast, is usually low-growing, around 8 to 12 inches (20–30 cm), but in Farrer's word, "tyrannous," suckering to form large, impenetrable thickets. Still, its tiny leaves, about ¼ inch (6 mm) long, and gnarled growth invite growing it as a heavily pruned specimen in a container. *Rosa stellata* is hardy at least to USDA Zone 7 with good drainage, and *R. minutifolia* only to Zone 8.

The last to be mentioned are the most eccentric of roses: the "Persian rose," *Rosa persica* from Iran, and the similar, possibly synonymous *R. berberidifolia* from central Asia. These are distinguished by their small, simple leaves and lack of

stipules; the flowers too are unique in the genus, prompting another of Farrer's joyous outbursts: "golden little dainty *R. berberidifolia Hardyi*, with a purple blotch at the base of its petals making its golden flowers look like a Cistus on their dainty arching sprays." Others have likened the flowers to poppies. These dwarf suckering shrubs, no more than 18 inches (50 cm) tall, are sometimes separated to constitute the genus *Hulthemia*, but molecular studies seem to have returned them securely to the genus *Rosa*. *Rosa persica* itself is rarely grown but has been popular with hybridizers. Its reputation in England for being shy to bloom may be warranted, but Central Asian populations (*R. berberidifolia*) seem to be easier to grow and bloom in wet-winter climates, and these are supposed to be hardy at least to USDA Zone 6.

Sources

Many species roses and primary hybrids are available from specialty rose nurseries in North America, but several of the low-growing forms mentioned above are not commercially available, at least in the forms best suited to the rock garden. The forms we value are not necessarily of great interest to rose fanciers, so much remains to be done in selecting roses for the rock garden—watch your seed lists and take cuttings of good forms! Wild roses are easily grown from seed, ready for planting out in their second year.

Some of the American species mentioned in this article can be obtained from nurseries specializing in native species, including Hansen Nursery (see ad in this issue) and Las Pilitas Nursery (www.laspilitas.com).

BOOKS

The Genus Arisaema: A Monograph for Botanists and Nature Lovers, by Guy Gusman and Liliane Gusman. 2nd ed. ISBN 3-904144-91-X. 438 pp., 475 color photos, c. 200 drawings, 17 tables. Hb, $69.95. Portland: Timber Press, 2006.

Reviewed by JIM MCCLEMENTS, Dover, Maryland

In 1997 I wrote a short article about arisaemas for this publication, noting that the genus was enjoying a surge of popularity in gardening circles. This was partly because more people were getting into shade gardening, and partly because many more *Arisaema* species were then becoming generally available. I also pointed out that arisaemas originated from many different parts of Asia (and a few from North America), resulting in a seemingly hopeless mish-mash of taxonomic treatments: one species might have any of several names, depending on its origin. If I may quote my deathless prose, I wrote, "What is desperately needed is a comprehensive book on Arisaemas and the development of a taxonomic treatment that combines the species from different parts of the world into an intelligible key, eliminating the confusion, synonymy and duplication that exists."

The first edition of the Gusmans' book, published in 2002, was a giant step toward that goal and remains the only comprehensive treatment of the genus. However, at the same time that the book was being written, edited, and published, major changes were occurring in the field, primarily in the sheer number of new species coming to light. When I first became interested in *Arisaema* in the late 1980s, it was thought that there might be as many as 150 species worldwide, and that is the number mentioned in the first edition. Now, four years later, the authors state that there are at least 200 species, subspecies, and varieties; indeed, the new index lists 500 names, including synonyms. While it is somewhat unusual for a monograph to benefit from a second edition after only four years, *Arisaema* certainly deserves one. The need has been magnified by the relatively sudden availability to the Western world of many *Arisaema* species previously

unknown to most gardeners, and now easily ordered over the Internet and shipped directly from China.

