

ROCK GARDEN



QUARTERLY

VOLUME 58 NUMBER 3

SUMMER 2000

COVER: *Calypso bulbosa*

by Rhonda Williams, Wasilla, Alaska

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Allium crispum

SOME ALLIUMS

from the Golden State

by Wayne Roderick

In the new *Jepson Manual: Higher Plants of California* (ed. James C. Hickman, University of California Press: Berkeley, 1993) are listed 48 species and 20 varieties of the genus *Allium*. There are three or four on the Federal Rare and Endangered List. A good number of our California alliums are nondescript, and some are look-alikes. I have tried to grow about half of all these species, and many I could not key out to species using botanical literature, as some are very similar, with only small differences in the bulb coats to distinguish them. Here I will write about the many species of California onions that, in my ever-so-humble opinion, are worth growing in the garden.

Most of our onions are small and best grown in the rock garden, and some are real treasures worth any trouble the gardener might take to please them. We also have several species that are dogs—of little horticultural worth—and two or three that can be invasive.

Allium campanulatum is best for areas where it can be snow-covered all winter. This onion grows 3-4" high. The flowers are light pink stars, well

displayed by the open umbel. *Allium campanulatum* can be found as low as 4,000', but the best patches are generally above 7,000' in very gritty soil. In these big patches, from time to time, one can find forms with snow-white or dark pink flowers, as well as pale pink.

Allium haematochiton is a nice, not a great onion. It seems easy to grow. *Haematochiton* means red tunic. If we could have this color in the flowers instead of the bulb coat, this would be a great plant. The scape grows to about 1' tall. Descriptions claim that some forms have pink flowers, but these I have not seen. The flowers are white with some pink shading. This species is found in hills of southern California and does nearly too well here in northern California; it is important to cut off the seed "heads." The flowers do make a show in the garden, one I would not be without.

Allium hyalinum is nice, but if left to go to seed, it can be very invasive, so all seeds should be pulled off. Borne in a cluster on a 5-6" stem, the white, star-like flowers are quite showy with a slight pinkish cast and reflector cells that give sparkle to the inflorescences. If this vivacity is not enough reason to

grow this species, the early-season foliage makes the most delightful chives that one could wish for in the kitchen.

Allium cratericola, as the name implies, is found in volcanic areas. I believe this is the best of all our California onions! The flower umbels look like small pink bon-bons perched on or among rocks. This jewel has heads 1–1.5" in diameter, and it produces only one leaf per plant. It is most common on south-facing, old lava flows at rather low elevations, where the summer heat can be very hot indeed, with very little soil or grit covering the bulb. *Allium cratericola* has not been happy on my north-facing slope but has done even more poorly in my hottest spot in very gritty, man-made soil mix. But even under these poor conditions the plant is admirable enough that my friends have admired them and wanted seed. Seed is, however, hard to collect, as the ripe seed umbels drop off promptly and become tumble weeds.

Allium crispum and *A. peninsulare* are very similar in plant height and flower color and shape. One has to look very closely to see the difference, whether the margins of the inner tepals are crisped or straight. These species are mostly scattered in nature and rarely form clumps, but a single stem of their bright wine-red flowers is noticeable even when you are doing 45 miles per hour down the road. These two species are most common on slopes quite too steep to climb, where they have some shade of trees or brush. They have done almost too well in my garden, but then there is always someone wanting some bulbs.

Allium dichlamydeum is most likely the showiest of all 8–10"-high growers we have. In the best color form this can be a most pleasing shade of cerise, with the flowers in umbels up to 3" in

diameter. The color lasts until the seed is nearly ripe. This species is found in masses among rocks above sea bluffs. Most often the big patches bear clear pink flowers, while the best rose-purple color forms are in smaller patches. The best forms have done well in my garden but never multiplied as fast as I would like. Even in the wild this species does not set much seed, so one never has to worry about it whether it will self-sow.

Allium tribracteatum can be a most charming gem, the umbels sitting on the ground, or a wretch on a 10" stem. For me the dog does well, but the gem from high up in the mountains has rotted out in the winters. The white bon-bon clusters splattering the ground are treasures that I continue to covet for my garden.

Too big for the rock garden, *Allium unifolium* is a good plant for the perennial border, growing 15–18" tall. The bulbs are an odd shape and generally are twins. The umbels of bright pink flowers can be nearly 4" in diameter and make good cut flowers. If *A. unifolium* likes your garden, it can seed all over and become a pest, so old inflorescences should be removed. It is so good for flower arrangements that it is worth the extra work of deadheading.

Allium validum is a wet grower that some people like, but I think it is only good for eating! It produces lots of 2'-tall leaves and a poor inflorescence of mauve flowers more or less hidden in the leaves.

Allium falcifolium has an unbelievable geographic distribution in the inner North Coast Ranges. Luxuriant plants can be found at about 1,000' elevation, growing in serpentine barrens with *Lewisia rediviva*. At high elevations, up to 7,000', the plants become quite small, and the color, more often, is pink to dirty pink or seldom white. At about 6,000' I have seen this small

onion so plentiful that the rocky slopes were pink, whereas at lower elevations it is scattered with never more than a few bulbs to a clump. The low elevation form is the prize of the species, having most often wine-red flowers in a cluster up to 3" across. I have once seen a snow-white plant that was very desirable. This low elevation form does very well in scree conditions, as long as it is given a summer baking.

Southeast of the San Francisco Bay area can be found *Allium fimbriatum* growing with *Fritillaria falcata* on steep, serpentine talus slopes. The *Fritillaria* has been so disagreeable to grow that I have never even tried its associate. This little onion has one long leaf and a very short stem with about ten wine-red flowers. The talus slope is so steep, and the serpentine is so loose that it is difficult for a person to stay on the slope and not slip off down the mountainside. One can run his hand in under the plants and lift them out. From a rocky, clay soil about 100 miles northeast of San Francisco comes a tall, whitish form of this same species, growing to about 8" high. This gave me trouble for two days while I tried to make it fit the botanical keys, until, by accident, I noted a reference to this location and the name *A. fimbriatum* var. *purdyi*. An adequate, but not great plant, and it must have hot, dry summers.

Now for a few of the Sierra Nevada alliums that I know. In the upper foothills, *Allium hyalinum* grows in moss-filled cracks of granite outcroppings. This onion occurs in such quantities that one could hardly believe that bulbs could be produced in such masses in such a small amount of space. Most forms of this species are white with a little pink shading. The specific name *hyalinum* means crystal. It is well named, as the clear reflector cells give sparkle to the tepals, and at

the base of the tepals these cells are so massed that it looks as though there were a little mirror on each tepal. The umbels are rather open, the starry flowers well spaced and making a cluster about 2" across on a stem 4-6" high. The flowers are showy with all their sparkle, and this gives them both charm and good garden value.

From about 5,000' elevation up can be found three of our good onions: *Allium campanulatum*, *A. lemmonii*, and *A. platycaule*. *Allium campanulatum* is a wanderer and is found over a very wide area, from near the Mexican border, western Nevada, on up into Oregon and to the higher peaks of some of our coastal mountains. There is much variation in this species with only two characters that seem to be steady: its preference for a light, loose soil, and the presence of so many plants with a rather dirty pink color to the flowers. The open cluster of flowers is up to 2.5" across on 3-4" stems. Like most high-elevation plants, it has never done too well in the mild winters of the San Francisco area. *Allium lemmonii* never lived for more than two years for me. I think this is because I never found any seed at its lowest elevation but obtained it from very high up at 8,000-9,000'. The nice, clear pink flowers are in rather tight umbels of about 1.5" diameter on stems to 8" high. *Allium lemmonii* is most often found in heavy soil near the edges of meadows, and the plants can be so plentiful that they color the entire area pink. *Allium platycaule* is found from 4,000-9,000' elevation in light, loose, rocky soils, mostly on the east side of the Sierra Nevada Mountains in low rainfall areas. The flowers are in such masses that the umbels, up to 3" across, look like lace. Individual flowers are bright pink, and the perianth segments are nearly linear. The stems 4-6" high. This

species has not bloomed every year for me, but it has persisted for over ten years. I consider a clump of *A. platycaule* a good addition to my collection, if for no other reason than for the flat, 5–6"-long leaves, which are a lovely blue-green with red tips, and very pleasing to the eye.

Allium anceps is a desert species with pinkish flowers that I collected only once, and that was the last time I saw that collection. I planted the bulbs in the garden, but I think our wet, mild winter rotted them. As near as I can remember, the inflorescences were similar to those of *A. hyalinum* but a better pink color.

Allium haematochiton and *A. praecox* were given to me by friends from southern California. Both have white-tinged, pinkish to pink flowers in open clusters up to 3" across on stems to 10" high. I am very fond of *A. praecox* because of its early flowering. One of my collections from the edge of the Mojave Desert has pale pink flowers and is slowly multiplying. *Allium praecox* has done best in clay soil and blooms, most years, from late February to mid-April.

Allium shevockii I have never seen in bloom, only in fruit, and I did not think much of the species. What a mistake! Found in granite sand and grit at about 8,000', one would think it would not grow down near the coast, but it has done fair to well, producing open

clusters of large, pink to wine-red flowers on 2" stems. This is too newly described and cultivated a species for us to know how well it will really do, so we can only hope for its bright future in gardens.

Allium siskiyouense is another rare plant, but not as rare as *A. shevockii*. It has never done well at lower elevations. It has a 2", flattish stem, two flat, gray-green leaves, and a small, open cluster of purplish red flowers that are very charming. It is a plant to be desired. It is found at about 7,000' on rocky, serpentine soil. If one has snow in winter and can locate and obtain seed, this is another choice plant for the rock garden.

These are far from all the species of *Allium* found in California. There are choice species such as *A. parvum* and *A. atrorubens* from high desert mountains that have been very difficult to grow. There are several others that can have good flower color, and in which the leaves dry up at flowering time, such as *A. anceps* and *A. amplexans*. I don't know why these have never done well with me. Most forms of *A. fimbriatum* are not exciting at all, as the fimbriate part describes not the flower tepals but tiny growths on the ovary, of no interest to those looking for visual attractions. And the other species found in California are either rare and endangered or are wish-washy undesirable—or both!

Wayne Roderick began his horticultural career with his first garden at age five, progressing to operating his own nursery for 14 years, heading the Botanical Gardens' California Section at University of California at Berkeley for 17 years, and serving as director of Tilden Regional Parks Botanic Garden for seven years before retiring. Since then he has organized study weekends, conducted countless tours throughout the West Coast, and expedited the introduction of many California bulbs to general horticulture. He has received the Marcel LePiniac, Marvin Black, and Western Chapter Service Award from NARGS and additional honors from a spectrum of horticultural societies, including the prestigious Lyttel Trophy of the Alpine Garden Society in 1993. Wayne's warmth, energy, humor, and generosity are legendary. Happy Eightieth Birthday, Wayne!

FABULOUS FRONDS: Growing Ferns from Spores

by Margery Edgren

It is hard to imagine a plant lover who has not been inspired at one time or another by the beautiful fronds of a fern. Perhaps it was sheets of *Adiantum* on the walls of Fern Canyon in Prairie Creek State Park on the northern coast of California. Maybe it was the sight of *Cheilanthes gracillima* spilling out of rock crevices in the Siskiyou Mountains. It may have been creeping carpets of *Drymoglossum* covering the trunks of tamarind trees in Singapore (photo, p. 192), or a tiny curly-grass fern in the New Jersey Pine Barrens. There seems to be a fern for every niche. However, those who return home hoping to fill that niche in their gardens with some fern admired in the wild may be sorely disappointed when they try to obtain it. It's true there are a number of specialty nurseries that grow very choice specimens, but the selection they can offer is a mere pittance compared to the fabulous variety of ferns that grow in the wild, or even those in cultivation in botanic gardens and private collections. The wide array of colors, textures, shapes, and sizes in ferns that could enhance our rock gardens is

generally unavailable in the trade.

Cheilanthes cooperae makes a charming subject for a trough garden crevice. I first saw it displayed this way at the East Bay Regional Parks Botanic Garden in Berkeley. The gold or silver powdery farina on the backs of fronds of *Pentagramma* species makes these small ferns delightful subjects for a rock garden setting and inspires their common names, goldback fern or silverback fern. Tiny *Humata vestita* from Malaysia is a perfect subject for a terrarium or moist, shady trough garden. Its tough runners, thickly covered with dark green, shiny fronds, thrive in a humid environment. Montane species of *Cheilanthes* and *Pellaea* make pleasing combinations with flowering plants in the sunnier areas of the rock garden.

Growing these ferns from spores would greatly expand one's options for landscaping. Curiously enough, even able propagators, who succeed with the most difficult alpiners, hesitate when it comes to raising ferns from spores. It is actually much easier and more enjoyable than you may have been led to believe. The following sug-



Cheilanthes gracillima in crevices of rock; Siskiyou Mountains, northern California

Polystichum munitum growing in wall at Tilden Park, Berkeley, California
photos, Margery Edgren



gestions are offered in the hope that they may encourage more propagators to grow ferns from spores, just as they grow plants from seeds collected around the world.

COLLECTING

First comes the pleasure of collecting spores. Of course they may be obtained already packaged from a few sources such as spore exchanges. The Los Angeles International Fern Society has one, as do the American Fern Society, British Pteridological Society, and others. Occasionally spores are offered on seed lists, our own NARGS Seedlist, for example. Specialty seed catalogs, such as Northwest Native Seeds and Alpains, are good places to look for spores of the montane species. Both these catalogs give valuable collection data, with notes on exact location, altitude, exposure, edaphic conditions, and general appearance of the parent population. If you're collecting your own spores, you'll find that, like seeds, they are much easier to carry from place to place and pass through regulatory agencies than their parent plants.

The decorative patterns of spore cases produced on the backs of fronds are amazing in their variety and often beautiful. Propagators and taxonomists are always inspecting the backs of fern fronds, even when not collecting, to observe how the groups of spore cases, or sori, form spots or chains that may outline the edges or veins of the frond, some with coverings, some without, in various colors and patterns.

An easy way to collect spores is to place the fronds in a paper envelope between layers of clean newspaper. If the frond is larger than your envelope, cut it into pieces to put inside. If the frond is really large, a small portion of it may be sufficient to provide thou-

sands of spores. The newspaper absorbs moisture from the frond, and this facilitates opening of the spore cases. Spores may be stored in this collection envelope and also sown directly from it, without removing the frond. Perfectionists may wish to clean the spores by sifting them through lens paper (a technique I learned from Judith Jones). Most distributed spores are cleaned before shipping. Some may also wish to sterilize their spores. Both precautions are highly commendable, but usually it is not necessary to take these steps in order to obtain a good pan of fern gametophytes and to produce hundreds of little ferns.

SOWING

The following method of preparing and sowing a spore pan is designed to produce a fast, easy start on a vigorous, rapidly growing crop of ferns. No sterilization is necessary for the medium or the spores. The goal is to create an environment that favors the development of fern gametophytes over the growth of mosses, algae, and fungi that can overrun the pan. All containers should be new, to keep contamination at a minimum, but need not be sterilized. The small, 4", clear plastic saucers sold at garden centers to place under potted plants make excellent pans for growing fern spores. Larger saucers, especially those over 5" in diameter, are unsatisfactory, as they are too flexible to provide stable support for the medium. Masking tape placed around the outside of the saucer makes a good label for identification and data. Even permanent ink does not sink into the clear plastic and will rub off when it gets wet. The medium for the bottom of the saucer consists of five parts of perlite to one part of milled sphagnum. This should be moistened with one part of a hydroponic fertilizer such as Chem Gro. It is

very important not to get the medium too wet, and using a measured amount of liquid will prevent this. The medium should be pressed firmly into the saucer with a clean spoon to a level about two thirds its depth. The perlite and sphagnum should lock together to form a level, stable surface. When finished, hold the pan on its edge perpendicular to the table. If the medium shifts at all during this tip test, start over, and press it in harder.

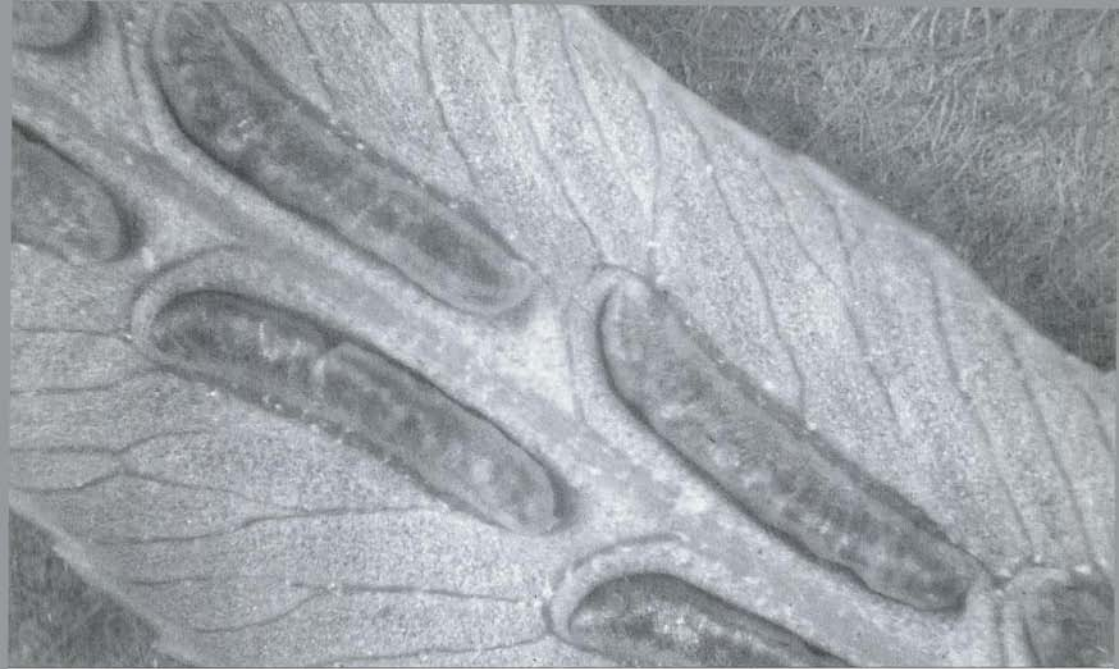
Sowing tiny spores evenly over the pan presents some of the same problems as sowing very fine seeds. To facilitate sowing, place two rounded teaspoonfuls of fine vermiculite in a new plastic cup and moisten with Chem Gro or other hydroponic fertilizer. The vermiculite should be moist so that the particles clump together but not wet enough that liquid seeps out. Next, add some spores to the vermiculite.

