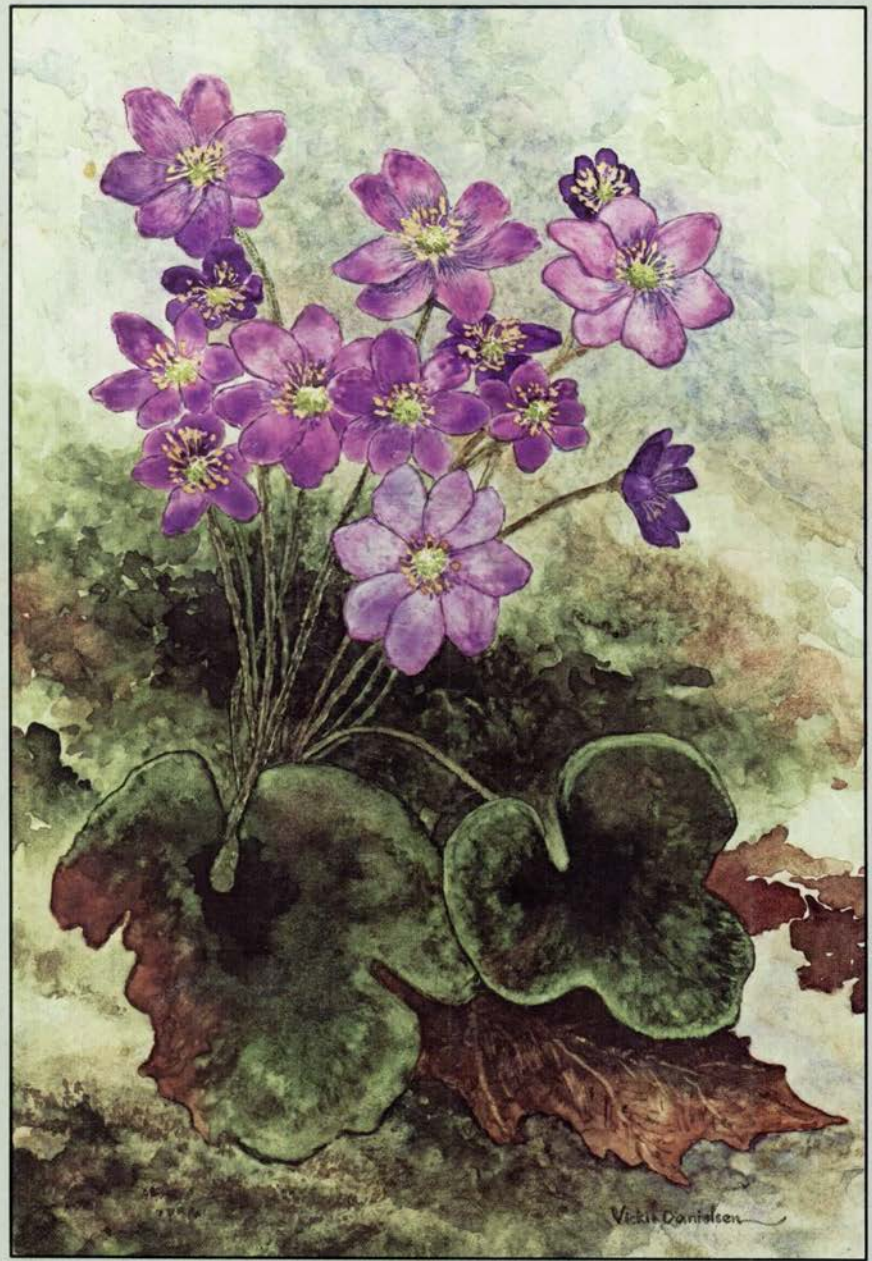
Bulletin of the
American Rock Garden Society



Volume 49 Number 1 Winter 1991

Cover: *Hepatica americana*

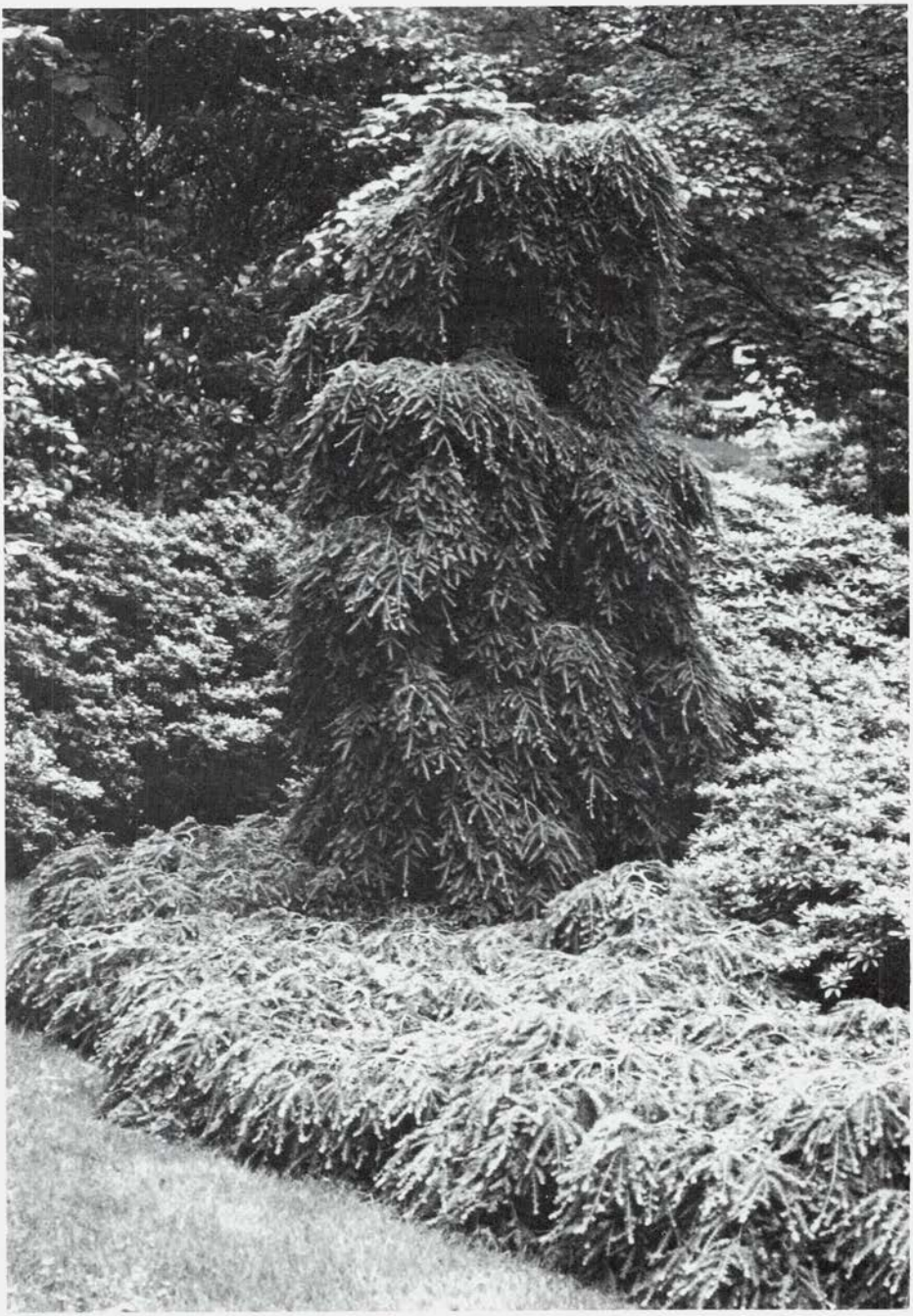
Watercolor by Vickie Danielsen of Englewood, Colorado