In addition to including newly recognized species and varieties, the book has undergone format revisions and clarifications. As in the first edition, the authors do not attempt to construct a single key covering all arisaemas, preferring instead to divide and formally key out the genus into the 15 sections and subsections that have largely been accepted in the past, and then to identify species within the sections by using tables of characteristics, instead of keys, supplemented by very clear color diagrams of the foliage patterns and inflorescences of the individual species. In addition, almost every species is illustrated by a color photograph. As a non-botanist who easily gets befuddled by the big words in the standard dichotomous keys, I find this approach extremely helpful. All of the new material adds up to 40 more pages than the first edition contains.

The second edition contains essentially the same thorough discussions of morphology, systematics, and propagation, as well as a wealth of information about arisaemas in the wild, this from authors who have visited and explored most of the areas where the plants grow. There are an extensive bibliography and a very helpful glossary, geared to the genus. There is a complete index of all species, synonyms, and known hybrids, but the book does lack a general subject index. However, the table of contents may meet that need.

The technical quality of the publication is excellent. It does not skimp on color, and the photographs, most by the authors, are abundant and beautifully reproduced.

The Genus Arisaema is the only existing true monograph of the entire genus, and it is an extremely thorough treatment of all its aspects. It is well organized and extremely readable, and it contains very good photographs of a high proportion of the species. While the second edition can hardly be considered a quantum leap from the first, it contains enough new material and revisions to make it very worthwhile for anyone seriously interested in the subject.

Wildflowers of the Pacific Northwest, by Mark Turner and Phyllis Gustafson. ISBN 0-88192-745-7. 512 pp., 1247 color photos, 1220 maps, 31 drawings. Pb, 27.95. Portland: Timber Press, 2006.

Reviewed by CHRISTY AKIMOFF, *Portland, Oregon*

In an effort to accurately review Timber Press's new field guide, *Wildflowers of the Pacific Northwest*, I made it my companion on several outings in various parts of Oregon and Washington. It accompanied me on a backpacking expedition into the Kalmiopsis Wilderness of southern Oregon, several day hikes in the Columbia River Gorge, a car tour of Olympic National Park, and a 47-mile boat trip down the John Day River of eastern Oregon. It is an attractive book with beautiful color photographs of every plant species described. Amazingly, my copy looks nearly new, despite hard use, thanks to its glossy soft cover, sturdy binding,

and water-repellent pages. Other helpful features include a ruler printed on the back cover for quick measurements, general descriptions of flower and leaf terminology, and a glossary.

The authors begin the guide with explanations of the climate, geography, and plant habitats of the Pacific Northwest, including Washington, Oregon, northern California, and southern British Columbia, along with excellent photographs by Mark Turner, some full-page. The bulk of the guide consists of more than 1200 plant descriptions, three to a page, written by Phyllis Gustafson, a longtime NARGS activist. As a result, this field guide weighs in at over 2 pounds and is not amenable to backpacking expeditions, but is better suited to day hikes and car trips. The plants described include both native and nonnative species. I found nearly every common native plant I came across in this guide, with a few exceptions, such as the showy *Asclepias cordifolia* from southern Oregon. In addition, some less common species have been omitted.

The organization system deviates from most other guides and is designed for ease of use. The plants are divided first by flower color and then by petal characteristics. This system is less daunting than a more technical key, but it requires a great deal of page flipping and scanning through photographs. I found the organization system unnecessarily cumbersome when I knew the genus of a plant but could not identify the species. In this case I had to turn to the index and then flip back and forth between sections. In an effort to avoid this time-consuming process, the authors include a Family Section (pp. 50–56) that lists major plant families along with page numbers for the family members in each flower color. Bookmarking this section saves a great deal of time.

Another obvious problem with dividing plants by flower color is accounting for natural variations among individuals and populations. I had a great deal of trouble guessing what color category a plant was located in and found that I got it wrong as many times as I got it right, especially when trying to distinguish between pink or white. In addition, several times I was thrown off by a white form, such as in southern Oregon, where I came across a beautiful white *Triteleia*. After checking both the white and yellow sections, I finally identified the plant as *Triteleia laxa*, located in the blue section. The authors attempt to remedy such problems by referencing other members of the same genus located in other color sections at the bottom of the page. Nevertheless, these drawbacks limit this guide's usefulness for more experienced plant enthusiasts.