If you are sowing directly from your collection envelope with the frond still inside, cut a small slit in the bottom of the envelope at one corner, and gently tap the spores out. This is much more satisfactory than trying to pour spores out the top. Do not cut across the corner, as this will make the hole too big and spores will fall out too fast. A light sprinkling of spores over the top of the vermiculite will suffice. Then, mix the spores and vermiculite thoroughly. Spread the spore mixture gently and evenly over the surface of the medium in the saucer. When well distributed, press the mix firmly into the bottom layer. It is important to make a good contact between the two layers. If the spores are mixed thoroughly with the vermiculite and spread evenly across the pan, a good distribution of spores will result. In addition, because the spores are trapped on the moist vermiculite, they do not float off across the room

on an updraft or breeze either during or after sowing. The vermiculite not only serves as a vehicle for sowing the spores, much as sand mixed with fine seeds, but it also becomes an important part of the medium. Ferns thrive on vermiculite, and I always include it in the planting medium for ferns of any age.

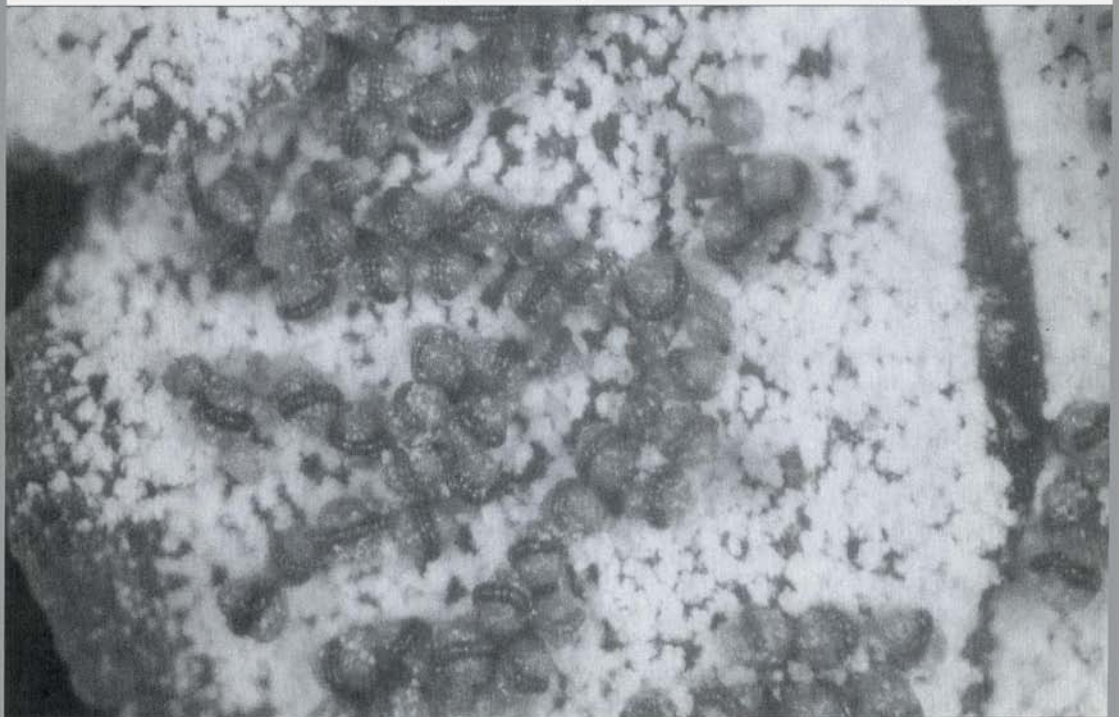
GROWING

Next place the completed pan inside a zipper-type sandwich bag and close it. There should be a good fit between saucer and bag to facilitate control of humidity. Gallon-size bags are unsatisfactory for small saucers and also waste considerable space. Place the pan under continuous fluorescent light for growth. Four-foot, cool-white, fluorescent tubes make an excellent light source. These are the inexpensive ones used for general lighting purposes and are available everywhere. Subdued light is best, so place the tubes about 18-24" above the pans, or cover the pans with white paper toweling to reduce the intensity and diffuse the light. If you are growing other plants directly under the lights, fern pans can be placed around the edges of the lighted area and will still get enough light. Technically, the quality of the light will be somewhat different there, as well as the intensity, but the spores grow well anyway. An ambient air temperature of 70°F is excellent, but close approximations will also give good results. The more stable the environment, the less trouble there will be with moisture control. The pan should be kept moist but not wet. Frequent wide swings in temperature will result in evaporation of moisture and drying of the medium, followed by condensation inside the bag, which will drip back into the pan. This causes some areas to be too dry and others too wet, encouraging



Woodwardia fimbriata, sori

Goldback fern, sporangia. Annulus or ring where spore case opens is clearly visible around each one (close-up through dissecting microscope. photos, Margery Edgren



growth of algae and fungi in the wet spots. Keep the pans not too wet and not too dry. As rock gardeners coping with alpiners you should already be skilled at this game. The bags should be opened occasionally to wipe out condensed moisture, as some always accumulates. At the same time the medium should be checked for drying. It will probably not need more moisture for about three or four weeks and will tend to dry out first around the edges. To remoisten, add water with the fine mist from a hand sprayer that is used only for water. Sometimes it is enough to gently mist the edges. If spraying the whole surface, hold the pan about 2' away from the mister to avoid getting too much water in the medium. The pan should not need additional fertilizer.

Several factors are essential to favor development of the fern. First, hydroponic fertilizer makes a good supply of nutrients available without burning soft tissues. Next, warm temperatures and continuous light produce rapid growth. Finally, moisture control is very important. Growth of ferns may be very slow in pans that are kept too cold and wet, or on short daylengths, and under those conditions pans may be overrun with algae, fungi, and other contaminants.

DEVELOPMENT

About two or three weeks after sowing, tiny columns of cells develop from the germinated spores, although this will only be apparent under the microscope. These grow gradually into a mat of gametophytes that cover the pan. Each individual looks something like a little liverwort with fine, root-like rhizoids that anchor it to the medium. On average, in three or four months there should be a nice mat of gametophytes covering the pan. Gametophytes of various species are

fairly similar in appearance, although some are wavy, some ruffled, and many are heart-shaped. Occasionally spore cases fall off the frond without opening to release the spores, and then gametophytes grow out of the case in a clump. This may make the pan look spotty instead of uniformly green, but the ferns develop just fine anyway.

When mature, the gametophytes, which grew from the spores, bear egg and sperm cells. A thin film of moisture is necessary to enable the sperm to swim to the egg for fertilization. A tiny sporophyte develops from the fertilized egg right on the little gametophyte. This new sporophyte will develop into a fern plant to grow in the garden. Since production of gametes and fertilization all take place within the spore pan, there is no need to worry about hybridization when collecting fern spores.

Rock gardeners are well aware of the tendency of certain genera such as *Primula* and *Aquilegia* to hybridize in the garden, making it unlikely that garden-collected seeds will be true to species. There is no need to worry about this when one is collecting spores from ferns. Hybrids may only result when spores from more than one species are placed in the spore pan together. Of course, spores of a different species may accidentally get into the spore pan, or flats left open in humid propagation houses may acquire wayward spores. However, in general, the species you collect in the garden is the species you get out of the spore pan.

The tiny new sporophyte sends up a rudimentary frond or two and grows a small root down into the medium as the gametophyte that bore it gradually deteriorates and disappears. The young sporophytes soon become apparent to anyone looking into the pan. At first, only one or two may

appear upon close inspection, usually around the edges of the pan where misting has been done to keep the medium moist. More will follow, sometimes quickly and sometimes slowly enough to try one's patience. It is risky to generalize, but appearance of sporophytes is common four to eight months after the spores are sown. Three months is fast, and two months is really fast but may occur. Some pans may take a year to produce sporophytes. Goldback and silverback ferns, which have powdery farina on the mature fronds, show spots of gold or silver farina on their first, rudimentary fronds (photo, p. 190).

POTTING

There are different ways to move the new ferns along. They can be pricked out individually to sporeling pots. This is difficult without a dissecting microscope or similar magnification and requires a pair of forceps with fine points. However, nice pots of well-spaced plants are easily handled later at repotting. Another practice followed by most commercial growers is to move clumps of sporophytes out to pots carrying gametophytes along with them. These will have to be separated later. It is easier to work with the larger plants but harder to get the roots apart once they have grown together. In either case, they are planted to a medium for small ferns. One that has produced good results for me consists of three parts coarse vermiculite, two parts peat, and one part sand. This mixture is moistened with the same hydroponic fertilizer used in the spore pan.

One may wish to prick gametophytes out of the pan before sporophytes have developed. Perhaps the pan is too thickly sown. Clumps of gametophytes moved to a new pan or pot of small fern mix will have more

room to grow. Another reason for removing gametophytes early is to rescue them from contamination. If one side of the pan is being smothered by algae or fungi, you may be able to save a good portion of the crop by pricking out clumps of gametophytes from the healthy area, well away from the contaminated side. Another way to deal with a small spot of contamination is to scoop it out with a small tool. It is not likely you will remove it all, but you may slow it down enough so the ferns have a chance to outgrow it.

It is not necessary to remove sporophytes as soon as they develop in the pan. For those who want small numbers of sporelings at a time, the tiny sporophytes can be kept in the pan and removed a few at a time over intervals, as long as a year or even several years. This is convenient for supplying arboretum or plant society sales. Thus, vigorous young plants can be grown from spore within a year, and their production hurried or delayed as desired. This schedule compares favorably with production of choice seedlings or plants from cuttings that are difficult to root.

If you find yourself wishing for captivated ferns that can't be found on catalog lists, or you want to propagate one of your favorites for plant sales, try growing some from spores. It does not seem that many little ferns so suited for rock gardens would be a profitable crop for commercial nurseries in the foreseeable future. I hope enough of you will try growing them from spores, in one way or another, so that rock gardeners everywhere can enjoy more and more of them.

Margery Edgren propagates ferns, alpinas, and California native plants indoors under lights and enjoys living in an oak-toyon parkland in Woodside, California.

Silene laciniata



AMERICA'S RED SILENES

by Donald W. Humphrey

The genus *Silene* contains around 500 species of annuals, biennials, and perennials and is distributed nearly worldwide. From South Africa and South America to the high arctic of North America and Eurasia, these members of the Caryophyllaceae include dull weeds, choice alpinists, good garden perennials, and several desirable eastern wildflowers.

The predominant flower color of the many species ranges from white through pink with a few purples. In the United States, however, there are at least seven species whose flower color is red. Their collective range is from New York and southern Ontario to Ohio, the southeastern states, Missouri, Oklahoma, Texas, New Mexico, Arizona, California, and southern Oregon.

My interest in these plants is twofold. I like red as a striking accent; and hummingbirds are attracted to red flowers. It is interesting to speculate that the red silenes, as well as the red penstemons of the Southwest, have co-evolved with the hummingbirds. In any case, I am always looking for good garden plants that are attractive to these feathered jewels.

What follows is a brief account of the seven species and my experience with them. I would be pleased to hear how others have fared in growing them. I have grown all but one of the species from seed and have had reasonably good luck in the garden with three species, although I am still learning their traits and cultural requirements.

Probably the rarest and most difficult to grow is *Silene plankii* from moss-covered ledges of the Franklin Mountains of West Texas. It is a plant for the rock garden, being only about 4–6" high. I bought seed from a collector a few years ago and grew them, but they languished and died in the rock garden before flowering. At present, there are two seedlings in my south-facing rock wall and one in the rock garden. They definitely look lonely for Texas.

Silene californica (photo, p. 194) ranges from southern California in the foothills of the Sierras and the Coast Ranges north to southern Oregon. It may reach 16" in height in the open, brushy areas and woodlands where it grows. Its five petals each have four lobes. Easy from seed, the real challenge is to find a place in the garden

where it will thrive and flower. Its tendency to splay outwards suggests placement in the rock garden, atop a stone wall, on a bank, or at the edge of a bed. Asa Gray designated it a form of *Silene laciniata*, but it is now considered distinct.

Silene laciniata (photo, p. 194) has a California range that is generally more southern than that of *S. californica*, occurring deep into the mountains of Mexico and west across Arizona and New Mexico to Trans-Pecos Texas. I have grown and flowered it from seed and have attempted, unsuccessfully, to cross it with *S. regia*. In those plants I have grown its flowers are a lighter, more orangey red than those of *S. regia*, but because the species has such a wide range, the flowers may exhibit color variations. Texas forms appear to be somewhat smaller. As the name suggests, the petals are deeply cleft. I hope to investigate this species and its garden potential more thoroughly.

Silene rotundifolia has been a mystery plant to me. It is said to be found on exposed rocky cliffs and banks from West Virginia and southern Ohio to Alabama and Georgia. I have never had seed nor seen the plant, but, like the other species, it is a tap-rooted perennial. It has decumbent stems, as one might expect from its environmental niche, varying from 8–30" in length. The opposite leaves are ovate to nearly round, and the petals are deeply notched. After I wrote about silenes for the Hardy Plant Society, I received seed from a family nature preserve in southeastern Ohio, where the plants grow on sandstone bluffs. In March I potted up 14 seedlings; this should be enough material to test in a variety of environmental niches. Hopefully there will be seed to collect for distribution through the NARGS Seed Exchange.

Silene virginica is well named the fire pink (photo, p. 195). It ranges widely,

from New York to Georgia and west to Oklahoma, growing in rich woodlands and on rocky slopes. It is the only species of these red silenes that I have seen growing in the wild. I saw it at the base of a west-facing shale slope in western Virginia, where it occurred with other low-growing plants. It is a beautiful plant that has long been in gardens, but, for me at least, it has not been very long-lived. I have always grown it in rock gardens but will now try it in cooler, richer soils to see if that will increase its life span.

Recently I acquired a hybrid between *Silene virginica* and the lovely, pink-flowered *S. polypetala* 'Longwood'. I hope it will bloom for me this year. *Silene polypetala*, according to correspondence in the 1960s from Fred C. Galle to NARGS member Arthur Kruckeberg, was known only from one site in Fulton County, Georgia. Kruckeberg's article, "A Garden of Catchflies," appeared in Vol. 19(1) of the *Bulletin of the American Rock Garden Society* in 1961 and was reprinted in NARGS' *Rock Garden Plants of North America* in 1996. Kruckeberg made "thousands of crosses..." of *Silene* species, including one hybrid of *S. virginica* x *S. polypetala* that bore coral-rose flowers.

All of the species discussed above are from mountainous areas or sloping land. The next two species are more nearly flatlanders. *Silene regia* is found in prairies and open woodlands from Ohio to Missouri, south to Alabama and Georgia. It has proven to be a long-lived and reliable plant with me, as long as certain conditions are met. It seems to take two or three years to achieve its full potential, both in height and number of flowering stems. As one might expect from a prairie plant, the stems are wand-like and may rise to 5', although 3' seems more the norm. The opposite leaves are



Allium dichlamydeum

Allium platycaule

photos, Wayne Roderick





Allium falcifolium

Allium fimbriatum var. *purdyi*

photos, Wayne Roderick





Allium cratericola

Allium lemmonii

photos, Wayne Roderick





Allium tribracteatum

Allium siskiyouense

photos, Wayne Roderick





Pellaea brachyptera growing at Tilden Park Botanic Garden (p. 175)

Cheilanthes covillei (p. 175)

photos, Margery Edgren





Mexican goldback fern, From limestone area, dry in winter, microscope view. (pp. 175, 181).