Bulletin of the
American Rock Garden Society

Volume 49 Number 1 Winter 1991

Features

Departments



Tsuga canadensis 'Cole's Prostrate'
photo by Harold Epstein

Saga of a Woodland Garden

by Harold Epstein

The saga of our garden begins in the spring of 1937, when my wife, Esta, and I purchased our present home situated in the woodlands of rocky Larchmont, a yachting center in Westchester, suburb of New York City. Our new home was in a dense forest of oaks amid huge rock outcrops. We did not realize the challenge we confronted in taming this wild, rough parcel of land. We little suspected how our lives were to be enriched by the adventure of developing this garden and by our introduction to the world of horticulture via membership in the American Rock Garden Society.

We quickly realized we needed professional assistance. The obvious and logical source was the New York Botanical Garden, not far distant. First visiting the library there, we were referred to the librarian, Elizabeth Hall, a gracious, helpful personality anxious to assist. Without hesitation, Ms. Hall presented four books on rock gardening by Louise Beebe Wilder, a nearby Westchester enthusiast. They were *Adventures in My Garden and Rock Garden* (1923), *Pleasures and Problems of a Rock Gardener* (1928), *The Rock Garden* (1935), and *Adventures with Hardy Bulbs* (1936). British publications were also suggested, but the librarian's advice was to concentrate on experienced United States authors. The books we found that day were to remain major reference sources for many years.

Next we consulted with Thomas H. Everett, who was then supervising the construction of the newly endowed Thompson Memorial Rock Garden at the New York Botanical Garden (now renamed in honor of Everett). We were impressed with the naturalistic rock ledges maneuvered into place there by teams of horses or mules (there were no bulldozers in that era). Drainage was achieved by use of cinders, a residue of the Garden's coal furnaces, available without cost. Everett recommended some local people to assist with our home project. After much wasted effort and time, we returned, somewhat frustrated, and the knowledgeable T.H. (as he preferred to be addressed) recommended that we join the American Rock Garden Society, organized only four years earlier. He referred us to Dorothy Hansell, the Society secretary.

That visit to Dorothy Hansell's office in New York resulted in our joining the ARGS and thus began a long period of activity in our first horticultural organization. A new world of interest was opened to us.

During those early years of the Society there were only a few chapters of ARGS—New York, Boston, and Seattle, each creating its separate activities with local chairpersons. We immediately joined the New York group (which later became the Mid-Atlantic Chapter) and participated in various lectures and garden visits. Enduring friendships began within its ranks.

Dorothy Hansell was also editor of the *Gardeners' Chronicle of America*. An arrangement had been made for several pages of that publication to be devoted to the news and editorial writing of the ARGS. In April of 1943, Dorothy discontinued the publication of the magazine. That year I was Chairman of the Mid-Atlantic Chapter and so was on the Board of Directors when the problem of starting a new publication for the Society was discussed. To demonstrate that such a publication was feasible, I offered to edit the first *Bulletin of the American Rock Garden Society* myself. Within a few months, members received *Bulletin* Number 1, which included eight excellent and appropriate articles from authors in different areas, including one by Frances K. Roberson of Seattle, still active in the Northwestern Chapter. The issue also included advertising to help defray the cost of publication, printing, proofing, and binding. The most important result of that first issue was that it induced Dr. Edgar T. Wherry to become Editor of the *Bulletin* for the years through 1950. The successful publication that resulted sustained the life of the Society through the difficult war years that followed. The Society really marked time during that period, with total membership of only about 400.

Our own involvement in the Society grew deeper and deeper. In 1948, I was elected President, succeeding Dr. Ira N. Gabrielson of Washington, D.C., and I continued in that position for 16 years. The Society increased to 800 members in 8 chapters. The renowned ARGS Seed Exchange began in the early 1950s and has evolved into perhaps the greatest seed exchange in the world. The Winter Study Weekends began with the first Weekend in the East at Atlantic City in 1968, and the first Western Study Weekend followed shortly.

Now there are 4000 members and 27 chapters. We still participate actively in most national ARGS functions and in meetings of several of the eastern chapters, attending Eastern Winter Study Weekends and some Western ones. We joined the Alpine Garden Society and the Scottish Rock Garden Club. We have attended four meetings in Great Britain at ten year intervals and hope to attend our fifth International Alpine Conference in April 1991.

Through all this activity in the Society, we were building and developing our woodland rock garden, constructing, planting, and evolving, and applying the knowledge we gained through exposure to ARGS. The major influence on the design of our garden was our admiration of the many rock gardens constructed from 1936 to 1946 by the Swiss born and trained Zenon Schreiber. We saw several of his skillful, extraordinary creations at the eastern spring International Flower Shows, including two sponsored by ARGS. These displays established Zenon Schreiber as a master of landscape design and construction and a perfectionist in all phases of horticulture. Each of his display gardens was beautifully planned, with a rich variety

of appropriate plants, always in perfect scale and at the peak of growth. His skill in growing and forcing rare alpines and shrubs and other plants to perfection has never been equaled.

We wanted to emulate Zenon's artistry in this garden. In 1940, we invited Zenon to begin preliminary study and planning here, and he continued to influence the creation of this garden by consulting with us for almost 20 years. His talent was not easily available, for his reputation spread through horticultural circles—only occasionally could he be induced to devote a few days to our garden. Working closely with him on many details of the garden and its construction was a valuable education. We learned about selection of stone and its use and placement, superior concrete masonry, soil preparation and handling, plant selection and sources, and so many details of design that cannot be absorbed from texts. His expertise resulted from personal experience in all aspects of labor related to horticulture.

The development of the garden was slow, partly because Zenon was sometimes not available for weeks or months, particularly during the war years. Also, there was little competent labor available. Only small sections of the stone work were completed and could then be planted with selected plants and shrubs. Many large oak trees and other unwanted trees and shrubs were removed. Many additional rock ledges and outcrops were exposed by careful blasting. Enough excess stone was made available in this process to construct 500' of boundary walls 6' high by 2' thick. The result of all this effort has been a woodland rock garden in which not a single stone has required renovation at any time after the initial construction.

The garden comprises about one and a half acres on an irregular sloping hillside around a curved private road. The development of the garden planned for the terracing of three contiguous levels from a boggy area on the west, including the driveway; a second, elevated central area and lawn, including the house and lawn; and a third area to the east, the highest ground, gradually reaching a prominent 10' tall outcrop. Each terrace has a small, central open lawn surrounded by islands and borders of trees and shrubs. The locations of these beds were dictated by rock outcrops and ledges.