The plant descriptions are generally thorough and accurate. The guide has helpful descriptions of plant habit and distinguishing characteristics, along with a range map for each species. These range maps can be useful for quick identification, but they are sometimes inaccurate.

This guide is not a replacement for technical plant identification keys but is certainly a good investment for anyone becoming acquainted with Pacific Northwest wildflowers. While the photographs lack many of the distinguishing characteristics clarified in botanical drawings, they are generally crisp and accurate representatives of the species. This book will make an excellent seed list reference and is certainly a pleasure to peruse.

Bookshelf: Ferns of the United States

JOHN D. SCOTT, *Rockland Botanical Garden, Berks Co., Pennsylvania*
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This list is excerpted from a longer bibliography resulting from a project to find and collect the county dot map data for the pteridophytes of the United States. I hoped to create a composite atlas of U.S. pteridophytes. However, only a few states have recent floras, general or fern, with dot maps. Most published data approach 50 years old. Internet searches were very helpful in finding books; correspondence via FERNET was extremely helpful in locating reprints. In addition to the more recent and specialized works listed below, the *American Fern Journal* published a number of state checklists, and most standard state floras contain a section on pteridophytes. (John Scott's full list, for which we lacked space, can be obtained in electronic form by writing to the editor at the address on the last page of this issue.)

Multi-State References

***Flora of North America* Online**
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NARGS National Awards 2006

The following awards were announced at the NARGS annual meeting at Snowbird, Utah, in July. Several other national awards are available but did not receive nominations during the past year. All members are encouraged to nominate deserving recipients during the months preceding each year's annual meeting. A list of awards and qualifications for them appears in the *Bulletin Board* newsletter from time to time; for more information write to the Vice President, Grazyna Grauer, whose address appears inside the back cover of this issue.

Marcel Le Piniec Award: Roger and Debbie Barlow

The Marcel Le Piniec Award is given to a person who as a nursery operator, propagator, or plant explorer is currently and actively engaged in extending and enriching the plant material available to North American rock gardeners. Roger and Debbie Barlow are the owners of a specialty nursery, Beaver Creek Greenhouses, in the Selkirk Range of southeastern British Columbia, where for the past 17 years they have been growing a wide range of perennial plants. During the past decade they have narrowed their focus to dwarf hardy plants suitable for rock gardens and containers. Many of these plants are alpines. Others are dwarf plants adapted to the harsh climatic conditions found in the high steppes and drylands of the American West, Turkey, and Central Asia.

All the plants they sell are grown in their nursery. These plants are propagated by means of seed, cuttings, and divisions from their large collection of stock plants. In addition, they travel the West each summer collecting seed of native alpine and dryland plants. Additional seed comes from exchanges with fellow nursery growers and seed collectors all over the world. Most of their mail-order plants are propagated, overwintered, and shipped in small, deep rose pots, a production method that ensures undisturbed root systems and plants ready to set out in the garden. The majority of their plants will be one year old, though some slower-growing items will be in their second year. All their plants are vigorous, well rooted, and ready to plant. Having both Canadian and American

mailing addresses, they make their plants readily available to many rock gardeners. In the fall they produce a seed catalogue as well.

Roger and Debbie are skilled propagators, especially of *Cyclamen, Echinocereus, Escobaria, Gentiana, Opuntia, Primula*, and *Rhododendron*. This nursery is a veritable testing ground for the plants they love, promote, and sell. They are the big attraction at Calgary's, Victoria's, and Vancouver's plant sales. They have profusely and selflessly donated plants to the Calgary Chapter of NARGS.

All this justifies Roger's and Debbie's nomination, but it should be mentioned that Roger is also a very knowledgeable speaker, using gorgeous slides to enhance his presentations.

—Ev Keddie

Edgar T. Wherry Award: Marilyn S. Light

The Edgar T. Wherry Award recognizes those who have made outstanding contributions to botanical or horticultural information about native North American plants. In 2006 the award was given to Marilyn S. Light of Ontario for her work on terrestrial orchids.