Fern *Blechnum spicant* sown 12/86, sporophytes, 5/87; photo 7/87; on right *Pentagramma triangularis* ssp. *triangularis*, sown 9/86; sporophytes, 5/87





Sporophyte on gametophyte, *Lygodium* sp., close-up through dissecting microscope.
photos, Margery Edgren

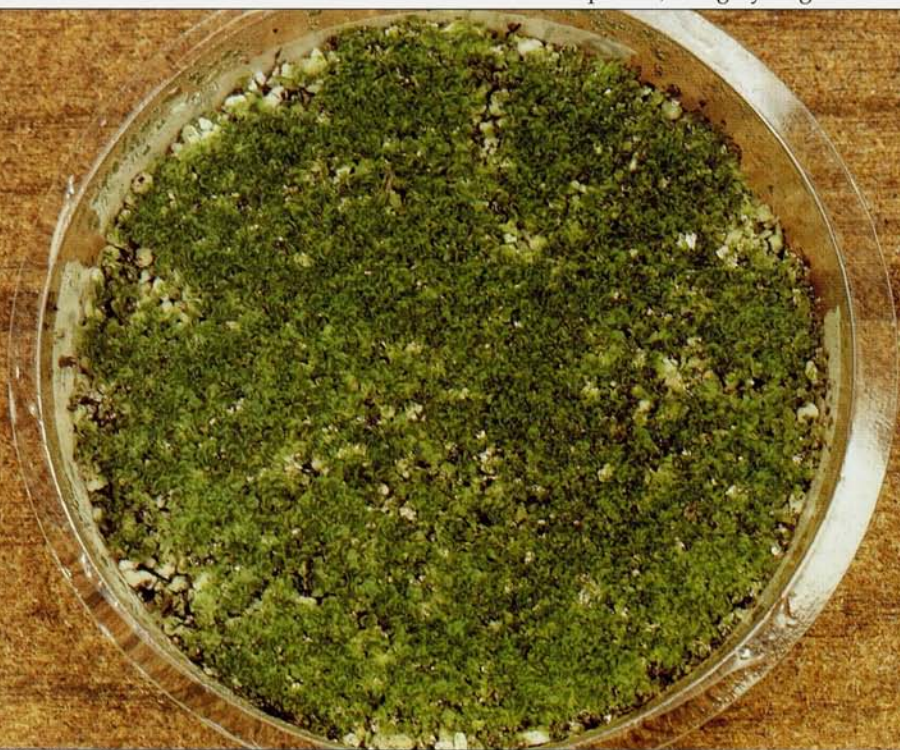
Cryptogramma acrostichoides, five months after sowing, sporophytes





Drymoglossum, from Singapore (p. 175)

Pan of gametophytes of *Polystichum munitum* three months after spores were sown.
photos, Margery Edgren





Saxifraga eschscholtzii (p. 205)

Saxifraga mertensiana (p. 205)

photos, Verna Pratt





Silene californica (p. 183)

Silene laciniata (p. 184)

photos, Panayoti Kelaidis





Silene virginica (p. 184)
photo, Panayoti Kelaidis

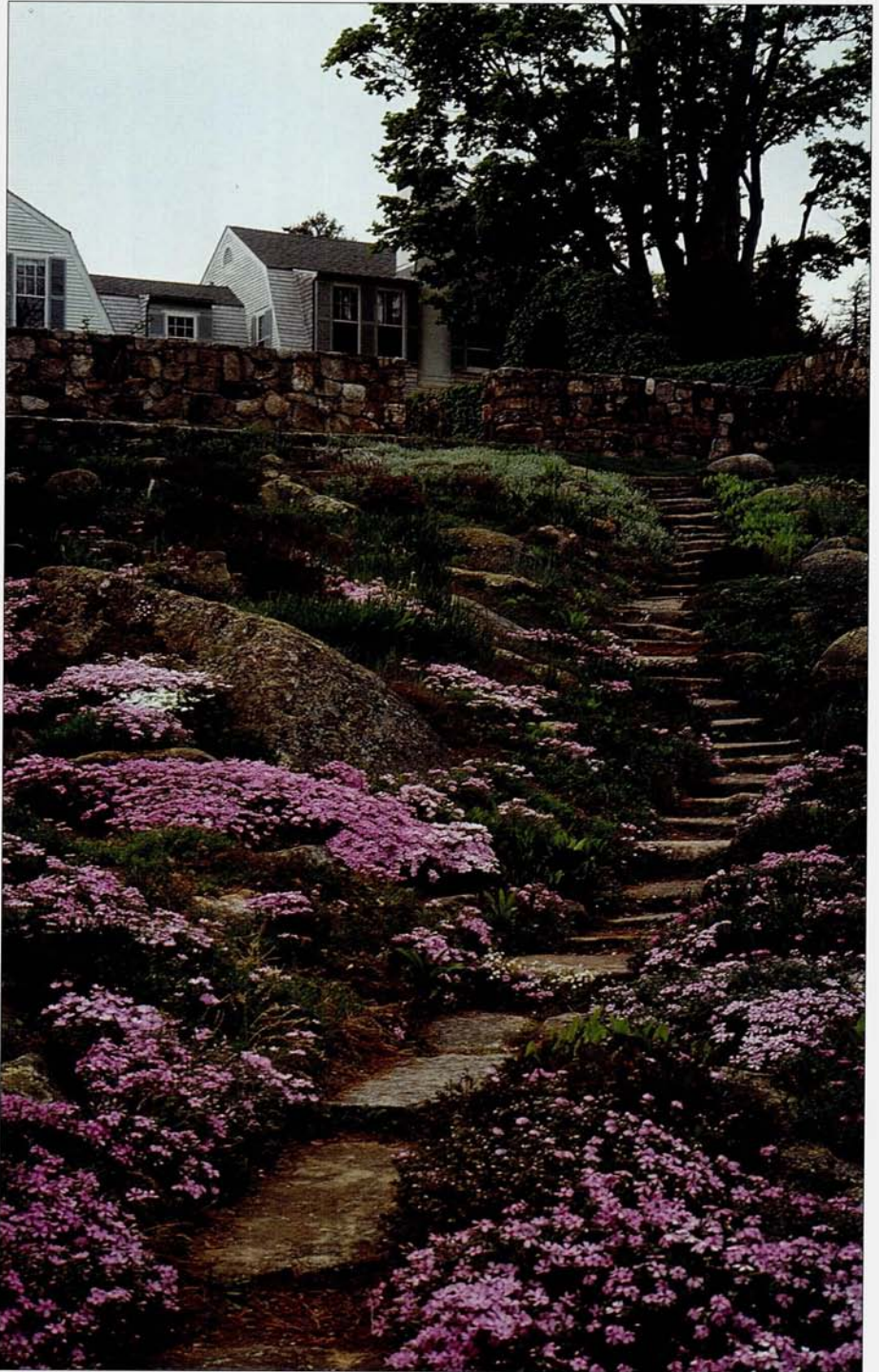


Silene subciliata (p. 201)
photo, Don Humphrey

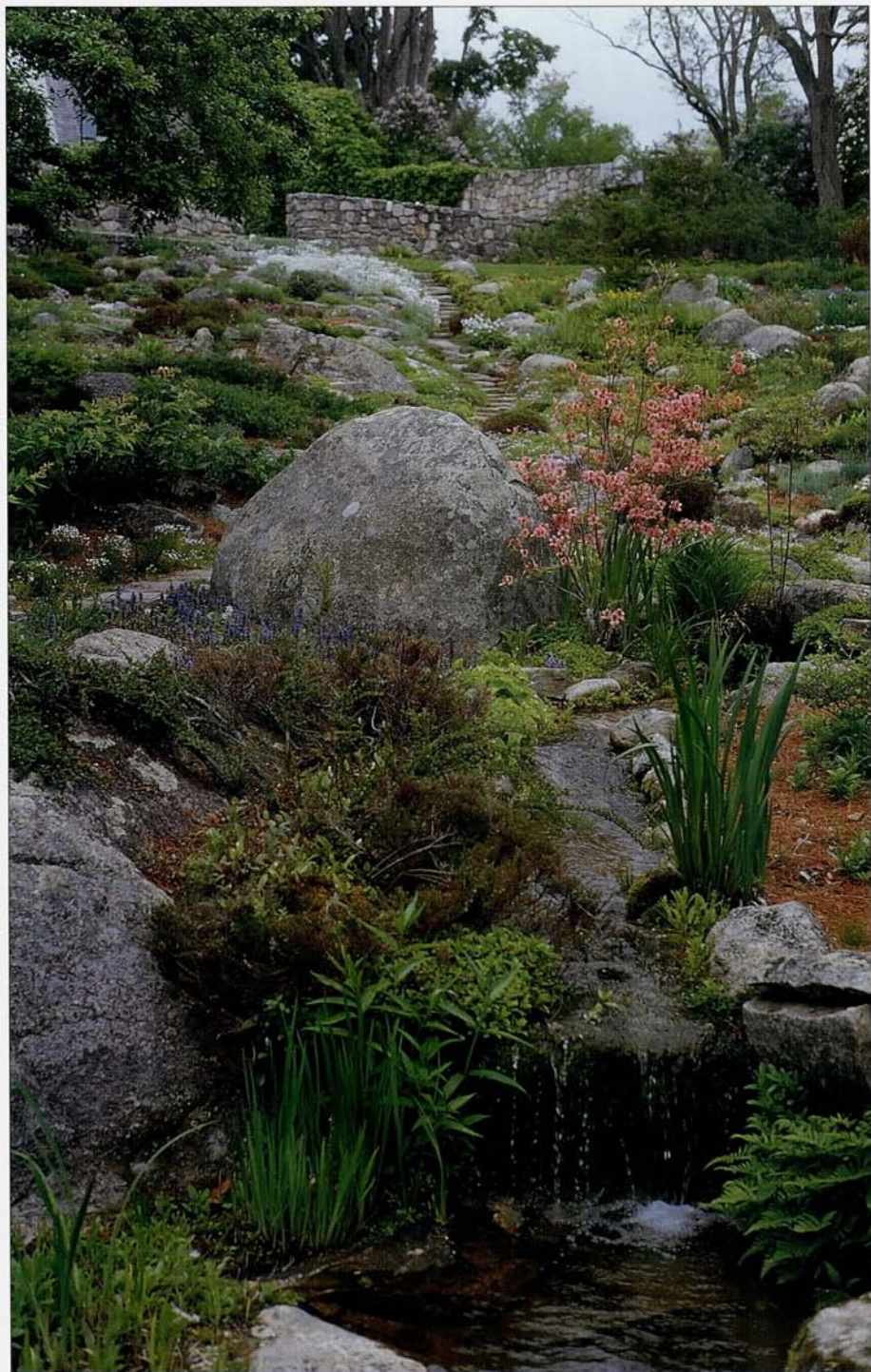
Silene regia (p. 201)

photo, Don Humphrey





196 Clarence Hay Garden, 'The Fells', Newbury, New Hampshire
(pp. 207–215) photo, Jeff Good

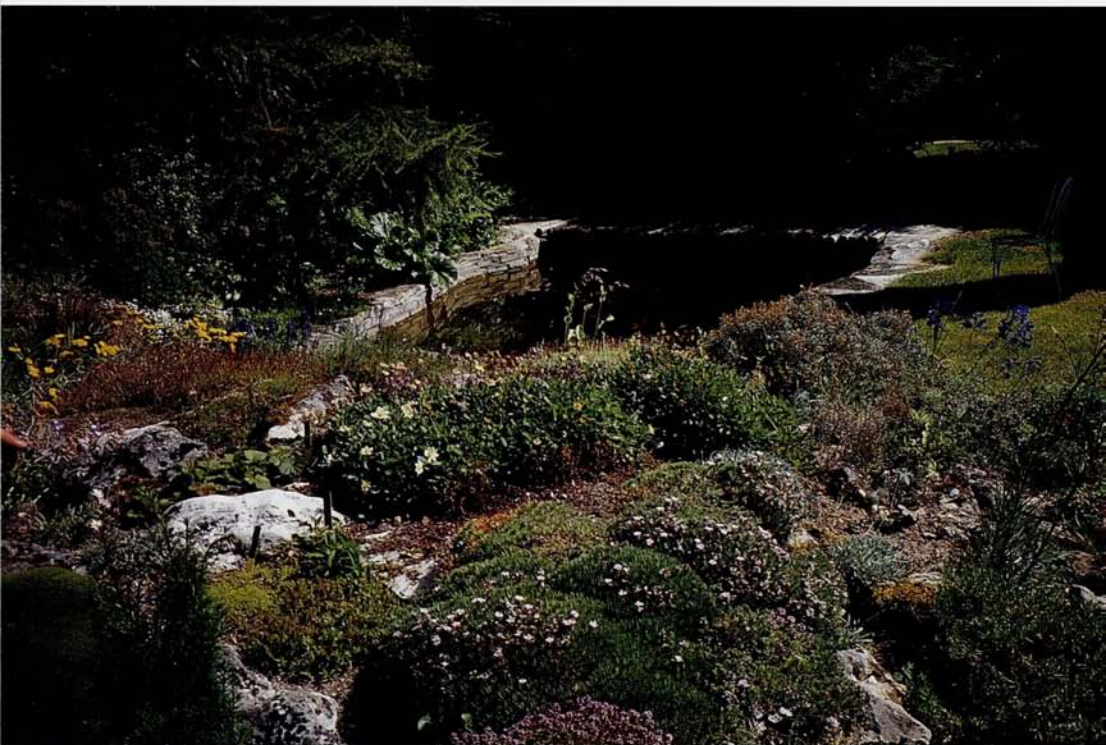


Clarence Hay Garden, 'The Fells', Newbury, New Hampshire
(pp. 207-215)



The garden of Monique Kemoun, long view up the hill behind the house, France
(pp. 226–227)

Camus' rock garden, France (pp. 227–228)





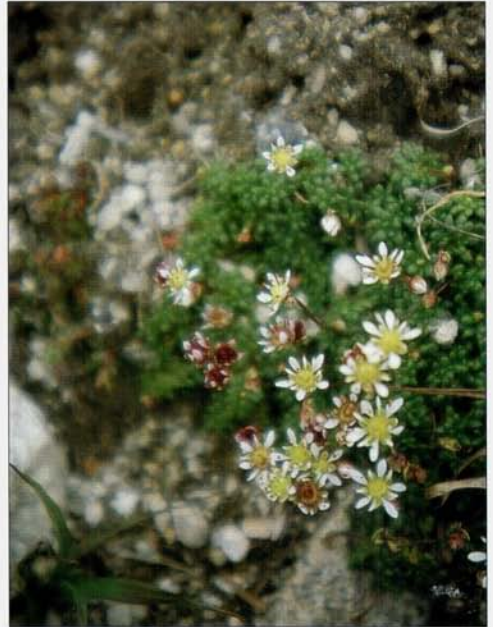
Saxifraga bronchialis (p. 205)

photo, Gwen Kelaidis

Saxifraga pennsylvanica (p. 204)
photo, Mark Tebbitt



Saxifraga tolmiei (p. 205)
photo, Gwen Kelaidis





Saxifraga magellanica (p. 205)

photo, Tamsin Goggin

Saxifraga bronchialis (p. 205)

photo, Panayoti Kelaidis



ovate and fairly widely spaced on the stems. Those I have grown on poor soils that dry out with some regularity during the summer have survived, but they have not flourished, having one or two stems and generally remaining less than 2' tall. On the traditional "good garden soil that stays moist but is well drained" they seem to flourish. My plants have good light and 5-6 hours of afternoon sun. My best plant had 7 flowering stems and reached 3' in height. These plants have not required staking, although they may lean somewhat against a nearby plant. The bloom period in northern Virginia is from mid-June well into July, with up to 70 flowers in bloom at one time. Hummingbirds visited this planting regularly throughout this time.

Every now and then a wildflower that seems to possess good garden potential escapes our notice for decades. This has certainly been the case with *Silene subciliata* (photo, p. 195). Overlooking it is perhaps understandable, since it is an extremely rare and endangered species known only from six stations in East Texas and adjacent Louisiana. It was, in fact, lost for some years after its original discovery, and a botanist of the times lamented that it would be very desirable to rediscover this beautiful wildflower.

I was given seed several years ago collected by Paul Carter, an East Texas gardener, who has made seed of a number of choice Texas natives available through various seed exchanges. Knowing nothing about the plant, I put one plant in a dry, hot, rock garden, where it produced several flowers and expired. Another, placed in a more moist, sunny garden, bloomed spectacularly in September.

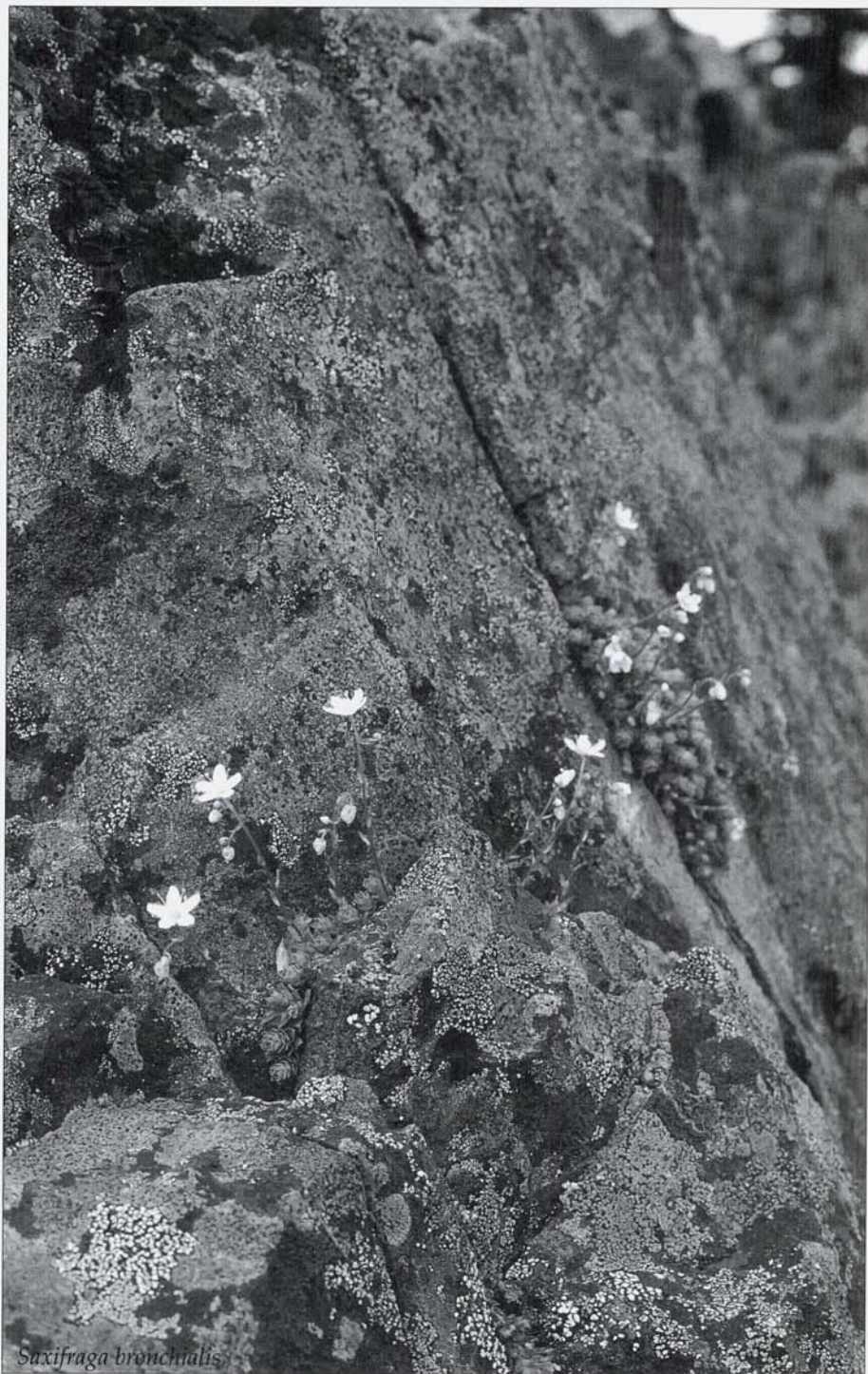
Silene subciliata has linear leaves that create a rather bushy effect on the lower third of the stem; the upper two-thirds appears more wand-like. I have

been actively experimenting with this species in a variety of sites and find that what I said about *S. regia* also applies here. My best plant is about 30" high, with ten stalks bearing bloom by mid-August. The flowers differ from *S. regia* in that they tend to face outward from the center of the plant, rather than upward. Another garden plant in drier, clay soil began blooming August 9. The *Manual of the Flowering Plants of Texas* gives the flowering period as July to September.