Originally, the plantings included a wide selection of choice herbaceous plants, placed where spaces and pockets were available. There were very few crevices in the huge granite ledges; plants were planted at the edges and encouraged to creep onto the outcrops. Some of these ledges were ideal for prostrate creeping junipers and are now almost completely covered. Constant judicious pruning is now required for control. Other herbaceous plantings are along steps or as borders for taller shrubs. There has been a slow invasion of the lawn.

The broad canopy of oaks has spread continuously during the many years since the garden was constructed and with increasing shade the variety of plants that can be accommodated has been reduced. There has been a continuous turnover of plants, and the garden has become increasingly dependent on shade-tolerant species. Our compost bins contain the largest catalog of plants on the East Coast. With a constant sense of curiosity and experimentation, we have brought in plants from many corners of the United States and abroad. Some have been long-lived; most from the West Coast states have lived only for short periods. Many European and eastern American natives have adapted more readily, most without time-consuming coddling. Many

natives of Japan have been established for the long haul, encouraging us to seek additional Japanese species whenever they are available. Extensive travel in Japan over the last 40 years has enabled us to procure many new introductions. Now plants of Japan, along with a few species from Korea and China, constitute about 75% of the plantings of the garden. These include a great variety of herbaceous, woody, and bulbous plants, although we have concentrated especially on a few genera. Most of the remainder of our plants are eastern American natives.

The floristic relationship between eastern Asia and eastern North America was first recognized back in 1750, by Halen, a student of Linnaeus. It was not until the 1840s that Asa Gray, a prominent New York botanist, called the attention of the scientific world to this affinity. Since then, considerable literature on the subject has been published. The climatic similarities of the two regions and the floristic history of the world help explain the striking similarities between the plants of these widely separated regions and the success we have had with growing Japanese plants here.

Our first plantings, in 1940, included several species and varieties of the genus *Epimedium*, native to Japan, China, Europe, and North Africa. Epimediums have been the most enduring herbaceous plants here, with decorative foliage and flowers. Many of these plants are still in their original sites, where they have increased over the years. They have not been lifted or divided and yet still flourish. This is unquestionably the ultimate testimonial to contentment for an herbaceous plant. Many years of expanding our collection of these tenacious plants have led to the domination of the genus here as a ground cover, as an underplanting to many shrubs, and in borders in difficult shady areas. Unfortunately, epimediums have not been accorded as much recognition as they deserve. Since they seldom set seed in cultivation, they are rarely available through seed lists. Surprisingly, the epimediums in this garden do set seed and produce seedlings on moss and among other plants.

It would be futile to attempt to list the huge collection of species and hybrids now in our garden. The great variability of identifying botanical details, added to the inconsistency of names in the nursery trade, makes such a task nearly impossible. I'll just mention a few favorites, with the caution that plants sold under these names by various nurseries may not be reliably identified. The showiest selections are *E. grandiflorum* 'Rose Queen' (p. 37), *E. grandiflorum* 'White Queen' (p. 38), and *E. grandiflorum* 'Flavescens', all with large flowers and long spurs. *Epimedium diphyllum* has dainty, white flowers with no spurs. Yellow-flowered species include *E. pinnatum, E. pinnatum* ssp. *colchicum,* and *E. perralderanum.* A few of the better hybrids are *E.* x *youngianum* 'Niveum', *E.* x *youngianum* 'Roseum' or 'Lilacinum', *E.* x *warleyense* (*pinnatum* x *alpinum*), *E.* x *rubrum* (*grandiflorum* x *alpinum*).

The nomenclature of this genus is most confusing, since hybrids have often appeared in cultivation as well as in the wild. In large wooded areas where the plants grow wild in their native home, there is great variation in flower color, particularly in *Epimedium grandiflorum*. For many hybrids in commerce, the exact nomenclature is questionable. It is recommended that plants be selected when in bloom.

Our ultimate shock regarding epimediums came in April 1990, when we visited a Japanese specialist in this genus. He had not only collected many

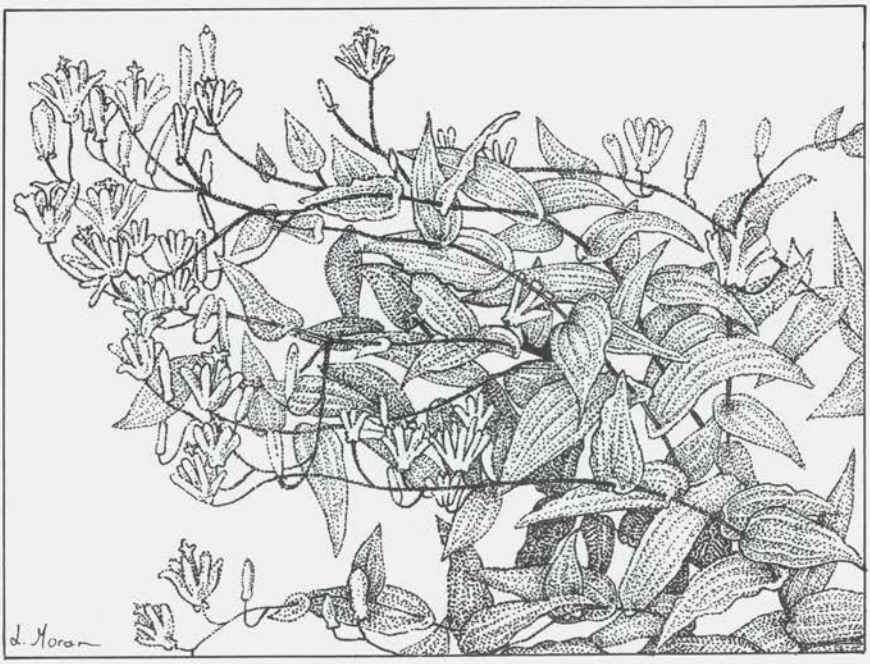
Glaucidium palmatum f. *album*

species but had hybridized plants, using hand pollination. He had published a color catalog showing, in flower, 75 different plants that he offered for sale. There were an additional 25 kinds to be available in the future—an overwhelming collection. Naturally, we purchased about a dozen distinctive varieties. We hope for a bloom of great interest next spring.

About a dozen Chinese species have recently become available from a few nurseries in Japan, an incentive to keep acquiring more. Of the few we have obtained so far, *Epimedium acuminatum* appears to be most distinctive, with excellent foliage and large cream-and-chocolate blossoms.

In order to vary the monotonous dark green of a planting of too many evergreen rhododendrons, many of the deciduous Asian species, with lighter green foliage, have been utilized in this garden. Together with the Japanese maples (varieties of *Acer palmatum*), native and Japanese dogwoods (*Cornus florida, C. kousa*), and other trees and shrubs, they all add to a colorful spring and fall display. All are dependably hardy here and they have given a new dimension to the garden.