Marilyn Light was born and reared in Montreal, where she began gardening at an early age. She earned a B.S. in agriculture at Macdonald College of McGill University in 1965, and an M.S. in microbiology in 1967. She lived in Barbados, West Indies, for seven years, teaching botany and biology; there she also began growing and studying orchids.

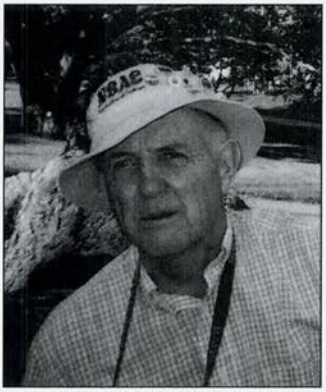
After returning to Canada, Marilyn was director of the Backus Mill and Agricultural Museum and information and education coordinator for the Long Point Region Conservation Authority in southwestern Ontario. She recently retired from her position as coordinator with the Professional Training Service (Science, Engineering, and Health Sciences) at the University of Ottawa.

Marilyn Light is the co-author with Iris Bannochie of *Gardening in the Caribbean*, and the author of *Growing Orchids in the Caribbean* and *Container Gardening in the Caribbean*. In 1993 she directed the Canadian Orchid Congress's video *For the Love of Orchids—In Living Memory*, about Joseph Purdon and his efforts to conserve *Cypripedium reginae*. She is now continuing to study the long-term behavior of terrestrial orchid populations in Gatineau Park, Quebec, where she began work in 1985 on the introduced European species *Epipactis helleborine*. Other investigations include inter- and intra-clonal compatibility and its effects on seed yield and seedling vigor in *Cypripedium parviflorum* var. *pubescens* and the other species mentioned above.

She has received the Anne Hanes Conservation Award from the Ottawa Field-Naturalists Club for her work. She is a member of many scientific and horticultural organizations, including NARGS; she is a very active member of the Ottawa Chapter of the Society, which treasures her participation.

—Ernie Boyd

Award of Merit: Bernard S. Jackson



The Award of Merit is given for distinguished contributions to the national activities of the North American Rock Garden Society. The sole recipient in 2006 is Bernard S. Jackson of Truro, Nova Scotia, who has been instrumental in founding both the Newfoundland and Nova Scotia chapters of NARGS.

Members of the Society attending the 2005 Annual Meeting in St. John's, Newfoundland, admired the wonderful naturalistic gardens at Memorial University and an entertaining talk by Bernard, who was deeply involved from the start in the gardens' design, construction, and development over two decades. Creating a notable rock garden in a region with a singular "alpine" flora at or near sea level is important in its own right and has been acknowledged by Memorial University, which granted Jackson an honorary degree.

Bernard Jackson did early work as a naturalist in remote parts of Newfoundland, establishing a reputation as a conservationist and public educator through both scientific and popular writing, which earned him several awards and memberships in learned societies. He taught and trained outstanding nursery growers. He instilled his interests in native flora, rock gardening, and heritage plant varieties in his coworkers, students, and the general public.

Upon his retirement in 1993, he and his wife left Newfoundland to seek a warmer climate where gardening (and golf) would be possible for more of the year. They ended up near Truro, Nova Scotia. There they created a garden with a wide range of plant material, which attracts birds, dragonflies, butterflies (the subject of one of Bernard's books), and busloads of visitors from near and far.

As if this weren't enough to keep a retiree busy, Bernard soon became involved with a volunteer group assisting in and planning the gardens of nearby Nova Scotia Agricultural College. They proposed to create a model rock garden. Bernard supported this effort vigorously, laboring on all stages of design, site preparation, acquisition and placement of tons of rock, and planting. The entrance to the feature is a large, low-walled, paved courtyard filled with the more delicate and demanding alpine plants, grown in troughs, a project made possible by a grant from the NARGS Norman Singer Endowment Fund.