My preliminary assessment is that *Silene subciliata* may be the best of the red silenes for eastern gardens, although too tall for rock gardens, as is *S. regia*. However, where rock gardens blend into larger plantings they could be used effectively. I have recently developed a 3-4'-wide bed behind my rock garden in which to grow these and other choice plants that don't fit well in conventional perennial beds. I still do not know how long *S. subciliata* lives, nor how much winter cold it can survive. I suspect it is hardy to USDA zone 7, and possibly to zone 6.

A minor problem with both *Silene subciliata* and *S. regia* is a susceptibility to leaf miner damage, much as columbines have. I made seed available in the 1999 NARGS Seed Exchange, so that other gardeners may test these species. I have also given seed to two commercial growers. These plants would seem natural additions to southeastern gardens and probably far beyond. I think it extremely important for garden-grown seed of our many rare native plants to be grown by gardeners, botanic gardens, and nurseries as a means, along with habitat protection, of assuring their continued protection.

Don Humphrey gardens in northern Virginia, where he is always looking for rock garden plants that will flourish in Virginia's summer heat and humidity.



Saxifraga bronchialis

LEAFY SAXIFRAGES

of the Americas

by Mark Tebbitt

The New World is home to some 65 species of saxifrages, 43 of which are found nowhere else in the world. Many of these species favor life in wet alpine meadows, or in areas receiving copious spring snowmelt followed by summer drought. Such conditions are difficult to replicate in the average garden and have gained these American species the reputation of being almost impossible to cultivate. Nevertheless, several underrated New World saxifrages are in cultivation and are just as garden-worthy as their more popular European and Asiatic cousins. The most desirable and easily cultivated of these species are presented with notes on their cultivation.

Botanists have subdivided the genus *Saxifraga* into a number of species groups, which are termed sections. Typically, species within these sections share similar cultural requirements. The majority of New World saxifrages are members of the section *Micranthes*. This section contains almost 70 species, roughly 40 of which are native to North America. Botanists have discovered recently that the species from this section, in addition to the two species of the section

Merkianae, are genetically distinct from the other species of *Saxifraga*, and, in fact, share a closer evolutionary relationship with species from other herbaceous genera in the saxifrage family, such as *Heuchera* and *Lithophragma*. However, until a revised taxonomic treatment is published, these species must remain classified within *Saxifraga*.

Amongst the cultivated North American saxifrages, the species of section *Micranthes* have distinct leathery basal leaves; several also have attractive flowers. Unfortunately, most of the choice North American members of the section, such as *Saxifraga marshallii*, *S. nelsoniana*, *S. nidifica* and *S. rufidula*, while frequently offered in the seed lists, usually prove extremely difficult to grow, being natural inhabitants of boggy tundra or mountainous areas in western North America. A fifth western species of this section, *S. ferruginea*, is more easily grown from seed and is an appealing plant that produces large inflorescences of starry white flowers in its second year.

In the eastern United States, eight species of section *Micranthes* are found, five of which are in cultivation.

The most commonly cultivated one is *Saxifraga pensylvanica* (photo, p. 199), which in the wild grows in woodland flushes throughout the eastern United States. This species produces a foot-wide rosette of leaves from which rises an inflorescence up to 3' tall, making it one of the largest members of the section. Indeed, when *S. pensylvanica* is compared with the choice, cushion-forming *Kabschia* and *Engleria* species of section *Porphyron*, it is easy to understand that these plants cannot be members of the same genus. Like many of the eastern species from section *Micranthes*, *S. pensylvanica* is far from showy, but it does have a certain charm and should be more widely cultivated in our woodland gardens.

Also in cultivation are *Saxifraga michauxii*, *S. micranthidifolia*, and *S. careyana*. These species, like the majority of eastern American members of this section, are found in the Appalachian Mountains. All are similar to *S. pensylvanica* but are slightly smaller in stature. *Saxifraga michauxii* is distinguished from the other cultivated eastern species by its irregular flowers and deeply toothed leaves; *S. micranthidifolia* by its combination of club-shaped anther filaments and pure white flowers; and *S. careyana* by its combination of white petals with two yellow spots each and fruits to 3 mm long. If given a shady, streamside position and neutral to acid soil, all are easily cultivated.

Another eastern species, *Saxifraga virginensis*, is widely distributed in the wild from southeastern Canada south to Alabama and Mississippi. In nature, it is commonly found growing upon shady rock ledges in woodland clearings and along road cuts. *Saxifraga virginensis* can be identified in fruit by its sepals, which curve upward, and its leaves, which grow to just 2" long. The species is often offered as seed, but I

have found it somewhat difficult to establish in a pan. Perhaps it would perform better in the garden if planted on an artificial, north-facing cliff.

Of all the true saxifrages from the New World, those of the small, predominantly North American section *Trachyphyllum*, when encountered in the wild, look the most suitable for a place in the rock garden. Most, however, are either difficult to cultivate or shy to flower. For example, the North American *Saxifraga tricuspidata* and the Asian-North American *S. bronchialis* (photo, p. 199) are frequently offered in the seed lists and are not difficult to grow, but rarely produce a good display of flowers in cultivation. *Saxifraga tolmiei* (photo, p. 199) is another attractive member of this section but also one that has proved difficult to cultivate, as its preference for a well-drained, yet moist, substrate often proves difficult to replicate in the garden.

The large, predominantly Himalayan, section *Ciliatae* contains over 150 species, of which only six occur in the New World. Unfortunately, none of the North American species are in general cultivation, although seed of three choice species, *Saxifraga serpyllifolia*, *S. chrysantha*, and *S. eschscholtzii*, are regularly offered in the seed lists. It is likely that these species would require similar growing conditions to those of *S. flagellaris*, a circumpolar species that grows in a similar range of habitats. *Saxifraga flagellaris* is best grown in a cool, gritty soil in a pot in the alpine house. It should receive plenty of moisture during the summer growing season and then be allowed to dry out during its winter resting period. In the wild, *S. serpyllifolia* and *S. chrysantha* form attractive mats bearing yellow flowers, or rarely, purple flowers, in the case of the former species. *Saxifraga eschscholtzii* is particularly choice, as it forms tight rosettes

of leaves which *en masse* resemble barnacles spread out on the rocks (photo, p. 193). If the exacting growing conditions of these species could be provided in cultivation, they would provide very welcome additions to the alpine house or frame.

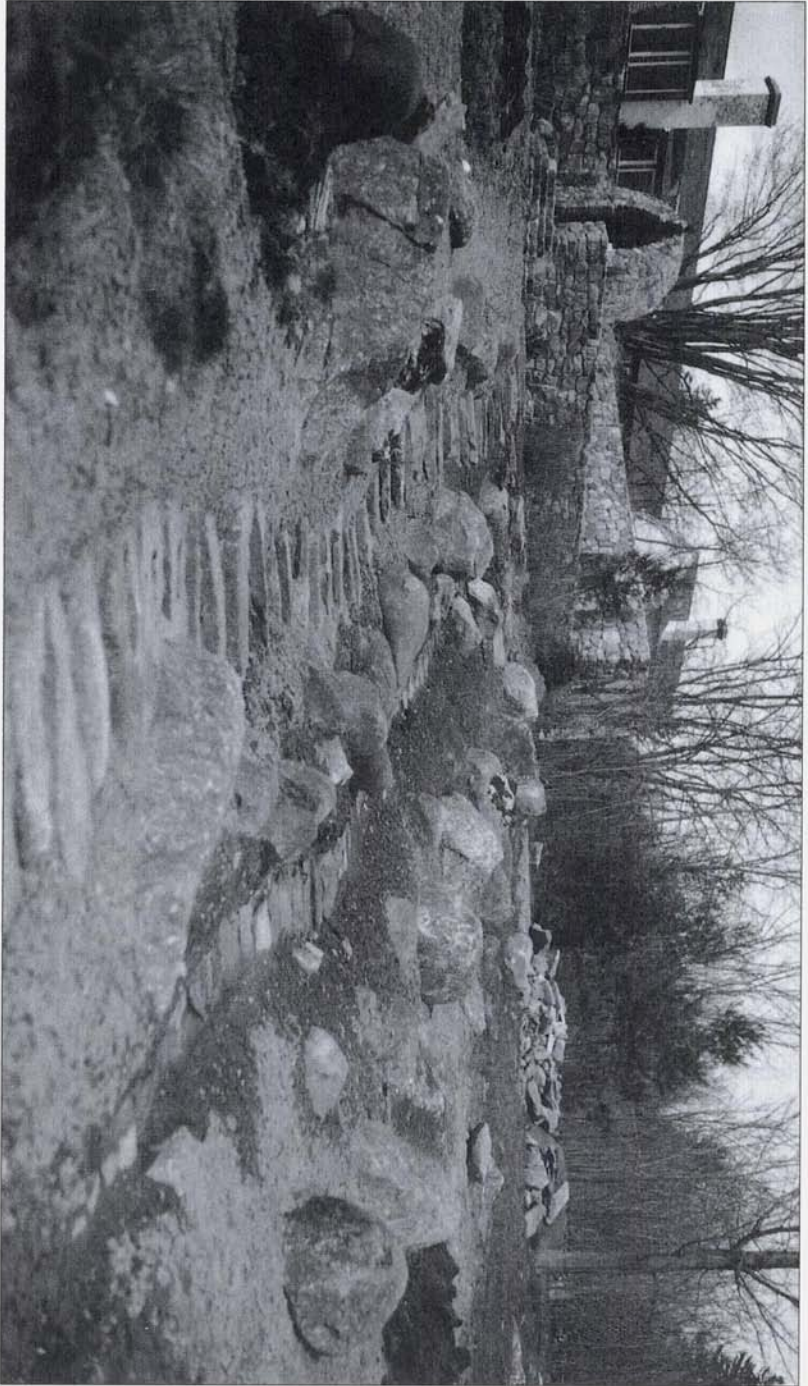
Saxifraga mertensiana (photo, p. 193) is the only species in the section *Heterisia* and is distinguished from other cultivated American saxifrages by its shiny, succulent, round leaves with crenate-toothed margins and long petioles. It produces multiple inflorescences to a foot in length that bear several small, white flowers from April to August. In the past, I have grown this shade-loving species in a clay pot with flat rocks added to the soil to provide it with a cool root run. Like the European *S. granulata* this species should be watered frequently during the spring and summer months and then be allowed to dry out during its dormant winter phase. In the wild, the species is found on moist rocks and cliffs from southern Alaska to northern California.

The large, widespread section *Saxifraga*, which contains many desirable European species collectively known as the mossy saxifrages, is worth mentioning here briefly as it includes the only members of the genus *Saxifraga* that occur in the Southern Hemisphere: *S. adenodes*, *S. boussingaultii*, *S. magellanica*, and *S. pavonii*. As far as I know, none of these species are presently cultivated in North America, although *S. magellanica* (photo, p. 199) has been successfully grown at the Royal Botanic Gardens, Kew, England. There the species is treated like any other mossy saxifrage and is provided with a free-draining, gritty mix that has some moisture-retaining capability but few nutrients. Like other species from the section, it requires a position with

good air circulation and must be provided with light shade in hot summers. The species performs best in the alpine house but may also be grown outside in tufa or in a shady position upon a dry stone wall.

In addition to the species discussed previously a number of Arctic species whose distributions include North America are also cultivated. Amongst these are such popular rock garden plants as *Saxifraga oppositifolia* (section *Porphyrium*), *S. paniculata* (syn. *S. aizoon*) (section *Ligulatae*), and *S. aizoides* (section *Xanthizoon*). These species are commonly grown, frequently discussed in the literature, and are mostly cultivated from European stock. Readers are referred to Webb and Gornall's *Manual of Saxifrages* for additional information on these and other cultivated species. Anyone with an interest in cultivating the species discussed here is encouraged to order seed from the NARGS Seedlist, where they are offered periodically. We-Du Nursery in North Carolina is also a good source of the large, easily cultivated, woodland species from section *Micranthes*.

Mark Tebbitt is a horticultural taxonomist at the Brooklyn Botanic Garden and a member of the Manhattan Chapter of NARGS. Horticultural interests include alpines, woodland plants, and begonias. Photo by author.



*The Fells', garden of Clarence Hay, Newbury, New Hampshire, under construction, closer view of stairs, circa 1924
photo, courtesy of Friends of the John Hay National Wildlife refuge*

GARDENING WITH GRANITE

Clarence Hay's New Hampshire Rock Garden

by William Noble

Stepping down a hillside overlooking Lake Sunapee in central New Hampshire is a rock garden that will appeal to all who think rock gardens ought to be inspired by their surroundings. The rock garden at 'The Fells' was inspired by the natural scenery of mountain, lake, forest, and meadow. It was planted with native herbaceous and woody plants from neighboring fields and streamsides as well as with choice alpine and rock garden plants. Begun in the middle 1920s and constructed section by section over the next decade, it provided over 40 years of gardening challenges and pleasures to its creator, Clarence Hay. Like many another rock garden built when garden labor was cheap, plentiful, and well-trained, it suffered when Hay no longer had the staff to keep the weeds and encroaching forest in check. Maintained for almost 20 years by his widow and family, the garden is now being carefully brought back to life through the efforts of a dedicated staff and volunteers working with the Friends of the John Hay National Wildlife Refuge and the Garden Conservancy.

CLARENCE HAY

Clarence Hay was born in 1884, the son of John Milton Hay, author and diplomat, and Clara Stone Hay, of the Cleveland manufacturing family. John Hay's respiratory problems demanded that he escape the miasma of the nation's capitol for the summer months. Shortly after Clarence's birth his parents purchased a couple of failing farms in Newbury, New Hampshire, with the intention of building a summer retreat. Spectacular views of the lake and Mount Sunapee (elevation 2,743') were framed by forests of pine, hemlock, maple, and beech. They named it 'The Fells', recalling Hay's love for all things English, even the rocky, unproductive hillsides of the north. Here the four Hay children whiled away their summer days. The young Clarence loved the rough and tumble New Hampshire countryside and as a teen-ager built a log cabin, gardened alongside it, and developed a life-long passion for the land. While at Harvard he studied forestry and completed a course in landscape design with Frederick Law Olmsted, Jr., where he

absorbed the Olmsted ethic of letting the land and native and hardy plants guide the design. In 1905, at the age of 22 and a year after his father's death, Clarence Hay became the owner of 'The Fells', with its 900 acres of land, a cottage, and various outbuildings. Over the next 60 years he was steward of the fields and forest and gardened with a deep appreciation of the landscape and native flora of New Hampshire.

Hay's early career as an archeologist took him to the Yucatan, where on a 1911–1912 trip he discovered the largest known Mayan ruins, the temple Rio Bec. In 1921 he was named Research Associate in Mexican and Central American Archeology at the Museum of Natural History in New York City. He was also Honorary Curator in the Department of Woods and Forestry and Associate in Vegetation Studies. He devoted his working life to the Museum and each summer returned to 'The Fells' to pursue his botanical and gardening interests. He kept his garden interest alive through the winter in part by becoming an active member of the Horticultural Society of New York and the New York section of the American Rock Garden Society.

The Fells

Not long after completing the course with Olmsted, Hay began work on a walled Colonial-Revival-style garden near his log cabin. Planted at first with species roses and old-fashioned perennials, it later became a woodland retreat, surrounded by hundreds of *Rhododendron maximum* and hardy *R. catawbiense* hybrids protected by towering white pines and sugar maples. Within its walls he experimented with plants never before seen in central New Hampshire: *Cornus kousa* var. *chinensis* and *Enkianthus*

campanulatus underplanted with *Gentiana asclepiadea*, both blue and white forms. Just outside the garden's massive stone walls he raised a few mounds of the local, sandy, and impoverished soil and began his first rock garden, starting with fail-proof plants—*Cerastium tomentosum* and *Dianthus caryophyllus*.

Meanwhile Hay was courting the younger Alice Appleton, who as a child summered at Appleton Farms in Ipswich, Massachusetts, which, with its manicured fields and stately trees, had been continuously farmed since 1638. The shock of the abandoned New Hampshire fields reverting to brambles and white pine was more than she could bear, and so for the first ten years of their marriage Clarence and Alice Hay tried civilizing their surroundings by building a series of formal gardens. Inspired by their frequent trips to Italy, France, Germany, and Great Britain, they built a formal entry court, a 100'-long perennial border, and a walled rose garden featuring a cascading fountain with dozens of less-than-hardy hybrid tea roses.