Deciduous Japanese rhododendrons in the Azalea Series and Subseries Schlippenbachii are especially emphasized in this garden. In the 45 years we have admired and grown the various species of the Subseries Schlippenbachii, we have also slowly acquired its close relatives, including some seldom available commercially. Species grown here include *Rhododendron amagianum* (late-flowering, orange-red), *R.*



Tricyrtis formosana

mariesii (rose-purple), *R. quinquefolium* (pure white), *R. reticulatum* (various shades of purple), *R. sanctum* (close to *R. weyrichii*), *R. schlippenbachii* (pink, best of the group), *R. wadanum* (deep purple), and *R. weyrichii*.

Rhododendron farrerae was for many years the only species of the subseries we did not grow. It could not be located in either the United States or England. It was finally discovered in a tiny family rhododendron nursery in Japan several years ago. A few strange, small, potted plants with unusual, quite distinctive foliage were among a great assortment of other rhododendrons. The usual label in Japanese characters was the sole identification. A plant was purchased, and when it bloomed the following spring in a cool greenhouse, we brought it to the herbarium of the New York Botanical Garden. Here it was identified by comparison with two plates: It was the long-sought *Rhododendron farrerae*. Our specimens had originally been collected near Hong Kong, indicating that they might not be hardy here. We grow the plant indoors and it has bloomed every year. It is still a much smaller shrub than other members of its subseries. This low, densely branched rhododendron was first introduced into England in 1829 by a Captain Farrer of the East India Company and was named for his wife (thus the feminine ending, "ae"). It is noted that the other Japanese members of this group have albino forms, greatly valued in Japan, most of them now in our collection.

Additional deciduous azaleas grown here include *R. albrechtii* (pink to rose, beautiful), *R. canadense* (rose-purple and white, the most northern azalea), *R. pentaphyllum* (beautiful rose-pink),

and *R. vaseyi* (rose-pink or white), all of the Azalea series, subseries Canadense.

In later years, many small and large shrubs have been added to the garden. There has been an special emphasis on the genus *Enkianthus*, usually known only by the species *E. campanulatus,* available from several nurseries. It is a neglected plant despite the fact that it looks so well in association with other ericaceous species. *Enkianthus campanulatus* has pendent clusters of flowers in May, in varying color combinations of yellow, pink, or red, and occasionally the flowers are a solid, dark red or pure white. Old specimens will reach 12-15' in height.

There are about 10 species of *Enkianthus* in China and Japan, most of them very hardy. Other species grown here include *E. cernuus,* in various color forms of flower, another smaller species; and *E. subsessilus*, with small, pearl-like white flowers. There are also varieties of several species available, the most interesting being a dwarf form of *Enkianthus perulatus* long known in Japan as *E. p. compacta*. It has been in our garden for about 30 years and is now exactly 4' in diameter and 2.5' high. It is one of the choicest dwarf shrubs in the garden. It blooms from April into May, with drooping clusters of small, white, lantern flowers that are quickly enveloped by the emerging new foliage. If planted in full sun, the autumn foliage will be brilliant red. Unfortunately, under the shaded conditions here this foliage does not have bright color. The type species will grow upright to 8' in many years. A unique and often overlooked identifying detail of this species is the seed pods, which are held upright, distinctly different from those of other species, which are always pendent. Unfortunately, neither the dwarf form nor the type species has been readily available in this country, presumably because of difficulty in propagating from both cuttings and seed. In Japan, on the other hand, this is perhaps the most common shrub in gardens of any size. It is typically pruned to globular shape and is most appreciated for its brilliant autumn display.

The genus *Tricyrtis,* in the lily family, has become available in recent years. There are about 20 species, with almost a dozen now available in the United States. Most are native to Japan, some to Taiwan, others to China and adjacent northern countries, and just one to Korea. They are all comparatively easy to grow, except for *Tricyrtis nana*, which has proved difficult here, surviving only a year or two. The most attractive and long-lived are the two closely related Japanese species, *T. macrantha* and *T. macranthopsis*. They are planted on a high, vertical rock outcrop in partial shade, where long, trailing stems bear attractive, tubular, yellow flowers in the leaf axils in September and October. A flat garden site cannot do justice to this attractive hanging plant. The remaining species are upright, of varying height, with flowers white or yellow, spotted either yellow or purple. The most common species is *T. hirta* and its beautiful white-flowered form. It blooms in September. Most species bloom in late summer and into autumn. The earliest to flower is *T. latifolia*. Its erect blooms appear from mid-June into July—upward-facing, yellow, funnel-shaped flowers on stems 2-3' tall.

A very prominent planting in the garden is a group of the most distinctive dwarf form of Canadian hemlock, *Tsuga canadensis* 'Cole's Prostrate'. The original plant was acquired from H. R. Cole about 1940. It was found in the wild in New Hampshire in 1931 by this nurseryman, who was keen enough to recognize its merit and to propagate

it. Fortunately, it grew readily from cuttings. Two of the first plants produced from cuttings were purchased when they were about 8" in diameter. One of these is now 9' across, and just 15" high in the center. The second is part of a group that covers an extensive area, forming a distinctive ground cover. Among the plants of this ground-cover area are several individuals grown from cuttings taken by me in 1948. One was immediately trained upright and staked when planted. Its present height is 8'. It is a unique specimen, with a 5-6" trunk, surrounded by its prostrate neighbors. A Latin name completely describing this specimen might be *Tsuga canadensis prostrata fastigata pendula*—certainly not acceptable for botanical nomenclature.

A most striking feature of the garden is a group of four old 90' oaks, their trunks completely enveloped by the Japanese climbing vine *Hydrangea petiolaris*. This hardy hydrangea attaches itself closely to the trunks and limbs by aerial roots. About 40 years ago, small cuttings were planted. Now the white flowers, borne in circular clusters up to 10" across, make an awsome picture in June as they glow in the deep shade of the oaks. The leaves are rounded and up to 4" long. An unusual crop is the seedlings that have emerged in surrounding areas. I have never seen seed offered, and nobody I know who grows this vine has ever had seedlings appear. Another oak nearby is partially covered by a later planting of a closely allied species, *Schizophragma hydrangeoides*, which blooms immediately after the *Hydrangea* with slightly different flowers.

The tendency over the years has been to replace the shorter-lived herbaceous subjects and increase the number of woody plants. For example, a shady slope covered with *Phlox stolonifera* gradually deteriorated and the *Phlox* was replaced with a mass of dwarf *Skimmia japonica*, which produced a compact cover. Locating hardy, low shrubs has been challenging. A recent introduction was *Deutzia gracilis* 'Nikko', a superb deciduous groundcover ideal for covering a slope, even in partial shade. It blooms with delicate, white flowers in spring. It is able to root on its low-growing, branching stems and quickly covers a wide area. Give it plenty of space.

Even slow-growing, small shrubs can outgrow limited space. An established small specimen of Korean *Buxus microphylla* 'Kingsville' obtained 50 years ago, planted in front of taller shrubs on a terrace adjacent to the house, has increased to a 6' spread 2' high. It now extends over a nearby outcrop.