Equally important have been Bernard's efforts to bring together the community of rock gardeners in Nova Scotia. He encouraged them to donate plants to the new rock garden (nothing was scorned, except perhaps the dreaded petunia), and his suggestions as to what could be grown spurred all to greater heights. It is no surprise that his presence in this part of Atlantic Canada has been followed by the formation of a new NARGS chapter.

—Nelson Watson

NARGS Coming Events

Eastern Winter Study Weekend,
"The Evolution of a Rock Gardener"
January 19–21, 2007
Hyatt Regency Hotel, Rochester, New York
Host: Genesee Valley Chapter
Registrar: Kate Van Scott, 555 Log Cabin Rd., Fishers, NY 14453
<kpvansco@rochester.rr.com>; website: <gvcnargs.org>

2007 Annual General Meeting
June 14–17, 2007
Canaan Valley Resort State Park, West Virginia
Chairperson: Martha Oliver
921 Scottdale-Dawson Rd., Scottdale, PA 15683

N·A·R·G·S BOOK SERVICE

Dwarf Campanulas and Associated Genera, Graham Nicholls. Describes more than 200 lesser-known dwarf species and hybrids suitable for rock gardens, alpine houses, troughs, and containers. 272 pp., 140 color photos, 3 maps. Timber Press $28.00

The Genus Arisaema: A Monograph for Botanists and Nature Lovers*
(2nd edition), Guy Gusman and Liliane Gusman. Revised edition includes 10 new species and recent developments in taxonomy, geographical distribution, revised tables for keying species, and new photographs. Arisaemas in the wild and in cultivation, propagation, and cultivation. 474 pp., 420 color photos, c. 200 line drawings, 20 tables. Timber Press. $64.00

Timber Press Pocket Guide to Clematis, Mary K. Toomey. Profiles 300 garden-worthy species and hybrids, from longtime favorites to new cultivars. Specific cultivation information for each, including hardiness zones, light and temperature needs, and flowering time. Flexibind, 232 pp., 319 color photos. Timber Press. $16.00

Timber Press Pocket Guide to Ground Covers, David S. MacKenzie. 1000+ readily available ground covers for temperate gardens profiled, with 320 color photos. Flexibind, 240 pp. Timber Press. $16.00

Green Roof Plants: A Resource and Planting Guide,* Edmund C. Snodgrass and Lucie L. Snodgrass. Photos and cultural information for 200+ species and cultivars of drought-tolerant plants suitable for extensive green roofs, including moisture needs, heat tolerance, hardiness, bloom color, foliage characteristics, and height. 204 pp., 299 color photos, 2 diagrams. Timber Press. $24.00

Heuchera, Tiarella and Heucherella: A Gardener's Guide,* Charles and Martha Oliver. *Heucherella*, *Tiarella*, *Mitella*, and *Tellima* as well as Heuchera. Color photographs, tips for breeding and propagation, and advice on feeding and pruning. Includes 277 wild species and garden hybrids. 160 pp. Batsford. $22.00

Ferns for American Gardens, John T. Mickel. Encyclopedic treatment of 400+ ferns. Useful appendices, including updated source lists. 384 pp., 360 color photos, 50 b/w illustrations. Timber Press. $20.00

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Fern Grower's Manual* (Revised and Expanded Edition), Barbara Joe Hoshizaki and Robbin C. Moran. Encyclopedic treatment of all ferns in cultivation in the U.S. Some 700 species including physical descriptions, cultural requirements, hardiness, common names, synonyms, special uses, geographical range, and notable cultivars or related species. Each species is accompanied by a b/w illustration for identification. 624 pp., 50 color photos, 165 b/w photos, 826 liine drawings. Timber Press. (price may be lower as Timber Press has been offering a "sale," which may be over—inquire for specific pricing) $48.00

Peterson Field Guide to Ferns, Second Edition: Northeastern and Central North America, Boughton Cobb, Cheryl Lowe, Elizabeth Farnsworth. Revised 2005. Comprehensive guide for ferns. Photos and line drawings for identification and updated taxonomy. 304 pp. Peterson Field Guides. $16.00

Additional information: Timber Press Publications at www.timberpress.com

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