Their daughter recalls the sound of blasting of dynamite as the fields surrounding the house were cleared of glacial erratics deposited 10,000 years ago. This provided an ample supply of weathered granite for the garden walls, and once the fields were cleared, potatoes were planted for a year to prepare the ground for fine turfgrass. By the mid-1920s, with the house renovated and surrounded by elegant formal gardens, Clarence Hay was ready to leap the garden wall and begin work on the hillside south of the house. With the help of immigrant Italian stone masons he pried apart exposed granite ledges on the upper reaches of Sunset Hill and dragged them into their new garden places with a stone boat and team of work-

horses. His project would take ten years to complete and would result in a rock garden inspired by the great rock gardens of Europe and the United States. But instead of using porous tufa and limestone he had seen elsewhere, he had to content himself with granite from the rocky foothills of New Hampshire's White Mountains.

THE ROCK GARDEN

In Hay's words the upper section of the rock garden "is an attempt to represent a very rocky New Hampshire hillside with no flat ledges in evidence. Rocks are placed far enough apart to make ample room for drifts of plants, giving bold masses of color. The overflow from a fountain in the rose garden forms a brook which runs between these stones and down the entire length of the rock garden." We know Hay's intentions for this garden, because he authored two articles for publication, one in 1937, shortly after its construction, and the other in 1962, after he had gardened it for another 25 years. Both were entitled "Gardening with Granite."

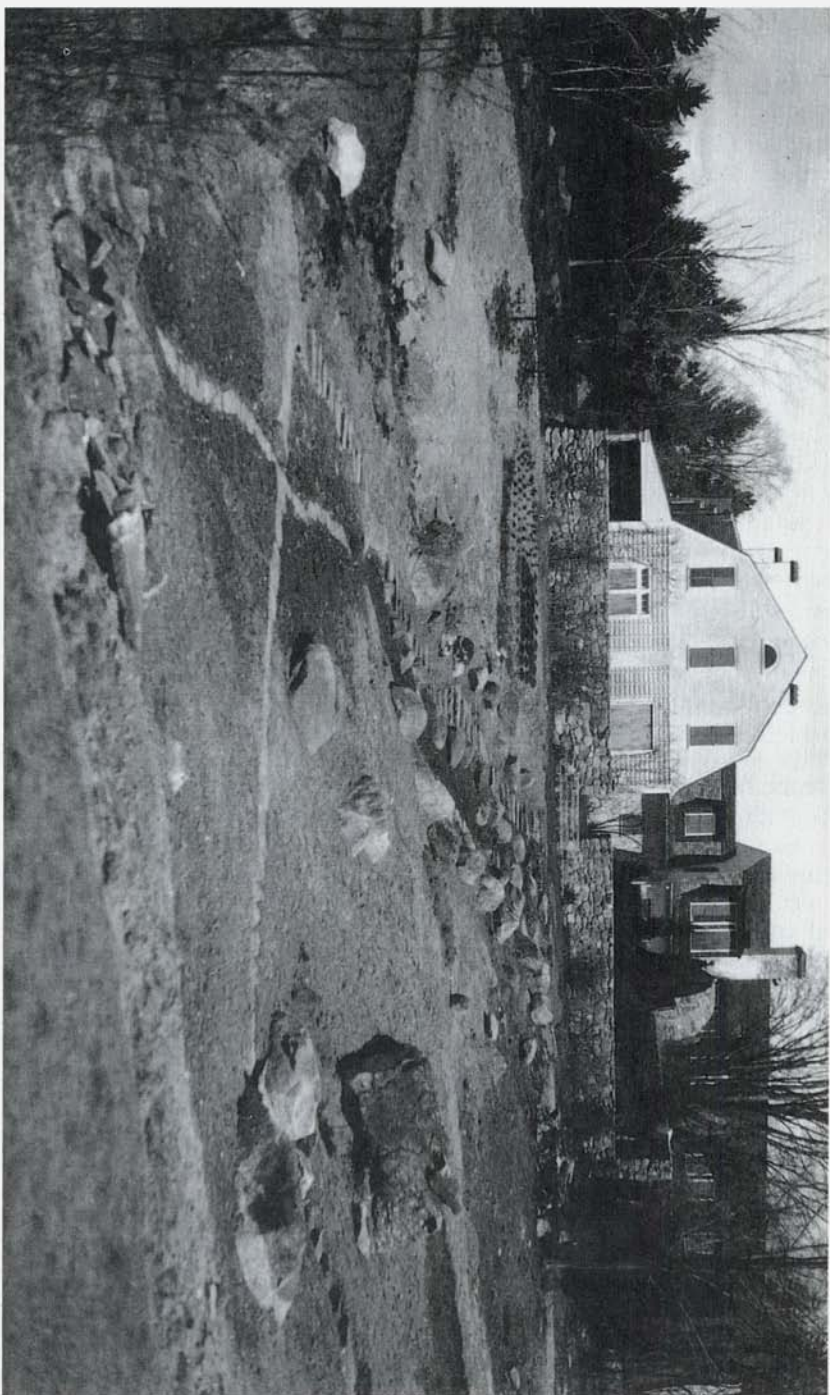
Having seen the alpine treasures that porous limestone is able to support, he was disheartened by the task of working with a hard, unadaptable medium such as granite. Furthermore, his travels to Europe with his wife occurred at precisely the season when most rock gardens are at their peak, and this further hampered his efforts to create a garden equal to those he admired. Hay's price for having married a woman of refined tastes was that they normally spent the months of May and June visiting gardens in Europe far from the black flies of the New Hampshire woods.

"We were faced with two problems: how to make a colorful effect that would be pleasing to the casual eye, and how to satisfy the ambitions of the maker, whose

desire (like that of all rock garden cranks) is to succeed with plants that are difficult. The first proposition was the harder. We occupy the house only during the summer months, which is the closed season for most alpine. June in New Hampshire presents no difficulties. Then flower the endless number of Dianthus, Armeria, Helianthemum, and many others that farther south are at their best in May. But July and August—there's the rub."

Hay employed drifts of plants giving bright drifts of color, some choice and some common: nepetas, penstemons, and hardy lavenders. Campanulas and gentians provided midsummer interest: *Campanula carpatica* in its various hybrid forms, both blue and white; *C. rotundifolia*, kept in bounds; and *C. persicifolia*, which normally is too tall, was useful in such a large garden. *Campanula* relatives such as *Edraianthus* and *Adenophora* found a place, and in the shades of yellow there were *Genista tinctoria*, *Inula ensifolia*, *Hypericum polyphyllum*, and several of the sedums.

Creeping thymes carpeted the ground, and Hay became quite fond "of some unobtrusive weeds such as the maiden pink and the ubiquitous harebell." "August is the month of Heather and we have made extensive use of the many heights and shades of *Calluna vulgaris* and its hybrid forms. Also the native *Aster linariifolius*, which spreads rapidly, is neat, blooms in September, and is useful to take over ground which if neglected would become a wilderness of grasses, goldenrod, and milkweed." He also became enamored of a tiny plant found on Mt. Washington, the evergreen mountain cranberry, with its edible red berries, *Vaccinium vitis-idaea* var. *minus*. "Without becoming a nuisance, this spreads everywhere, in sun and shade, in moss and even under low junipers." Over the years, this plant has knit together gracefully with haircap



'The Fells', garden of Clarence Hay, Newbury, New Hampshire, under construction, circa 1924
photo, courtesy of Friends of the John Hay National Wildlife refuge



'The Fells', mature garden, view towards house, circa 1930
photo, courtesy of Friends of the John Hay National Wildlife refuge

moss, *Gaultheria procumbens*, and *Maianthemum canadense*, and these now carpet large areas along the paths and brook.

The water for the brook emerges from an underground pipe that carries the spillover from the fountain in the rose garden. Water spills down the hillside in a stream built without cement. "Clay was used in the bed, and stones from a natural brook were laid over it. The clay does not entirely hold water, but after a couple of weeks in the Spring the ground becomes saturated and there is little seepage. It is important to remember, if no cement is used, that the earth on the margins of the brook is always moist, a condition required by many rock plants." Today magnificent clumps of *Galax urceolata* take advantage of these conditions.

To the west of this upper section Hay planted trees and shrubs to define the edge of the garden from the meadows beyond. A return path was laid and seed of lupine scattered along either side of the walk.

Just below the first section a natural depression was carved out and a concrete pool constructed in 1931. The artificial edges of the pool are capped with large, flat slabs of weathered granite. The stream appears to feed the pool but was instead diverted underground, leaving the still water in the pool to heat up through the summer and to encourage an abundance of tropical waterlily bloom. Japanese iris grew on the margins of the pool but were eventually replaced with a collection of Ghent azaleas. A turf of *Sedum acre*, various creeping thymes, low-growing field junipers, and a heather bed planted on the far slope completed this picture of a rocky New Hampshire hillside.

Directed into a natural hollow, the brook reappeared near some exposed ledge which, with additional excava-

tion, made a small waterfall. Hay declares proudly, "The best compliment we ever had was from a lady visitor who exclaimed, "Weren't you lucky to have a brook running right through the rock garden!"

Flanking the stream, and well out of view from the top of the garden, Hay and his crew laid large, flat stones to give the effect of a series of outcropping ledges. "*Ramonda pyrenaica* and saxifrages, both mossy and encrusted, are also planted on the sides of this cut, as the flowers appear to better advantage when they can cascade from chinks in a vertical wall." An extensive area in this section is covered with *Gentiana sino-ornata* which he believed was perhaps the most beautiful and satisfactory of all gentians. Hay's special regard for this genus is reflected in his list of the 24 species and hybrids he tried to grow in the garden and in the notes on gentians he submitted for publication in the *Bulletin of the American Rock Garden Society*.

The Collector's Section, as he called it, was where he experimented with "such rarities as *Phyteuma comosum*, *Boykinia jamesii* and other plants of unknown hardiness which will receive the protection of deep snow in the cut." Hay bares his elitist rock gardener's soul when he writes, "But in the delightful uncertainty lies the fascination of rock gardening. There is more joy to be found in one rare plant that has survived a New England winter than in the ninety and nine of the commoner varieties that thrive without special attention." Hay's index card files, of well over 600 taxa, are full of the disappointments of plants that succumbed in this section, despite his best efforts and those of his Kew-trained rock gardener. Sixty years later some of the successes persist—*Ramonda pyrenaica*, a number of encrusted saxifrages, and a selection of gentians.

The brook continues to meander between mossy banks, which are blanketed with ferns and moisture-loving plants, until it comes to the lower pools. Here, shaded by a large crab apple and dark hemlocks, are tall specimens of *Rhododendron arborescens*, as well as *R. prinophyllum* and *R. periclymenoides*. Then the water descends again, and entering the woods, wets the roots of pink lady slippers, willow gentian and seeps into a small pool fringed with ferns. Here the ground was once carpeted with moss and native plants—trailing arbutus, *Linnaea*, *Chiogenes*, twinflower, goldthread, partridge-berry, snowberry, checkerberry, and bunchberry. Many of them were transplanted from the woods in the days when a gardener and naturalist could play his part in the depletion of native populations without special reflection.

Towards one side of this glade, under a spreading apple tree, a table and bench made of uncut, weathered slabs of granite give respite to the visitor. Here one paused and enjoyed the dappled light as it played upon the greens of the ferns and the brilliant pinks and whites of the primulas planted in the moist humus at the center of the clearing. Then the brook disappears between a large chunk of granite and a few stepping stones, with the edge of the lake nearby.

THE GARDEN OVER TIME

Reflecting back over the years, Hay realized he had built more than he could tend. A rock garden of nearly three-quarters of an acre with hundreds of taxa was a project for a younger man with adequate garden help. Despite the strategy of covering the ground with masses of shrubs, small trees, and easily cultivated plants, he and gardeners such as Stephen Starkey and Percy Plume-

ridge found the garden more and more difficult to maintain. Looking down the road Hay saw that the heathers would survive but that "the Creator in His infinite wisdom designed our part of New England for forests. It is a constant uphill fight to keep the trees from engulfing us. Every year countless thousands of seedlings of maple, birch, and white pine crop up in our gardens, and if neglected would soon take over and revert to the forest primeval."

Clarence Hay passed away in 1969 and for the seventeen summers that she survived him Hay's widow, Alice, remained vexed by the size of the garden and the labor required to keep it from disappearing all together. She scolded her gardener, Al Kathan, when he snuck into the garden to pull a few weeds while Mrs. Hay went into town for the mail. As the rarities succumbed, the hardier plants were divided and used to fill in the gaps, which would otherwise quickly fill with grasses and clovers. Where there had once been rich sweeps of summer bloom and cavities of the choicest plants, now the plant thugs were actually encouraged and, naturally, threatened to take over. The forests that the Creator had intended for New Hampshire now grew all around.

Beginning in 1995 a concerted effort was made to rehabilitate the rock garden. But what to do, and where to start? Restore to the very plant-rich and well-documented, expansive garden of the young and ambitious Clarence Hay? Or learn from the older, more experienced gardener, who after a lifetime of toil had to accept a diminished garden and narrow his focus to the planting along the stream's edge? Or was there a new course to chart? Could one learn from Hay's experiences, accept what remained, and renew the garden in the spirit of his work, but with an eye towards current conditions?

Of the gardens at 'The Fells', the rock garden is perhaps the most beautiful and certainly the most complex. Parts of what by then was a 60-year-old garden still worked quite well, especially the mosses and ericaceous groundcovers that had knit together so beautifully. And portions of the garden that seemed spent still stole the show at certain seasons. But overall the plantings were too tall and lacked sufficient interest. The structure was in remarkably fine shape: only a few stones needed resetting, and the pond took only one repair to stop its leaking. Gradually the streambed is being fixed, and occasionally water runs all the way to the bottom. Features, such as a garden bench that had been buried, have been rediscovered and made functional once more. The garden needed to be restored in such a way that it maintained the feeling of age and natural beauty, yet it had to be refreshed with new soil and plants.

The decision was made to keep the garden in a holding pattern for a couple of years by weeding and fertilizing, while other more pressing projects were undertaken. The time spent observing the garden and getting to know it would pay off in enabling us to approach it with a surer hand once work could begin in earnest. Meanwhile, the history of the garden was documented, and this would provide guidance for restoration work. It should be no surprise that this is the best documented of the gardens at The Fells. Clarence Hay was a first-rate amateur photographer, and dozens of photographs depict the history of the garden and show off the beauty of its structure and plant combinations. His index card file numbers approximately 683 entries; for each plant he added to the garden, he made notes of its location, cultural

conditions, flowering time, and source. He inventoried the garden in the late 1930s and again in the 1950s. His two articles on the garden provided guidance about his approach to the garden over the years. He possessed a fine garden library, specializing in rock garden books, which he marked up with various notes that indicated not only plants he was interested in but methods and styles he preferred.

After the first tentative steps of removing cartloads of the taller woody and herbaceous plants, a more systematic approach was developed. The garden was divided into sections (using the same four that Hay mentioned in one of his articles) and work was begun in the upper section. This being the most visible and unsightly section, it made sense from a practical point of view, yet questions were raised over the proper approach. Should whole sections be lifted and replaced, as is being done so effectively at the T.H. Everett Rock Garden at the New York Botanical Garden? Or was there a way to merely refresh the successful established areas, while starting over in other areas? Each section was studied and a decision made where to remove all plants and 8-10" of soil, and which sections could be saved by devoting the time to weeding, incorporating fresh soil and amendments, and selected new plants. In this way we have embraced the beauty and history of the garden, while also creating opportunities for newly planted areas. Much of the garden is being replanted with plants that appeared on Clarence Hay's plant list. Hay's practice of constantly experimenting with new plants is also being continued.

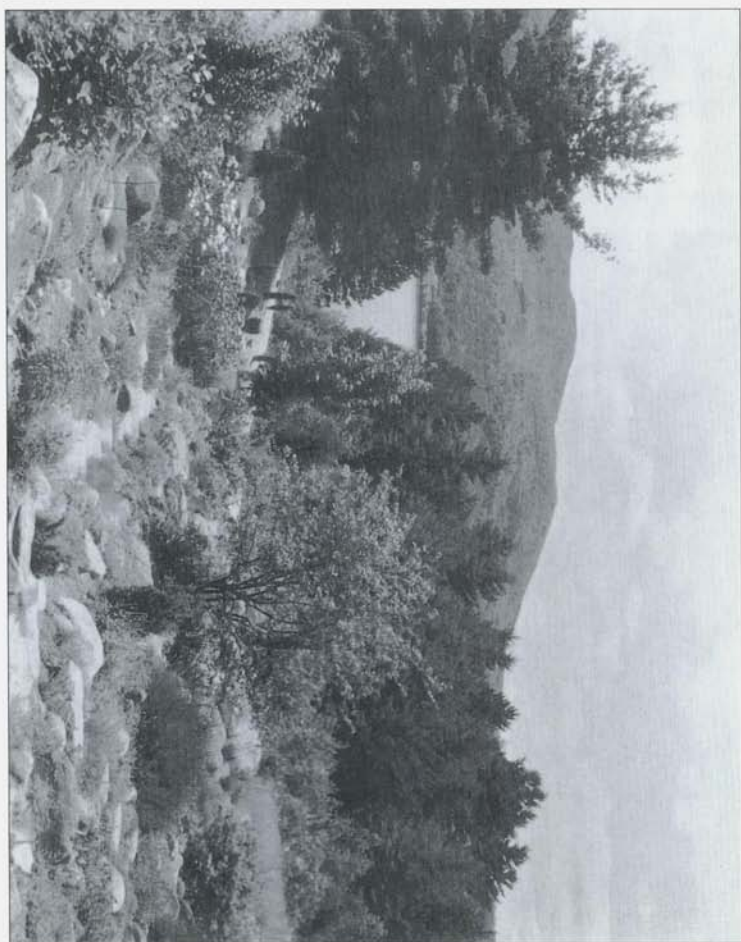
As of this writing, the garden has been undergoing a process of renewal for five years. The upper section is looking like an established rock gar-

den again, and well over 2,000 new plants, representing over 400 taxa, have been re-introduced. It is the hope of those who garden there that were Clarence Hay to return to 'The Fells', he would recognize this garden as his own. After wandering down the steps he might ask how the garden had escaped succumbing to the grasses and forest. Then he would surely walk over to some unfamiliar little rarity and ask its name.