The challenging terrain of this woodland rock garden, with its varying density of shade, has never lacked a diversity of suitable plants. The huge deciduous oaks with the underlying canopy of shorter trees plus smaller shrubs provide an unusual landscape for all seasons. The mature garden, while challenging in its concept, has provided satisfaction and pleasure. Most important, it is the culmination of exposure to horticulture through membership in the ARGS. Bless all ARGS members, past and present, for this enduring and enriching half century.

Drawings by Lisa Moran.

(Harold Epstein is President Emeritus of the ARGS. He and his wife Esta live and garden at La Rocaille, the garden described here. Tours through La Rocaille at peak bloom will be one of the features of the 1991 Annual Meeting of the ARGS, sponsored by the Hudson Valley Chapter.)

Fatal Treatments of Seed

by Norman C. Deno

Twelve species are discussed that exemplify how easy it is to treat seeds in ways that are fatal. Even the traditional and time-honored procedures are fatal to certain species. The examples given here are drawn from a program on seed germination in which quantitative measurements have been made on induction times, rate behavior, and germination patterns for over 2000 species in 551 genera and 118 familes. A fatal procedure, a best procedure to date, and a discussion of the principles involved are presented for each of the species. Although a few additional examples have been listed, a summary of the results is in the future, as most experiments are still in progress, and many more are planned. Numbers refer to the temperature in degrees Fahrenheit.

Aster (*Machaeranthera*) *coloradoensis* (Asteraceae), a D-70 germinator.
FATAL: Sow fresh seed at 70°F.
BEST: Store the seed dry for six months; germination is 100% on sowing at 70°.
PRINCIPLES: Every species must have mechanisms for preventing germination before the seed is dispersed and for initiating germination at a propitious time after dispersal. This aster secretes powerful germination inhibitors in the seed, and these must be destroyed by drying before germination can take place. This pattern is termed D-70 because the seed must be dried (D) and the germination takes place at 70°. This pattern is used by about 50% of all temperate zone plants and is the pattern for over 90% of Campanulaceae, Asteraceae, and Brassicaceae.

The D-70 germinators generally cause little trouble for growers because of the common practice of storing seed dry before planting. The drying requirement goes unnoticed. The amount of drying required varies a great deal with species; grains like barley take only three weeks, whereas *Rumex crispus* has been reported to take 18 months. Usually six months at 70° is sufficient. Drying at 70° is faster than at 40°, and a few examples have been found where dry storage for six months at 40° was not enough and therefore germination of seed stored at 70° was greater than of that stored at 40°.

For D-70 germinators, dry-stored germinates better than fresh seed, and dry storage at 70° is better than at 40°. When fresh seed is sown at 70°, irreparable damage begins. In many species, the seed is absolutely dead after three months moist at 70°, as in *Aster coloradoensis*. In other species, varying degrees of damage occur, as shown by a lower percentage of germination, longer induction times, slower germination rates, and an increased proportion of weak or abnormal seedlings.

Helleborus orientalis (Ranunculaceae), a 70-40 germinator.
FATAL: Sow seed at 70° or 40° and keep temperature constant.
BEST: Sow seed at 70°. After 3 months, shift to 40°, whereupon 100% germination occurs in the second and third months.
PRINCIPLES: Certain chemical reactions, probably destruction of inhibitors, must be completed inside the seed at 70° before germination can take place at 40°. The metabolism of germination is so much faster at 40° relative to that at 70° that in effect germination occurs only at 40°. This is one of the great number of examples where metabolism rates increase with a temperature decrease. Such germinations involve chemical reactions with negative temperature coefficients. Their wide occurrence in plants and, in particular, in seed germination does not seem to have been adequately recognized. Incidentally, a single chemical reaction can never have a negative temperature coefficient, and negative temperature coefficient reactions arise from an intricate interplay of at least several individual chemical steps. Some other 70-40 germinators are *Colchicum luteum*, *Eranthis hyemalis*, *Helleborus niger*, and *Viburnum setigerum*.

Nemastylis acuta (Iridaceae), a 40-70 germinator
FATAL: Sow seed at 70° or 40° and keep temperature constant.
BEST: Sow at 40°. After three months shift to 70°, whereupon 90% germination takes place in 2-10 days.
PRINCIPLES: This is like *Helleborus* except that the temperature cycles are reversed. Now the requisite preconditioning takes place at 40°, and the germination at 70°. Traditionally, this has been termed breaking dormancy, but this terminology obscures the true situation. It is not a matter of triggering or breaking something, but rather, certain chemical reactions must be completed at 40° before germination can take place at 70°. These reactions taking place at 40° are again of the negative temperature coefficient type. Some other 40-70 germinators are *Aesculus hippocastanum*, *A. pavia*, *Myrica pensylvania*, *Parthenocissus quinquefolia*, and *Viburnum tomentosum*.

Clematis lanuginosa (Ranunculaceae), a multi-cycle germinator
FATAL: Failure to make the requisite temperature shifts.
BEST: A 40-70-40(3%)-70(76%) pattern, plus added time for leaf development after radicle formation is complete. [This notation means three months at 40° with no germination, followed by three months at 70°, followed by three months at 40° with 3% germination, followed by three months at 70° with 76% germination.]
PRINCIPLES: Some species have taken three or more 3-month cycles before germinating. It is presumed that the three months at 70° is the equivalent of a summer and the three months at 40° the equivalent of a winter. It is possible that the

number of cycles would have been reduced if each cycle were longer. The alternating cycles are readily accomplished when the seed is in moist paper towels in polyethylene bags as it is only necessary to shift from room temperature, which is usually around 70°, to the refrigerator, where temperatures are generally set for around 40°.

Clematis columbiana

After the radicle emerges, it develops to a length of 4" over a month and then growth ceases. The seedling must be kept at 70°, and after two to three months a stem and true leaves emerge in a typical, hypogeal-type germination. Strong, healthy seedlings result. A variety of patterns have been found with multicycle germinators, involving varying numbers of cycles—germination at 70° in some and 40° in others. There are also multistep germinations where long time intervals and cycle changes occur between splitting of the seed (step 1), emergence and development of the radicle (step 2), and development of the cotyledons or of true leaves (step 3). Some multicycle germinators, with various patterns, are *Actaea rubra, Aristolochia serpentaria, Arum maculatum*, and *Taxus baccata*. There is some uncertainty in these species, in that they might have germinated more rapidly with some other treatment, such as exposure to light. Such possibilities are being studied.

Kolkwitzia amabilis (Caprifoliaceae)
FATAL: Sow at 40°.
BEST: Sow at 70°. Germination occurs in 10-30 days.
PRINCIPLES: Sowing at 40° is completely fatal, and this experiment has been repeated several times. The seed was collected in midwinter, so that some drying had occurred in all seed used. What happens naturally is that the seed hangs on the branches until growth starts in May. The seed falls on warm, moist soil and germinates. Any seed blown off in winter falls on cold, moist soil and is killed. Germination was 20-40%, but this reflects inability to distinguish empty seed coats from viable seed. The behavior shown by *Kolkwitzia* is uncommon. To date, only *Sabatia kennedyana* has shown this fatal sensitivity to sowing at 40°.

Hepatica nobilis (Ranunculaceae)

FATAL: Sow at 70°, or dry store seed, or both.

BEST: Sow fresh seed at 40° and follow multicycle procedure described below.

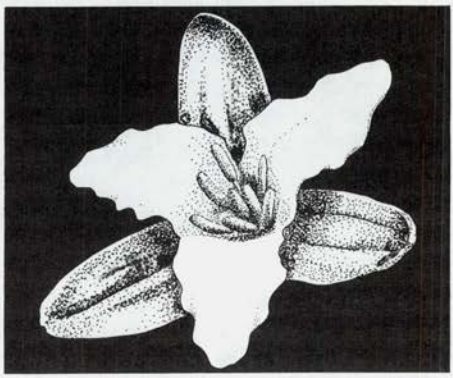
PRINCIPLES: Only the radicle develops at 40°. After the radicle is 2-3" long, the seedlings must be kept at 40° for an additional three month period. The cotyledons will then develop on shifting to 70°, although it is likely that cooler growing conditions are preferable. *Hepatica acutiloba* and *H. americana* behave like *H. nobilis*. There are many species whose seed cannot tolerate dry storage. Most Eastern U.S. woodland species behave this way, and it has long been known that *Populus* and *Salix* seed cannot be dry-stored. A surprising find was that a composite, *Tussilago farfara*, died quickly on dry storage, and it is interesting that this species ripens early, like *Populus* and *Salix*.

Trillium albidum (Liliaceae)

FATAL: Dry storage.

BEST: Wash and clean the seed and follow the multistep procedure described below.

PRINCIPLES: Trilliums are of much interest, and it has been found that dry storage is fatal for the eight species studied. The seed exchanges and commercial seed houses will have to adopt different procedures with these and other species that cannot tolerate dry storage. As it is now the seed of these is regularly distributed DOD (dead on delivery).



Even with fresh seed of *T. albidum*, germination is multistep, and the behavior differed depending on whether the cycles were started at 70° or 40°, as shown by 70(75%)-40(11%) and 40-70(1%)-40(79%). Germination consists of development of the radicle and a small corm. When this is complete, the seedling must be given 4-6 months at 40°, after which the cotyledon will develop at 70°. Unlike many multistep germinators, trilliums have epigeal germination and a true cotyledon develops. This is the only leaf until the following year, and for several years only a single leaf is developed each year.

Some species for which dry storage is fatal are *Anemone blanda, Anemonella thalictroides, Claytonia virginica, Corydalis cheilanthifolia, Corydalis lutea, Dentaria laciniata, Dicentra cucullaria, Dicentra spectabilis, Galanthus nivalis, Jeffersonia diphylla, J. dubia, Leucojum vernum, Lindera benzoin, Meconopsis cambrica, Mertensia virginica, Primula rosea, Sanguinaria canadensis, Stylophorum diphyllum*, and *Tiarella cordifolia*.

Asparagus officinalis (Liliaceae)

FATAL: Failure to wash and clean (WC) seed before sowing.

BEST: Seed that is thoroughly washed and cleaned gives 100% germination in three to five days.

PRINCIPLES: Probably all fruits contain germination inhibitors to insure that the seed does not germinate before being eaten and dispersed. In the present work, all fruits were crushed under water and the pulp removed mechanically over several

days. After the seeds were clean, they were left under water and the water changed with three rinses every day for seven days. There was a concern that this washing could be insufficient, and experiments are in progress in which washing is varied from one to four weeks. In some species, the pulp contains water insoluble oil and wax, and seeds of these species were washed twice with detergent. *Euonymus alata* and *E. europaea* exemplify this type.

In order for the seed of *Asparagus* to germinate so quickly after washing and cleaning, it must be that a water channel is present to allow the germination inhibitors to continuously diffuse into the seed and that the seed destroys these inhibitors continuously. In fact, such a cleft is visible in seed of Cornaceae, Juglandae, and Rosaceae. It is thus to be expected that scarification will have no effect on such seeds despite the hardness of the seed coats. This was verified for a limited number of Cornaceae and *Prunus*. It also can be expected that after a long period of time the supplies of inhibitor will become exhausted and germination may start, albeit weakly, inside the fruit. This can occasionally be observed in an old lemon or other citrus fruits.

Albizia julibrissin (Leguminosae)
FATAL: Sow seed without physical pretreatment.
BEST: Pierce the seed coat, after which germination is 100% in 2-4 days at 70°.
PRINCIPLES: Legumes use a physical mechanism to inhibit germination before dispersal. A hard seed coat is produced that is impervious to water. Usually, but not always, germination is greatly accelerated by rupturing the seed coat in some way. Traditionally, this has been termed scarification, but this term obscures the fact that the seed coat must be pierced or ruptured to provide a water channel in order to obtain reproducible results. With large seeds, this was accomplished by grasping the seed in pliers and holding it against a grinding wheel until about one square millimeter of white seed was exposed. This grinding should be done on the concave side of the seed to avoid damaging the embryonic radicle. If *Albizia* seed is not pierced, there will be very little germination, even after a year. Some Ranunculaceae use this hard seed coat mechanism, and Cactaceae have been reported to use it. These small seeds present a problem of how to achieve reproducible piercing. This subject and our many experiments with physical pretreatment will be the subject of a future article.

Lobelia cardinalis (Lobeliaceae)
FATAL: Keep seed in dark.
BEST: Keep seed moist in light and over 50% germination will take place in 30-60 days.
PRINCIPLES: Light was absolutely essential, and seed in the dark gave less than 0.1% germination after a year under all other regimes. The exposure to light was accomplished by placing the seed on the top side of a moist paper towel, inserting in a polyethylene bag, and folding so that the polyethylene surface was in contact with the seed and moist towel. The bag was not sealed, but only folded over to inhibit loss of moisture (dark experiments were conducted the same way.) The seeds were placed in a sunny window, where they experienced normal daylight and darkness. The sunlight was filtered through the pane of glass and the polyethylene film, so that the irradiation consisted of visible light. The seed could also be placed under fluorescent lights with a timer to give light and dark periods

comparable to normal day and night. Photo requirements are a complex subject and many experiments are in progress. Suffice to say that our program has found that usually light is an absolute requirement in contrast to the implications of literature which usually phrases the photo effect in terms of germination being favored or not favored by light. A definitive article on this subject is being written.

Berberis thunbergii (Berberidaceae)
FATAL: Sow at 70°.
BEST: Wash and clean the seed and dry store for six months at either 70° or 40°, after which sowing at 40° will give 85-95% germination in the first and second months.
PRINCIPLES: There is something about starting at 70° that is fatal, and this is true of either fresh or dry-stored seed. The seed can be stored in the dried berries, but it is more convenient and cleaner to store washed and cleaned seed.

Nymphaea sp. (Nymphaceae)
FATAL: Good aeration
BEST: Reduce oxygen pressure under water.
PRINCIPLES: The following is based on experiments conducted by Roberta and Fred Case of Saginaw, Michigan. Successful germination was obtained by placing a 1"-2" layer of mud in a glass jar, placing the seeds on the mud, adding 2-3" of water, and closing with a screw cap. Of course, some oxygen is required for the germination metabolism, so that oxygen cannot be completely excluded, but only reduced. It is this reduction that would appear to initiate germination. Chemical explanations can be constructed. Suffice it to say that this behavior can be expected of aquatic plants where the requirement of partially anaerobic conditions insures that the seedling is immersed in water when it germinates.