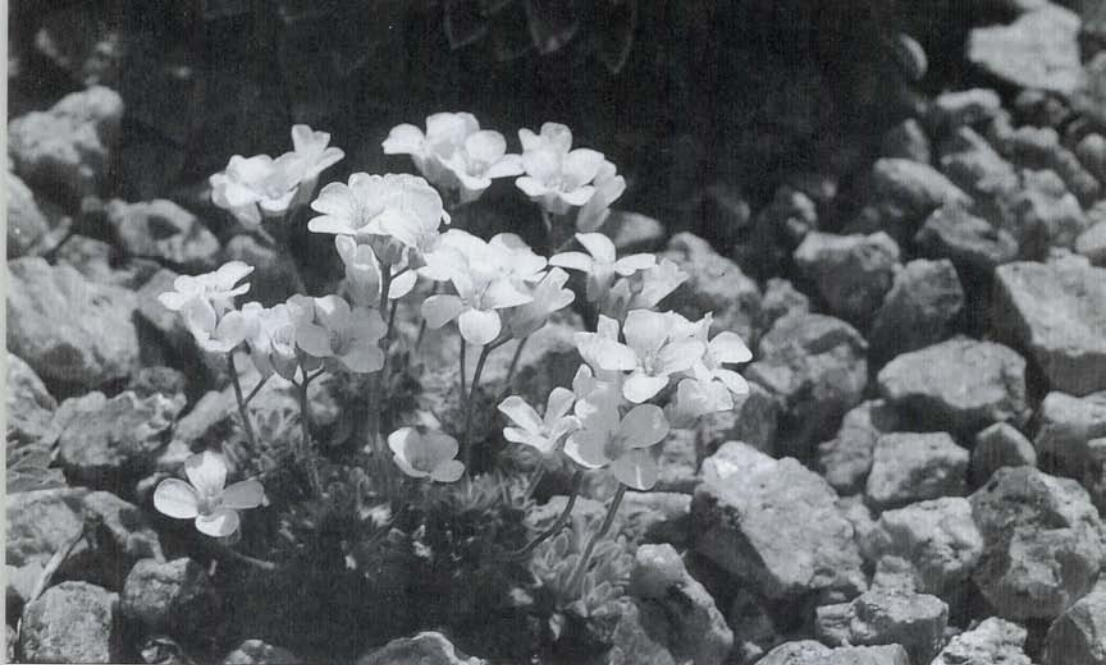
'The Fells' is located at the John Hay National Wildlife Refuge in Newbury, New Hampshire, and is managed by The Friends of the John

Hay National Wildlife Refuge. It is a project of the Garden Conservancy, which managed the gardens from 1993–1997. The site is open daily from dawn to dusk. The rock garden is of interest in spring, summer, and fall. Other features at 'The Fells' include a walled woodland garden, perennial and rose gardens, and naturalized heathers, rhododendrons, and native northeastern plants.

William Noble is Director of the Garden Conservancy, a non-profit organization dedicated to the preservation of great gardens in America. He lives in Cold Spring, New York.



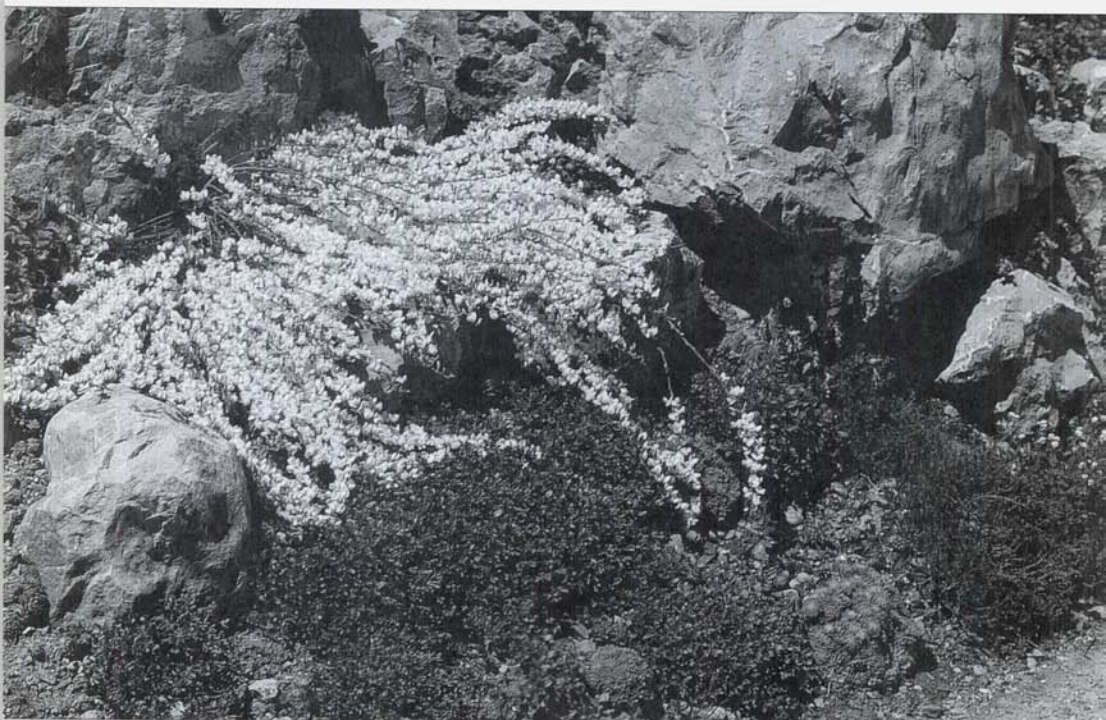
'The Fells', mature garden; view down the hillside
photo, courtesy of Friends of the John Hay National Wildlife refuge



Arabis bryoides

Cytisus x kewensis

photos, Panayoti Kelaidis



THE SECOND HUNDRED: Reliable Plants for the Post-Beginner

by Gwen Kelaidis

After the rock garden has been planted, after the rush of the first spring, when we can scarcely find the time to properly adore each plant as it blooms in turn, after spring subsides to summer, it is time to study the rock garden anew and plan for additions, for yet more charmers to fill the empty spaces, to replace any shirkers, to enhance the glory of what we already have. In the Summer 1996 issue of the *Rock Garden Quarterly*, Geoffrey Charlesworth shared with us a list of the first 100 plants he might recommend to a newcomer to the delights of the rock garden art. This is an article about another 100 great plants to add to what you have. I made this list by looking around my rock gardens, some now twelve years old, and considering the plants that give the gardens substance, that carry them through the years, the plants that I would not want to be without.

Some of these plants require more attention than those mentioned by Geoffrey, but after a few years of gardening, one might assume that the gardener would be prepared to fuss a bit. Some require occasional replacement, but they are so worth the effort. Most of these plants can be obtained with a bit of effort, although any one nursery is unlikely to have them all. The quest is all part of the adventure, after all, so happy hunting! Nurserypersons, take notice! These are plants that are, for the most part, willing in propagation as in the garden, and they could provide good sales and help to develop your rock gardener clientele.

Adiantum venustum is one of the daintiest, yet most willing of the rock garden ferns. Unlike the maidenhair fern native to the eastern US, this Himalayan waif is evergreen with deltoid fronds on similarly wiry stems in early May. The shade fades from gold to green; the spreading mat of fronds forms a trembling aura of light green, contrasting beautifully with any plant of heavy foliage, such as primrose, bergenia, or even pulmonaria. Panayoti has plants more than 30 years old in his mom's garden in Boulder. This little beauty appreciates a shady rock crevice. It can be divided after several years even by those not expert in fern culture.

Androsace sempervirens—*Androsace sarmentosa* is so easy to grow, while *A. helvetica*, *A. vandellii*, and so many other dainty delights are almost impossible to grow in the open garden. But *A. sempervirens* is a simple and beautiful addition to the garden representation of this lovely genus. The rosettes are trim, deep green, neat, and usually about an inch across. The mats do not overgrow themselves or invade other plants. The flowers are much the same as those of *A. sarmentosa*, various shades of pink, but on stems only about 4" or less high.

Anemone 'September Sprite'—This is a smaller version of the fall-blooming Japanese anemone, admissible to the woodland garden or even the verge of the rock garden. Clear, deep pink flowers appear in late summer and early autumn, abundant, of good substance, and a lovely color, usually on plants under 18" tall. The selections available are now many, but this is one we know to be restrained and beautiful. Why not try many different forms?

Anemone blanda—Ah, the windflower! Dainty, early, easy in any woodland soil, light-hearted and rapidly evaporating as summer comes on. This plant is to be had quite inexpensively, \$15-20 for a start of 100. Hey, think what you pay for an arrangement of flowers for a sick friend or for a funeral! Treat yourself this fall, and next spring will bring you delights. Several selections and collections are available. I have just the blues, and I rogue out the white flowers, so that the self-sown of the future will remain primarily blue. But I am also quite in love with the white form with pompom center—which is so happy in Carl Gehenio's garden near Pittsburgh that he has lost all respect and refers to it as a weed! Tidier in the aftermath of bloom than crocus, this species bridges the gap between crocus and tulips—at least in some springs. Our weather is variable and becoming more so! This year we enjoyed the anemones for six weeks.

Aquilegia viridiflora—Many, many more aquilegias are available than most of us grow. This black-and-green-flowered species is of dark and exotic interest, reaching 8-10" in height. Place it where all that darkness will pop out, next to something yellow, or even orange! And try many aquilegias. None live for long, but many produce seed that may be sown on into many generations. Other good species for the maturing rock garden include *A. saximontana*, a blue sprite only 6-8" in nature, larger in rich cultivation; *A. bertolonii*, with solidly purple-blue, nodding flowers on a trim cushion, etc., etc.

Arabis bryoides—Despite their wild credentials, wall cresses are so frequently utilized as front-of-the-border plants, ubiquitous in cottage gardens, that rock gardeners sometimes turn a jaundiced eye to them. How cruel that this densely downy cushion plant from high mountains in Anatolia could be overlooked as a consequence: dense pads of grayness sport bright white crucifers in early spring on wiry, 3" stems. This is a gem from Olympic heights, but easily accommodated by mere mortals.

Arenaria tetraquetra—While this will not dazzle you with its bloom, it is an excellent mat, spreading to perhaps 8" wide over several years. The leaves are tightly ranked in four series, a pale green often, especially in full sun. Somehow I couldn't imagine having a rock garden without it.

Arisaema—With little shade, I can't be too much of an *Arisaema* devotee, but this is a genus that deserves to be in every woodland garden. From the best known Jack-in-the-pulpit (*Arisaema triphyllum*) of the East to the exotic *A. candidissimum*, so striking in its black and white hood, all have a structural appeal and add an exotic touch evocative of Southeast Asia, of deep woods, and woodland mystery. Just find your desired plant, at a nursery or a plant exchange, or beg one from a friend. It's as easy to plant as any daffodil, in humus-rich woodland soil. Then sit back and await its surprise next spring.

Asperula gussonii—This forms mats of bright green or midgreen, with very narrow leaves, reminiscent of a pad of moss. Over this low mound of green appear tiny pink or white stars, funnel-form flowers with long tubes composed of four pointed petals. The better forms, in my view, are deeper pink, whereas some pale pink, almost white forms have become widespread in the trade through vegetative reproduction. This plant appreciates a bit of rock shade in our Colorado climate but should not be grown in deep shade, where it becomes lanky, losing its denseness. Nor should it be allowed to dry out. This again is a plant to be valued because it is durable but not aggressive. It will spread to 8–12" across.

Asperula sintenisii—A refined cousin of the former, this species has blue-gray mats, smaller in spread. The flowers are sugar pink and way beyond adorable. Hmmmm...I say this is a must-have, but I do not seem to have it at the moment, in either garden. It is perhaps harder to please and to keep than the above, yet most desirable. One may be honored to grow it for even a few years.

Athyrium nipponicum The amazing painted fern has changed hardiness zone almost as often as it has assumed new Latin names: a few decades ago it was regarded as a delicate waif for Southern gardens. Nowadays, everyone seems to be making their own favorite selection and filling wide spaces with this indestructible pteridophyte. The fronds can vary from plum and white with flashes of deep green or even chartreuse in some forms—a fern for everyone. The fronds interest even the casual, plant-unmotivated garden visitor. And they contrast nicely with the heavy rosettes of primulas or the thick, succulent leaves of *Bergenias*.

Aubrieta gracilis, *A. scardica*—Similar in their compact mounds and deep flower color, these two are both species to be grown for early spring glory, after the larger, more rambunctious *A. deltoides* starts to be perceived by you as 'too big.' Both provide very fine color and a very cunningly compact plant for little effort.

Bolax glebaria 'Nana'—This treasure from South America is small enough to grow in a large trough. It is smaller in proportion and in my experience, touchier, than the larger unselected species. It forms a tight dome or bright green leaves that are stiff and feel almost like plastic. It is an incomparable foil for dainty flowers—corydalis, oxalis, the small varieties of *Geranium*, *Aquilegia*. Don't let it dry out completely, and if you lose it, try it later in another situation.

Campanula chamissonis—Deep blue bells and glossy, low, dense foliage make this an excellent choice. Apparently this is well known to Calgary gardeners, as each of them seemed to have at least one plant in their lovely gardens last summer. I like the way it spreads out to a 6"-wide, dense mat of leaves, without becoming leggy in the flower-stem, as some campanulas do. Well-proportioned might be the word to describe this compact plant of no high pretensions but steady reliability. It carries more mass than *C. tridentata*, with its small tuft of leaves, and is not as large or unruly as *C. portenschlagiana* or even that little invader *C. cochlearifolia*.

Campanula trogerae—The broad, pure white, chiffon flowers open widely, while the heavily toothed, gray-green leaves, with enough weight to balance the flowers, cascade daintily over the rocks below. The huge flower buds are pink-tinged and lengthen the time of enchantment this beauty holds over the garden. The flowers are comparatively giant starfish—over 2" across—that come at the depth of green, green summer. It may not be a long-lived plant, but here it sows itself into another generation or two. Good near anything with mid-green foliage—*Vitaliana*, silver saxifrages, or *Draba rigida*.

Coptis laciniata—This is a plant that may go quite unnoticed by visitors, or even those with whom we share our gardens, yet it forms a background and sets a mood. The shiny, sharply incised, deep green leaves are part of a carpet in a low glen of my rock garden, mixing with *Hebe pinguifolia* var. *pagei* and *Dryas octopetala*. In spring the foliage is penetrated by *Anemone blanda*, for whose flowers it acts as a perfect foil. The plant is only about 4" high, the leaf dome of each stem 3–5" across. The way it mixes with its neighbors reminds me of the carpeted look of the Far North tundra and of the Canadian Carpet, where the scale is that of fairies, and although the foliage of many plants is dense and deeply intermingled, no one plant dominates the others. A plant that so easily tolerates and complements its neighbors is much to be valued in the maturing, long-lived garden.

Corydalis solida 'George Baker'—The genus *Corydalis* has been ever so fashionable the last ten years, at least in the British Isles. There are many species to explore, but *C. solida* is a nice, relatively simple to please plant. It is large enough to contribute substance in the garden, but not so large as to overwhelm. For us, in the dwarfing sunlight of the Mile-High City, it reaches 6–8" in height, a bit more in spread. 'George Baker' has been described as brick-red in flower, but ours is a more rosy red, quite stunning with the many yellows and whites of mid spring. I would like to acquire a pure white form also. The flowers are relatively plump for the genus. There are many other fetching species, including the diminutive *C. persica*, a dramatically contrasting purple brown and white, to the famous blue *Corydalis* like 'Blue Panda', heavenly, but a bit larger and perhaps harder to please. A characteristic of the *Corydalis* I have grown which I feel calls for praise, is the hastiness of their retreat. The plants go quickly dormant after flowering and leave with little trace behind them, quite a bit tidier than the leaves of *Crocus*, *Tulipa*, or even *Iris reticulata*. Because of this neat habit, it is possible to place them amongst even the choicest cushions without disfiguring the garden for weeks after the flowers are gone.

Cyclamen coum—Oh, what a pretty dainty this is! Blooming with the leaves, in late winter or early in the spring, the tiny, reflexed, gem-tone flowers are so bright and courageous. They bring us hope and joy, appearing as they do out of the winter snows. Some gardeners, such as Nina Lambert in Ithaca, New York, and Lawrence Crocker, of Oregon, succeed wildly with this plant, which self-sows and dances through the lawns. But most rock gardeners will have some measure of success, as this is one of the hardiest members of its tribe. If you want to be driven wild, visit someone who has spent years collecting all the interesting leaf-patterned forms of this species.

Cytisus x kewensis—Of all the brooms, this is one of the best, its cream-colored flowers pleasing to all who crave the pastel versions of yellow, the cascading form pleasing those who seek plants that weep, the fat flowers providing all the voluptuousness one could wish for in a broom. Find a place for it at the top of a wall; plant it at the crest of a ridge. And for heaven's sake, get someone to keep it in propagation. This gem appears occasionally in the rock garden trade, but I can't always find it when I want it. It is not too hard from cuttings, and I'm sure your fellow chapter members would appreciate it if you would take some cuttings and propagate it for them!

Daphne arbuscula—This dark, forest-green-leaved treasure tuck itself willingly up along a rock, be it limestone or granite. I grow it in partial shade, but Panayoti has had it in the full blast of sun, alongside a large rock, on the west side, for some 15 years. The flowers of the form I have are deep pink. Not only is this a durable, gorgeous plant in flower and in leaf, but I hear that additional forms of it will be coming on the market soon. Unlike *D. 'Carol Mackie'* and others of that ilk, this will not overgrow its space. I'm thinking it would be nice to have five or ten forms...