A Final Caution:
In all of the experiments, seed was placed in moist paper towels in polyethylene bags. This is a great way to germinate small amounts of seed and particularly those with complex germination patterns. However, precautions must be taken to prevent the contents from going anaerobic. The polyethylene bags were never sealed but only folded over. Nevertheless, when large seeds were germinating and when there were too many seeds per towel, anaerobic conditions arose, as shown by dying and rotting of the tips of the developing radicles. This was specifically observed in *Baptisia, Jeffersonia,* and *Paeonia.* Possibly these species have unusually high metabolic rates, but possibly it is just their large size. In any event, the solution is to limit the number of seeds per towel and to open the towels frequently, even daily.

Drawings by Al Stavos

(Norm Deno has pioneered several new techniques for growing challenging rock plants including wet and dry sand beds. He gardens on several acres near State College, Pennsylvania, where in his retirement he is conducting pioneer research on the seed germination requirements of rock garden plants.)

Hepatica acutiloba (p. 23) David Vesall

Hepatica nobilis, mixed colors (p. 24) Baldassare Mineo

Hepatica "Grandiflora" (p. 24) David Vesall

Hepatica acutiloba 'Eco White Giant' (p. 23) David Vesall

Hepatica 'Louise Koehler' (p. 25) David Vesall

Hepatica transsylvanica, semi-double (p. 24) David Vesall

Hepatica nobilis (p. 24) Phil Pearson

Hepatica nobilis 'Millstream Merlin' (p. 24) Baldassare Mineo

Hepatica 'Eco Blue Harlequin' (p. 23) Don Jacobs

Hepatica 'Blue Beauty' (p. 23) Baldassare Mineo

Hepatica 'Crocker's Jewel' (p. 24) Baldassare Mineo

Hepaticas and Anemonellas

by Jeanie Vesall

In late April, the native woodlands of Minnesota are transformed into a delightful garden. Sun-warmed hillsides are alive with wildflowers, providing a wonderful distraction from the still-bare trees. No flowers are more loved than these spring ephemerals. The first hepaticas, bloodroots, anemonellas, and trilliums remind me of childhood days spent exploring and picking mayflowers. Every winter we promise ourselves time to escape to the wild woodlands. Every spring we are chained by guilt to the chores of caring for our collection of rock garden treasures. No idling away in the woods is allowed. Why go anywhere when we have early flowers of our own to admire?

Our first woodland wildflower garden follows the winding course of a stream that winds 100' through undulating berms scattered with granite boulders. Under the shade of Japanese white birches, we tried to create a natural scene by using interwoven drifts of native plants. At first even violets were allowed to merrily reproduce. It was only a short time until we realized that space here was scarce and precious and we transplanted some of the common wildflowers to other garden beds. We especially cherish anemonellas and hepaticas and they now edge the bed along the stream so that we can enjoy them every time we walk by.

On our north-facing hillside under the shade of giant white oaks, we have a native colony of pink *Anemonella thalictroides.* I have transplanted some of these wild anemonellas to the garden and there, in the enriched soil, they quickly form large, dividable clumps with deeper colored, long-lasting flowers. The double forms, 'Schoaf's Double Pink' and 'Cameo', were the first exceptional wildflowers we acquired. I bought them long ago at the Minnesota Landscape Arboretum Plant Sale. They were the most exquisite flowers I had ever seen and the most expensive I had ever bought. They grew for years undisturbed because I was afraid to divide them. Now, I grow and divide them confidently. I absolutely adore them and keep them in the beds along the stream, to be coddled and watched over, diligently fed and mulched. New, small starts of the forms 'Betty Blake' and 'Jade Feather' receive even more reverent care. Their tiny

clusters of tubers are nestled in plastic berry boxes below the soil surface and marked with huge labels as protection against an errant trowel. When I divide the carrot-like clusters, David enjoys tallying a market value. I blissfully dream of growing drifts of these exquisite floral buttons. There will never be enough to carpet our hillside as easily as the singles do.

The two native species of *Hepatica*, *H. acutiloba* and *H. americana,* do not grow on our property. They do occur in the deciduous woods of the river valleys just southeast of the Twin Cities. The first hepaticas we grew were a sampling from this wild population. Nurseries did not have plants for sale and we never knew any named forms or doubles. It is only recently that we discovered some unique hepaticas and our treasure hunt began.

Most of these collectable anemonellas and hepaticas are the beautiful and rare results of Nature's constant experimentation. No doubt, many of these plant misfits have met a cruel fate, fading away before we knew of their existence, eliminated by natural selection. Sterile doubles are especially vulnerable to loss. It is remarkable that even a few of these plants have been preserved. My theory is that these plants develop irresistible cuteness as a survival mechanism to lure gardeners to rescue them from the wilds. Would we pause to rejoice in a patch of wishy-washy pink anemonellas or gray-white hepaticas and be inspired to propagate them? Rarely. Instead, we rush about the woods in search of vivid pinks and blues and suffer eyestrain looking for doubles. Once we have found a prize, we divide it and take it to our garden, there to remind us of the flower-filled woodlands we had forgotten to look up to see and enjoy. Have our gardens lost the charm and innocence we so appreciate in the natural woodlands because of our passionate desire to grow these extraordinary wildflowers?

We may be crazy in collecting as many beautiful forms of these flowers as we can find, but we are not alone. After the 1990 Western Study Weekend, we had the pleasure of meeting one of the speakers, Atsushi Kuyama, when he visited Grand Ridge Nursery. He brought copies of a Japanese gardening magazine, full of color photos. The pictures of orchids made Steve Doonan salivate. Then he turned to the hepatica photos, and we *all* swooned. There were dozens of unbelievable forms and colors. We asked Atsushi the price of these plants, and were told a sum in six digits—dollars, not yen! These are real collector's plants, many simply not for sale. Owners consider their hepaticas heirloom plants and gain status through displaying them at shows. The plants have been collected from the wild over generations.

Found in the deciduous forests of northern Honshu, these plants are of the species *Hepatica nobilis* var. *japonica* forma *magna*. Their extreme variation might be due to genetic flexibility (multiple allelism) or selective breeding over many years. Many seedlings have been grown from these crosses. The genus is highly regarded in Japan and selections are protectively withheld from the rest of the gardening world. Luckily, Steve Doonan has a special talent: he conjures images of the rare plants he desires and miraculously they arrive at the nursery. We must have faith in his magic and await the propagated progeny he may produce in the future.