Daphne cneorum 'Eximia', 'Pygmaea Alba', 'Grandiflora'—*Daphne cneorum* could be said to be not only a larger, but a looser plant than *D. arbuscula*. It grows some 15" across and about 10" high for us. The flowers cover the plant and have a celestial fragrance; the leaves are of a lighter texture than those of *D. arbuscula* and are a mid-green, even light green in the case of 'Pygmaea Alba'. Again, I would be happy to have ten or fifteen forms. I would be particularly delighted if this species could be induced to produce seed in cultivation. Think of how much fun we could have with the grandchildren! Hints, someone? And what the heck is the wild pollinator?

Dianthus anatolicus—(*D. simulans* of hort.) For several decades now a densely pulvinate dianthus has been making the rounds of rock gardens under the erroneous name of *D. simulans*. Superficially it resembles the tightest forms of *Silene acaulis*, although somewhat bluer of leaf. And flowering is almost as sparse for most gardeners. The cushions can reach a foot or more across. This choice morsel from high mountain tops in westernmost Turkey is a classic bun, mounding about, knitting the rocks, inspiring even the uninitiated to oohs and aahs. I have had the thought that the damage it often suffers in very hot weather may be from spider mites. Try insecticide, should this problem plague you. Or just cut out the dead and hope for regrowth to cover.

Dianthus callizonus—In all the multiplicity of *Dianthus*, a few stand out. This species has very good, very blue foliage, is not tall or rangy, and has large, zoned flowers. It won't live forever, but it will give you several good years of bloom. It is simply worth growing over and over.

Dianthus erinaceus—Closely allied to *D. anatolicus*, this prickly creature has rosettes and blossoms several times larger than its fellow western Turkish cushion pink. In fact, the prickliness of the tight cushions when not in bloom leads people to think this is an acantholimon. A well-grown plant, studded with stemless, lavender-pink dianthus blossoms, is a sight to behold. Some of us like it whether it blooms or not.

Dodecatheon pulchellum—It is somewhat odd to me that the floral emblem of NARGS could be so rarely seen in gardens. Shooting stars are generally plants of wet places—especially in spring when they are in active growth. For those with gardens where the cool seasons are long and nighttime temperatures drop, this is a first-rate plant. We saw many, many fabulous plants in Calgary gardens, and in Alaska. *Meconopsis*, *Dodecatheon*—we only dream, but our northern colleagues should never be without these plants.

Draba rigida—Of all the drabas, this seems to me the purest combination of bun and willing plant. Other species are good—*D. brunnifolia*, *D. hispanica*, *D. dedeana*, etc., etc. Other drabas are adorable—*D. acaulis*, *D. rosularis*, *D. cappadocica*, *D. longisiliqua*. The former are reliable, have good foliage all year, and make a bright show in spring. The later form rounded cushions, tight, some fuzzy, inspiring envy, but they usually don't persist for long in the garden. *Draba rigida*, on the other hand, has graced my gardens for 13 years, just growing slowly. There are several selections available, propagated from cuttings. Recently, wild seed has become available, so perhaps now more seed will form in cultivation. I think I have about fifteen plants in the Mississippi Ave. garden; it just wouldn't be right to have fewer than six!

[to be continued in a later issue]

Gwen Kelaidis gardens on half an acre of sand in Arapahoe County, Colorado, with her husband, Panayoti, and their two children. The garden features a rock garden, a small prairie, and a recently completed dry garden featuring xeric plants of Asia and the American West. She also grows vegetables, large perennials, and even annuals.

PLANT PORTRAIT

Calypso bulbosa

Along with the lady's-slippers, *Calypso* may be one of the most beloved and sought after of American orchids. In the eastern states and Canada, few who have sought it have seen it in the wild. Named for the Greek island goddess whose beauty made sailors forget home and family, the dainty bloom, with its very complexly constructed labellum, or slipper, also fascinates, as does the beauty of its forest habitats. The rarity or inaccessibility of the plant, in the East at least, adds to the challenge of finding the plant.

Calypso bulbosa is circumboreal in distribution, occurring in Asia, Europe, and North America, in Europe and Asia mostly in the far northern boreal forests. In North America it grows across the continent in boreal forests, but extends down the Rocky Mountains to Arizona and New Mexico at higher elevations. *Calypso* occurs more commonly in the western US and Canada than in the East.

In eastern North America, *Calypso* grows (or did grow) as far south as central Michigan, New York, Vermont, and New Hampshire, and to Toronto, Canada. Most stations today are far north of that city.

Southern stations in the East tend mostly to be cedar swamps, i.e., treed fens in which arborvitae (*Thuja occidentalis*) is a dominant tree, growing along with Canada fir and various species of spruce. The orchid is not a plant of soggy fen or bog mosses, such as sphagnum. It prefers to grow on slightly drier "islands"—raised stumps and logs, bog borders in moss and needle crumble, almost always in deep shade. Plant companions include dwarf bishop's cap (*Mitella*), twinflower (*Linnaea borealis*), bunchberry (*Cornus canadensis*), rattlesnake plantain (*Goodyera*), and *Cypripedium* species, particularly the ram'shead lady's-slipper (*C. arietinum*) and yellow lady's-slippers (*C. calceolus*). Such habitats at the south of its range provide the cold temperatures this plant requires, shade and the constant evaporation of water from the groundcover of mosses. In this eastern habitat, *Calypso* typically occurs as a few plants scattered here and there across large areas of swamp forest. Colonies of many plants are rare. Northward, at higher latitudes, *Calypso*, like many swamp plants, comes out of the swampland to higher ground, for it is the coolness, not the water *per se* it seeks.

On the upper Great Lakes shorelines and islands, the most suitable *Calypso* cover is dry cedar-fir-spruce woods just above the beach, or on and between sand dunes. Here, where temperatures are moderated by the lake nearby, *Calypso* more often successfully fruits and produces good seed. For although *Calypso* is a northerner, its developing flower scape is extremely sensitive to and easily cut down by frost. Hence larger colonies of plants, sometimes in dozens and hundreds can develop in these lakeshore habitats, cool and buffered from late frosts. Although suitable cedar swamp habitat occurs south of calypso's

range, only in those swamps far enough north and cold enough that snow remains in drifts until after the last late frost (to cover and protect the plant) can *Calypso* survive.

Lumbering, draining of swamps, insect pestilence, and such have pushed *Calypso* out of many of its former southern stations in the eastern US. Here it is very rare today. In the northern tiaga forests around the world, *Calypso* still thrives.

In the Rocky and Sierra cordilleras there is still abundant habitat, and large colonies still thrive. In Colorado's latitude at between 7,000–8,000' it may be locally abundant.

Botanists disagree as to whether there is one species of *Calypso* or two. On the West Coast, from central California northward into Canada, and at low elevations *Calypso* is quite different. Where that of the East and Far North has a lip with a golden, hairy crest and cinnamon markings, the West Coast plant (var. *occidentalis* of botanists) has a slightly larger flower, with madder-purple spots over the lip, a white crest, and no gold markings. This plant, generally growing at lower elevations right down to sea level, is a bit more heat-tolerant, and ever so slightly cultivatable. It grows abundantly in clearings among the redwoods, sitka spruce, and coastal cedars north to Alaska on the coast. It, or a very similar form, occurs as well in Japan. Threats to the western forms, both cordilleran and coastal, include lumbering, especially clear cutting, collection, and development.

In all *calypso* forms, the plant is small, often surprising the seeker who had previously seen only close-up photographs. The plant blooms early, only a couple of weeks after the snow leaves the plants. The small, deeply ribbed, heart-shaped leaf, about the size of a quarter or fifty-cent piece, commences in autumn and persists unharmed by freezing all winter. As growth commences, a flower scape arises from the small, subterranean corm and grows 4–7" tall. At the top of the naked scape a tiny, petal-like bract subtends the solitary flower. Sepals and petals, all delicately colored lavender and petal-like, cluster above the slipper-lip like deer's antlers. The complex lip, a slipper with two-pointed toes, opens to the pollinating insect by an opening which has the tissue folded out into an apron, instead of being inrolled like the lip opening of cypripediums.

While some authors aver that seed is seldom set, that is not always true. In a good season, many plants set seed. Like all orchids, the wind-transported seed is dustlike, and one pod produces thousands of seed. Pollinated flowers first turn weak-coffee brown, before withering as the ovary develops. At this time the leaf gradually yellows and dies, and the plant goes dormant and underground during the summer's heat. A new leaf appears in autumn.

The enormously complex and beautiful (though tiny) flower prompts many to want to grow *Calypso*. It is virtually impossible to keep the plant more than a single season in most, if not all garden conditions. Like all our terrestrial native orchids, *Calypso* grows symbiotically with soil fungi in a delicately balanced tug-of-war. Only if one has the native soil and conditions on the property might it be grown. One such garden on Vancouver Island near Victoria, British Columbia, does have this orchid seeding about abundantly. But for most of us, this charmer is best left to be enjoyed in the wild.

—Frederick W. Case, Jr.

PROPAGATION

Getting Seedlings Through Their First Year

During my past fifteen years as a nurseryman, I have grown approximately 12,000 pots of seed, thus providing myself ample opportunity to learn from my mistakes. I have tried everything, from starting seed under lights to covering the seed pots with clear plastic covers, and even just starting the seed in the open with just a cover of light cheesecloth to keep the raindrop splatter and birds at bay. Here in near Mt. Tahoma, Washington, these have been my experiences.

Starting the seed under lights always left me with weak, spindly young plants that just never ended up looking as they should—if they lived to grow on past their first year. Covering the pots with clear plastic resulted in many losses from damping off due to the high humidity under the plastic; starting the seed in the open meant that many of the pots were much too wet to suit many alpine and dryland plants when they were at the tiny seedling stage.

I now manage my seed pots and seedlings in just two ways. All Ericaceae such as *Rhododendron*, as well as such plants as *Shortia* and *Ramonda*, are sown on the surface of pots of sterilized peat [sterilization prevents damp-off] with an inch or so of grit in the bottom of the pots. The pots are covered with a plastic bag or kept in a closed propagator in a warm room until they germinate. After germination, the pots are moved to a bright area out of direct sun in one of my tunnel houses. The young plants are kept covered for the entire first year of their life. Then I take the pot of seedlings and move the whole bunch, undisturbed, up into a 6" pot to grow on for another year. At the end of the second year, the plants are lined out into a flat to grow on or moved up into individual rose pots [2" wide x 3" deep]. I bring a very high percentage of my seedlings along to maturity in this way.

All seed of alpine plants, as well as many other sorts of things, are started in early winter in a gritty alpine mix which is 9 parts washed builders' sand, 5 parts coarse peat, and 4 parts Oregon white pumice. Grit can be substituted for the pumice. I use about 1" of pumice for drainage in the bottom of the pots and about 1/4" of pumice for top dressing. I also add about 10 pellets of encapsulated fertilizer to the bottom of the pots.

Most seed is sown on the surface of the alpine mix and then covered with the top layer of pumice. Very fine seed such as *Saxifraga* seed is sown right on top of the pumice top dressing and then lightly watered into the pumice. The seed pots are then held in an open-ended tunnel house on shelves until they germinate. The tunnel houses are covered with shade cloth during the hot months. About 70% of the pots have germination to some degree in the first year. Most of the rest of the pots germinate in the second year. Some seed such as *Paraquilegia* have very erratic germination over a period of four years or more, so save your pots.

The tunnel houses allow me to control the water which the plants receive, while exposing the seed and seedlings to the outside temperature fluctuations

that bring about germination and that produce strong first-year plants which remain in character. The excellent airflow inherent in open tunnel houses, combined with the fact that I let the seed pots become surface-dry between watering, means that damping off is not a problem.

I have found that seedlings grown in this way can remain in the original seed pots for at least a year with very few problems, and even after a year the plants can be separated from one another with ease, as the mix is so open and loose. Pots of plants that tend to germinate very heavily, such as *Meconopsis*, should not be left in the seed pots for more than a few months, or they will become too crowded and weak, and subject to fungal attack.

So, if you provide your seedlings with a good well-drained mix, plenty of air flow, and a chance to dry out a bit between waterings you should have few problems bringing the seedlings along to garden-sized plants.

—Rick Lupp

GARDEN VISITS

Rock Garden Visiting in France

The contest was sponsored by HGTV, and I knew I was going to win the grand prize: a trip to France. The entry blank was difficult to acquire, and the rules almost impossible to read without a magnifying glass. I spent six weeks video-taping my garden and condensed three hours down to the required two minutes. I wrote a narrative and then asked a consultant to edit it into one tape (not against the rules). As a surprise, he added music. Weeks went by, and my friends kidded me, wanting to know why I hadn't won my trip to France yet. I was patient. Gardeners have to be. Finally, I received a registered letter—and I knew for sure.

The trip took place in June, during the height of the rose season. I repeated the strategy used for my trip to Japan (see *Rock Garden Quarterly*, Winter 1997, Vol. 55[1]). I wrote to several French members of NARGS, describing my itinerary and asking about private rock gardens I might visit. Again, gardeners were more than gracious with invitations and suggestions of other members' gardens to visit.

JARDIN DE LA KEMOUN (photo, p. 198)

Mme. Monique Kemoun was one of the first to reply. She lives about 20 minutes from Versailles and invited my sister and me to lunch after our morning tour of the palace and grounds. While I was contemplating how to get to her home, by coincidence her friend from the French Alpine Garden Society, Mme. Monique Reichert, called and offered to pick us up, drive us to the Kemoun residence, and then return us to our hotel that evening.

The charming home of Mme. Kemoun was glimpsed through the gate in the tall hedge. The steep-roofed cottage was constructed of light-colored cut

stone set off by rustic shutters on doors and windows. Several twig baskets filled with annuals and trailing ivy hung from the wall or sat on the deep sills. Foundation plantings included *Verbascum*, *Malva*, *Hydrangea*, and low-growing annuals. The off-white house set off the colorful perennial beds bordering the front yard. Several penstemon were especially attractive. Inside, Mme. Kemoun also has a large orchid collection, and she does arrangements with dried flowers.

The flat front yard did not give a clue to what awaited us behind the house. The backyard rose on a steep slope, a perfect site for her alpine collection. Starting at a small terra cotta building, a combination of alpines, Mediterranean plants, and small shrubs flowed down the hill, spilling over a low, gray, stone wall at the bottom onto a small, paved patio outside the door. The property was edged with more shrubs, and a grass path allowed the viewers to progress up and down. Silver pear, lavender, *Santolina*, and *Cotinus* made an attractive combination along the path.

Although Mme. Kemoun spoke only a little English, and I spoke even less French, we communicated in the common language of botanical Latin. Mme. Reichert graciously filled us in by translating descriptive phrases.

CLOS SUMAC (photo, p. 198)

On the day of our arrival in France, we had traveled straight from the Paris airport to Orleans. There M. Gerard Camus and his friend, M. Coutant, picked us up for a short drive to the home of M. and Mme Camus at *Clos Sumac*. *Clos* is French for enclosure and implies an informal garden—Monet's garden is named *Clos Normand*. Monsieur Camus is the president of the Central Area of the French Alpine Society. Monsieur Coutant formerly worked for Ford in France, so he acted as our interpreter. His wife, Mme. S. Coutant, is also a very serious and knowledgeable member of NARGS and of the French Alpine Society. The organization has meetings during the winter and takes trips to the Alps and various botanical gardens. Mme. Coutant is especially interested in *Lomatium* and is looking for seeds of *Lomatium ambiguum*, *L. hallii*, *L. macrocarpum*, *L. martindalei*, *L. oreganum*, *L. gormannii*.

Behind the house was M. Camus' alpine house with complete environmental controls. The sand bed was filled with alpine treasures, each in its pot sunk half into the sand, carefully labeled, including the finicky *Androsace helvetica* and several small *Dionysia curviflora*. *Sarmentia repens* from Chile was covered with solitary, tubular, scarlet flowers hanging from each leaf axil. The silvery, fernlike foliage of *Tanacetum haradjanii* doesn't really need its yellow flowers to be attractive.

Centered in the alpine house was a raised bed of tufa with terra cotta pots perched on top filled with interesting plants, including *Azalea nakeharoi* 'Mariko' from Japan covered with coral blooms. Growing happily in the tufa was a perfectly round rosette of *Saxifraga longifolia*. A *Ramonda* relative, *Jankaia heldreichii*, its thick, oval leaves densely covered with silver hairs, was nestled in the tufa between a delicate maidenhair fern and another broadleaf fern, contrasting nicely with the other foliage. *Trachelium asperuloides* formed a bright green cushion, all blue with flowers in spring. A contrast in form was provided by *Helichrysum* from New Zealand: *H. coralloides*, was very upright, its stems forming branches covered with overlapping, scale-like leaves, indeed resembling the coral for which it was named; *H. plumbeum* was similar but smaller overall, described by

Ingwersen as "softer and fluffier,...a must for the alpine house." Most things in the alpine house are irrigated with tubes and watering heads but some were watered individually, including *Draba longisiliqua*, from the Caucasus, a gray mound of tiny, obovate leaves with bright yellow flowers on stems several inches above the cushion. One section was devoted to pots with extremely tiny cuttings being rooted—some as small as 1/16". Some were covered with cut-off soda bottles. I invited M. Camus to visit me in the US, but his gesture obviously meant that he was chained to these demanding plants. By the way, he also was raising his own escargot in a covered enamel pan.

Cutting through the garden was a water feature, including a stream and small pond. He jokingly told us he had named them the Mississippi River and the Great Lakes. The area surrounding the water was filled with perennials that I could identify, including *Campanula glomerata*, *Dianthus deltoides*, *Geranium psilostemon*, *Delphinium*, *Euphorbia*, gentians, lilies, and annual poppies in the sunny areas, while ferns filled in the shady spots.

Monsieur Camus had constructed a waist-high curved bed from stones transported from the French Alps. Here was growing a delicate white *Dianthus microlepis* from Bulgaria, protected from precipitation by a plastic teepee, flowering for six months with no direct moisture all year. *Physoplexis comosum*, with a spikey ball of pink flowers, was squeezed between angular rocks; difficult, it grew here in dolomite. Next to it was *Eriogonum*. Sharing this home was *Pteroccephalus perennis*, its numerous *Scabiosa*-type flowers of soft lavender-pink, some of them a little past prime bloom. Monsieur Camus described it as easily grown in rock garden or scree. Near the patio were several trough gardens planted with interesting specimens.

Monsieur Camus's collection of alpines was outstanding. There was an impressive specimen of *Acantholimon androsaceum* from Crete, its mounds of spiky leaves appearing to be planted on four stones placed in a square form—*trés sensual*. Another *Acantholimon*, this one *A. glumaceum* from Greece and Turkey, was in full bloom, a beautiful pink cushion. Ingwersen describes it as "everyman's acantholimon... with deep green cushions of narrow leaves, less spiny than in most species." Nearby a *Dryas* was blooming white. Other attractive plants in bloom were *Convolvulus boissieri*, pink-flushed white funnels showing up against the soft gray foliage; *Sisyrinchium macrocarpum*, with large, golden yellow flowers; *Campanula* 'G.F. Wilson', a hybrid of *C. pulla* with *C. carpatica* var. *turbinata*—bright, almost neon blue, bell-shaped flowers, growing next to a variegated *Phlox*; *Trachelium jacquinii*, with low foliage; *Arenaria* covering the rock.

When we left it was 9:30 p.m. but there was still enough light to take a few more photographs. The lovely form of the garden, the blues, mauves, and whites of the flowers showed through the twilight. Returning full of our impressions and memories to our hotel, we agreed that Mme. Kemoun, Mme. Reichert, the Camus's and Coutants exhibited as much gracious hospitality and concern for gardens as any ever did at Versailles.

—Carole P. Smith

TECHNO-GARDENING

Garden Records: Navigating through Time

The supreme joy of gardening is, without question, to be out in the garden fussing with plants. But that can go on only so many hours a day—eventually night falls, and, let's face it, fatigue intervenes. Or winter! As I write this, it is a cold, white day in January, with the garden out of sight under the snow. So what's the second-best thing to gardening itself? Why, record-keeping. The plant connection continues, however attenuated, when one settles down in front of the computer to enter the day's doings.

Now all that is true enough, but it is really only a gloss over the more compelling reasons for putting in what can be a significant amount of time and effort. For myself, there is no doubt about the underlying motivation: it is a desire for control. I want to know just where a given plant is, and if it isn't there, why not. That is a need in itself, but it also feeds the artistic motivation to plan combinations of plants that look good together and, in particular, bloom at the same time. This latter is perhaps less compelling in the austere, spread-out spaces of the rock garden than in the border, but I nonetheless suspect that many of us would confess to such aesthetic impulses.

The bulk of my record-keeping therefore has to do with pinning down where I've put a plant and, more of a challenge, keeping it pinned. Over the years, this compulsion has driven me to considerable lengths of invention, resulting in an abundance of records that, even to me, can seem like overkill. However, it seems the minimum necessary to: a) record each new acquisition; b) keep track of its location; c) keep track of its performance.

A NEW PLANT OR SEED LOT ARRIVES

Each new accession, and there are several hundred every year, is promptly entered into a hand-written log, specifying source, date received for plants or date sown for seeds. Germination date, when appropriate, will be added subsequently. At a more leisurely pace, the information is entered into the computer. I use HyperCard, a MacIntosh-compatible program that provides a virtual card for each taxon. The card is divided into fields, in my case including 1) a number-letter combination for each accession, the final letter being the first letter of the genus; 2) the source of the plant; 3) the history of sowing, germination, transplanting, etc.; 4) location in garden; 5) the record numbers of any photographic slides that picture the plant.

LOCATION

The trigger to my quest for control was the dawning, vexing realization—days, months, or years later—that a plant (no, many plants) had disappeared, leaving me clueless as to where to begin the search. The pain involved drove me

on, step by step, to devise a system that would at least give me a fair shot at tracking down each one.

To begin with, I divided the overall garden area, totaling about 720 square meters, into subspaces, more and more of them, to a present total of 22. Each area was given a two-letter name, such as VF (derived from vestibule front), and that name was included on each appropriate HyperCard. The record is updated every time the location of the plant changes, through death, for instance, or division. The card is still maintained after decease, even after the requisite three deaths per taxon, as far as that goes: in a mature database, the cards marked DE (for DEAD) will significantly outnumber those still in play.

This system works satisfactorily, in conjunction with plant labels, (which I find stopgap measures at best) and photographs (the definitive record, if only the plant manages to bloom).

PERFORMANCE

In this category, the quest for control continues to be a strong motivation; I want to know not only where a plant is, but also how long it has been there, and what it has been up to in the meantime. The record provides the bare bones; in addition I have records that show when each species blooms, and how many years it has done so. This is based on a weekly, or two-weekly, census of what is flowering in each of the 22 areas. Sound like a chance to commune with the plants? In actuality, it is more like drudgery, but it is the information that feeds my winter dreams and planning.

Each week I print out a list of the plants in each area, and I then use it as a survey form to record which plants are in bloom. With a full season's weekly records, I can compile all the results into one list showing when each taxon is in bloom. This is the list I use for garden planning.

As a final, not strictly necessary adornment, I use the census information to tally up which species are still in there blooming, and which have petered out. It can be very reassuring to see that some, at least, go on and on. These, of course, can serve as the cornerstones of a garden plan. Does this then give me a satisfactory degree of control? Yes! Increasing competence has met decreasing expectations, and all is well in the garden.

—James L. Jones

BOOKS

Beverley Nichols: A Life, by Bryan Connon. 2000. Timber Press, Portland, Oregon. 320 pp., 52 black & white photographs. 6.25" x 9.25". \$29.95. Hardbound. ISBN 0-88192-444-X.

Most gardeners are familiar with English writer Beverley Nichols (1898-1983). He was a best-selling author of more than 60 books on subjects as diverse as religion, travel, and politics; a newspaper and magazine columnist for over 20 years; a noted lecturer in the UK and the US; and a playwright and musical comedy composer. However, it was the witty, warm, and poetic musings in his twelve gardening books that placed him firmly in the hearts of millions from the early 1930s to the late 1960s.

There has been a Nichols renaissance in the last few years, fueled largely by the Timber Press reprints of *Merry Hall* and its two sequels, *Laughter on the Stairs* and *Sunlight on the Lawn*, as well as by two reprints from the Antique Collectors' Club (*Down the Garden Path* and *Green Grows the City*). Timber Press has now brought out a reprint of the 1991 biography of Nichols, which was published only in the UK and had a very short in-print status due to the sudden folding of the publisher.

Bryan Connon befriended Nichols in the last years of his life. Nichols asked him to be his biographer and gave him all his personal papers, diaries, and photographs. Connon, remaining clear-eyed and unbiased, wrote an extremely balanced view of Nichols, cataloging not only his successes and talents but also his failures and foibles, keeping nothing back about his private life and the many enemies he made.

The book is a fascinating chronicle of a man whose main goal in life was to be famous and who was always looking out for "the next big thing," which he had a knack for finding. While he did achieve popular fame (although not much fortune), he was never taken seriously by the critics or the writing establishment, a source of increasing bitterness as he grew older.

The book covers all the garden writings but does not emphasize them, placing them within the larger context of the many other publications Nichols produced. Readers who think of Nichols as the charming, sentimental, and proper gentleman he appears to be in his fictionalized gardening accounts may be shocked to learn of his very business-like approach to life, his deliberate distortion of the facts about himself and his family, and the way in which he made friends and acquaintances for personal gain. Nonetheless, Timber Press deserves credit for making available again the only full account of this beloved author's life. The book includes a revised and updated bibliography of all of Nichols' books, plus references to his published and recorded music, as well as a detailed index.

—Roy C. Dicks

The Genus Galanthus, by Aaron P. Davis. 1999. A Botanical Magazine Monograph, series ed., Brian Mathew. Illustrated by Christabel King. Timber Press: Portland, Oregon in association with The Royal Botanic Gardens, Kew. 297 pp., 56 plates, 19 paintings, 36 photographs, distribution maps. ISBN 0-88192-431-8

When I first started making notes, this review was in danger of degenerating into a discussion of the British Class system as it applied to gardening—readers may still detect traces of this. The book itself is an out-and-out scientific monograph, that is, a carefully planned, detailed examination and revision of the taxonomy of the genus by a scientist. Note that I say “scientist,” not “gardener.” This implies a certain rigor, even stiffness, in writing style and treatment. Of course, we need a periodic scientific revision of each genus to get us back to fundamentals. Then, out of these treatments can come more garden-oriented books, with an easier approach and more concentration on horticultural matters. I am sure there will be such spin-off from this book.

This book originated as a PhD thesis, and elements of this can be detected in occasional obsessive detail: for instance, more than six pages of synonyms for the common snowdrop, *Galanthus nivalis*. The book fits in well with other publications produced in the Monograph series at Kew. The author is currently a research botanist at the Royal Botanic Gardens, Kew, England, working on the wild coffees of Madagascar.

The earlier great monograph on the subject is F.C. Stern's 1956 *Snowdrops and Snowflakes*, published by the Royal Horticultural Society; some degree of comparison is in order. Stern's book is in itself a classic of its time—a model of how to treat a subject. For the past 45 years the book has been very much revered as the standard treatment. It includes *Leucojum*, which Davis does not. Looking back, I can see that our world of snowdrops was molded by Stern's views. He was at the time one of Britain's leading rock garden authorities.

In a very real sense, Stern's studies were confined by World War II and its continuation, the Cold War. What he had to work on was largely material in cultivation in British gardens, collected in nature before 1939. Most of the regions where snowdrops grow were in socially and militarily unstable regions such as Greece, Turkey, and Syria, or in “no-go” areas behind the Iron Curtain where travel was forbidden to foreigners.

By contrast Davis' work can be regarded as the “peace dividend” we were promised when the Cold War ended in 1990. Davis was able to travel extensively in Greece, Turkey, and the Caucasus. He examined, in the field and in institutions, species which were not (and still are not) in cultivation in our gardens.

The extraordinary differences between these two monographs can be ascribed to the material available to each author and to the differences in training and approach. Sir Frederick Stern was an English gentleman with a career in the military, an expert gardener, but one with no knowledge of the subtleties of botanical science. Aaron Davis is a scientist trained in modern techniques. The difference shows. The newer book is startlingly different, both because of its approach and the large amount of new material available.

Between these two comes an intermediary to whom considerable credit must be given. In the then-Soviet-Union, starting in the 1960s, Z.T. Artiushenko

worked on Russian snowdrops, producing a monograph in *Amaryllidaceae* SSSR in 1970. She eventually enlarged her studies to all the then-known species. Her eastern point of view and her access to material from behind the Iron Curtain led to a radical reappraisal of what existed in the wild. Artiushenko wrote several articles on snowdrops, many readily available, but her views never really filtered down to the level of the gardening public. It was in order to reconcile her more revolutionary ideas with the traditional views of Stern that Davis' monograph was undertaken.

Among the major differences between Stern's and Davis' monographs are the number of species recognized and the names affixed to them. Stern recognized 12 species; Davis recognizes 18—but these exclude four from Stern's list.

By not referring to the literature, or examining the original herbarium specimens on which the names are based, Stern completely reversed the usage of certain names. His biggest mix-up was in using the name *Galanthus elwesii* for specimens of *G. gracilis*. This is a big problem, because the Sternian concept of *G. elwesii* is now the universally accepted idiom of horticulture. It is so embedded in our vocabulary, trade, and literature that to change back to the proper usage would cause endless confusion. So Davis bows to the inevitable and formally conserves Stern's use of *Galanthus elwesii*.

A name that has disappeared is *Galanthus caucasicus*, long cultivated and the stated parent of many garden hybrids. Davis contends that the plant of gardens given that name is simply the early-flowering variety (var. *hyemalis*) of *G. elwesii*. The plant in question has a single, terminal green spot on the inner petals. Davis maintains that *G. elwesii*, during cultivation, has given rise to single-spot forms that have mistakenly been designated *G. caucasicus*.

To illustrate how complicated some of the naming problems are, I can add that there is a wild plant from the Caucasus also called *Galanthus caucasicus* but now named *G. alpinus*. This latter includes the triploid clone, *G. alpinus* var. *bortkewitschianus*, previously regarded as a hybrid or a species in its own right.

Readers' heads will be spinning over naming problems; in places this book is not easy reading. However, I think that Davis' revision is going to be very influential over the next few years. The new names will gradually filter down to the garden level. Meanwhile, don't take at face value any label in a nursery.

About three-quarters of the book is concerned with descriptions of the species, the history of their discovery, their distribution, and naming problems. Other chapters discuss pollination, anatomy, cytology, ecology, pests, and diseases. There is a useful chapter on how to cultivate them (they do better in the ground than in pots), and the propagation section includes a detailed account of chipping and twin scaling (contributed by Ronald MacKenzie).

One chapter sure to interest gardeners is that on cultivars. Some 118 cultivars are described, with their origin and chief characteristics set out. This is a valuable section. My only regret is that it is still difficult to put a name to an unnamed specimen. Old hybrids, one must note, persist for long periods in gardens, whereas their labels decay.

In terms of illustrations, there are excellent photographs of the species, most taken in their natural habitat, some in gardens. Christabel King was commissioned to do the illustrations and produced a black-and-white page of the general habit of a snowdrop with enlarged dissections of the parts. Her color plates, I think, are a missed opportunity. Each shows a clump of plants in flower, some

with, some without, bulbs. However, unlike the black-and-white plate, there are no dissections of flower parts shown. This is in a group where details of the markings on the inner petals are of crucial importance. In fact, rather than show an enlarged flower, or part of a flower, with a different form of mark, two of the species have been given duplicate plates for the rather trivial reason of showing a different marking. There is a long history at Kew of botanical illustration, and many of the paintings produced illustrate dissected parts. These are, after all, scientific illustrations, not bedroom decoration.

To sum up, this is one of the most radical revisions of any plant group to appear in recent years. The book is a must-have for any grower of temperate bulbs.

— M.J. Harvey

Lewisia by B. Leroy Davidson. 2000. Timber Press: Portland, Oregon. Hardback, 9" by 6", 238 pp., 68 color photos, 20 color plates, 13 line drawings, 4 maps. ISBN 0-88192-447-4. \$34.95.

Although the genus *Lewisia* may contain only a few dozen species of plants, unlike the hundreds of kinds of saxifrages, primulas, or penstemons, say, the brilliant coloring and the pleasing form of the various lewisias have given them a prominence in the garden far greater than mere numbers imply. Two, fine, small monographs on the genus by Roy Elliot and Brian Mathew, as well as Jerry DeSanto's treatise on bitterroot have provided a worthy adumbration on this, surely the final word on the genus for many years to come.

Roy Davidson is well known for his frequent, lucid, and welcome notes to a wide spectrum of rock garden, iris, and penstemon publications. Here he has gathered the observations of a lifetime of gardening, field botany, and scholarship, blended together with the artfulness of a master story teller: here is a monograph you can pick up and read like a novel, and, like all great writing, his authorial presence is felt like a wise friend, nudging you to ever greater appreciation and knowledge of this novel group of plants.

The sonorous prose is a stark contrast to the cookie-cutter language found in most made-to-order gardening books that seem to roll off the presses these days like boxes off an assembly line. Here is Roy's rendition of various leaf margins in varieties of *Lewisia cotyledon*: "var. *howellii* was the first fancy-leaved lewisia to become familiar; its leathery leaf has a fluted, piecrust-like margin as crisp as a cucumber, and with the same cool color contrast. *Lewisia cotyledon* var. *heckneri* has flatter leaves, their margins bristling with fleshy teeth, like a saw blade." This sort of muscular prose, glistening with lively and appropriate tropes, makes even the geographical descriptions entertaining. Would that the muse that straddles Roy's pen could be cloned and shared with the writers of the endless array of horticultural monographs now assaulting our shelves.

But nothing can replace the observations of this indefatigable explorer. It is quickly obvious that for every species, he has sought out a wide variety of habitats, especially on the periphery of their ranges.

The wonderfully enlightening text is richly complemented by Micheal Moshier's sensitive portraits of each species, and by stunning photography by a

host of enthusiastic artists/plantsmen. Particularly striking are the moody landscape pictures by Sean Hogan, depicting lewisia habitat. This is not just another wordy monograph to clutter your library. This is more like a pulsing piece of the West yearning to burst the bounds of the book. This book should be stationed on your nightstand for weeks to come.

—Panayoti Kelaidis

ERRATA

#@!*\$%\$#@!!!

Volume 58(2), Spring 2000.

p. 128. James Waddick lives in Kansas City, Missouri. He has no interest at all in bearded irises, which he refers to as "colored hankies on a stick." He is actually interested in peonies, variegated anything, bamboo, bulbs, and on and on.

p. 119. Last line should read "I have grown *L. radiata* here for...."

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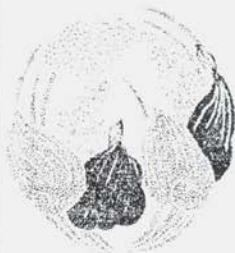
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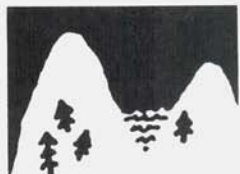
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QUARTERLY STAFF

Editor	Gwen Kelaidis	(303) 368-7530/kelaidis@ecentral.com
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Proofreading Assistance	Ted and Barbara Cochrane, Hans Sauter	
Advertising Manager	Al Deurbrouck	(412) 653-0281/adeurbrouck@juno.com
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