The keeping of hepaticas is not nearly as honored a pastime in the US and Europe as it is in Japan. This was not always so. Many named color forms and doubles were popular from the early seventeenth to the early twentieth

centuries and are described in horticultural literature. Michael Myers' article on the genus, recently published in the *Bulletin of the Alpine Garden Society*, is a thorough review of hepatica taxonomy, cultivation, and history, including descriptions of named forms that tease growers like us. Some that have survived the years are now difficult or impossible to find; others are gone forever. In this article, I have tried to gather information on the forms available to US growers. The list is short. Plagued by slow propagation, few nurseries have enough time or perseverance to develop sufficient stock for sale. Seedlings must grow at least three years before they are sturdy enough for transplanting. Named or sterile forms must be reproduced solely through division. And for the present, tissue culture is ineffective. Species of Ranunculaceae produce toxins in the growth medium and cell division never occurs. Yet, beautiful and elusive, the hepaticas continue to lure collectors in search of treasure.

We purchased our first named hepaticas from Don Jacobs of Eco-Gardens, near Decatur, Georgia. He works with many forms and variations of native wildflowers. The Cumberland Plateau in Northwestern Georgia was the source for his own hepatica selections. He describes the area as one of sandstone ridges cut through to reveal limestone valleys. *Hepatica acutiloba* (p. 17) is common on the damp hillsides over this rocky substrate, and Don offers three forms of this species. *Hepatica* 'Eco Regal Blue' has large, rich blue flowers and is the best blue of this species that he has found to date. Our plant grows vigorously and divides easily. It is temporarily out of stock at Eco-Gardens. We really like *H.* 'Eco White Giant' (p. 18). Loads of clean white flowers up to 1 3/4" across are followed by a 10" tall clump of foliage. The leaves are distinguished by their extra lobing. It sometimes comes true from seed. Even two-year-old, nursery-grown seedlings show the extra leaf lobes. Don has plants available for sale. Under propagation and not yet available is *H.* 'Eco White Fluff', a shaggy double with larger leaves and flowers than the type species. The flowers are not tight pompons, but Don thinks it is respectable. It may be sterile.

The other American species, *Hepatica americana*, grows in the acid duff of dry oak and hickory woodlands. Don has selected three forms. A favorite of ours, *H.* 'Eco Blue Harlequin' should be grown for its fancy foliage (p. 19). The blue flowers contrast with the small cluster of marbled, silver-and-dark-green leaves. Since the flowers of most hepaticas are short-lived, Don tries to chose plants with exceptional or unique foliage to lengthen their season. The plants he sells are nursery-raised, quality seedlings that have good foliage characteristics. Our plant has grown slowly and is small enough to live with ferns in a humus-filled, granite crevice bed. The mottled foliage of *H.* 'Eco Indigo' is not as patterned as that of 'Eco Blue Harlequin', but it has the darkest blue flowers of all his hepaticas. Both are available. *Hepatica* 'Eco Tetra Blue' was originally chosen for its big, deep blue flowers, half again the size of the typical species flowers. The large, thick leaves have little or no patterning. Don thinks that this may be a tetraploid form. He is increasing his stock for future sales. Finally, Don is working to improve the pink flower color in his stock *H. americana.*

Siskiyou Rare Plant Nursery recently offered two selections of *Hepatica nobilis*, 'Blue Beauty' (p. 20) and an unnamed, pink-flowered form. They are from the original nursery stock of Lawrence Crocker and Boyd Kline. *Hepatica* 'Blue Beauty' has midnight-

blue flowers with long, yellow stamens, followed by a dwarf mound of shiny foliage. The leaves might be mottled. This nursery's pink-flowered *H. nobilis* has been selected for its deep color.

A stock plant of *Hepatica* x *media* 'Ballardii' has been at Siskikyou for almost 25 years. *Hepatica* x *media* is a sterile, naturally occurring hybrid between *H. nobilis* and *H. transsilvanica*. 'Ballardii' is an old, much admired hybrid from a pairing of two select forms of the parent types. The large flowers are iridescent lavender-blue. The foliage is shaped like that of *H. transsilvanica* but is smooth and leathery as in *H. nobilis*. Even with careful divisions made over the years, the nursery has only about a dozen plants.

Several years ago, Siskiyou acquired a plant of *H.* 'Millstream Merlin' from Linc Foster (p. 19). This plant is thought to be a cross between *H. transsilvanica* and *H. americana* and in 1989 it received an Award of Merit in Britain. It has performed slightly better than 'Ballardii' at the nursery—they have about two dozen plants. Its small, intense purple-blue flowers and tendency to rebloom make it exceptional. For now, collectors will have to wait out the horribly slow multiplication process or resort to begging.

Siskiyou would like to acquire good, dark pink hepaticas whose flowers hold the darker color as the blooms age. They are working with hepaticas that Crocker had labeled red. If a selection shows promise, it may be introduced as *H.* 'Crocker's Jewel' (p. 20).

Grand Ridge Nursery has maintained two hepaticas from the late Bob Putnam's nursery. They have a semi-double *H. transsilvanica* with rich blue flowers. It is most likely a tetraploid, as expressed by the large flowers and leaves. Our plant has grown for several seasons in the garden and we were surprised to find numerous healthy seedlings underneath the foliage. The second selection is a single-flowered red form of *H. nobilis*. The flowers on our plant are not a true red, but rather a deep, rosy pink. Fresh green seed has produced several generations of seedlings. Steve has one other special hepatica, a double pink from the garden of the late Jane Platt. It was not healthy when he acquired it, but he hopes to restore it to good health.

Like all inveterate plant collectors, we embrace the mail order catalogs that arrive all winter. We search every page for something wonderful. In 1988, we found a special jewel. A simple entry, "*Hepatica Grandiflora*, full double pink," attracted our attention (p. 18). We ordered one. I tenderly planted it in a protected, rock-edged bed and looked after its every need until winter arrived. It emerged in the warmth of a late April day. I saw it first through our kitchen window but couldn't imagine what was blooming. My heart skipped a beat as I dropped to my knees to stare at the opening flowers. Crystalline stems held the precious, ruffled buttons of velvety rose pink. The radiant color and intricacy of this tiny blooming plant overwhelmed the garden. Extraordinary beauty like this could only have come from the Garden of Eden. Surely Russell Graham, Purveyor of Plants, must have connections in heaven! But the actual history of this plant is not quite so divine. For several years Russell and Yvonne Graham did some shipping of their plants overseas. Russell said he received the hepatica as a trade from a customer in Denmark. They have grown it at their nursery for about nine years. It expands at a rate of two crowns in three years and they now are trying to replenish their supply after it was offered in 1988. Our plant has only one fat crown so far and it stubbornly

peers at us through a chicken wire cage we use to protect it from mice and other garden varmints. The name 'Grandiflora' came from the fellow in Denmark, but they have not been able to confirm it. The Myers' article mentions a double pink, 'Rubra Plena' that sounds similar. Anyway, it would be absurd for any of us to presume to name such a plant, not of this earth. We send the Grahams good luck as guardians of this gem.

Last spring our search for unique hepaticas led us to a surprising place, Ambergate Gardens, owned by two members of the Minnesota Chapter of ARGS. Mike and Jean Heger offer perennials for sun and shade and are responsible for introducing many Minnesotans to perennial border gardening. In their 1990 spring catalog, right before the long list of hostas, was *Hepatica acutiloba* 'Louise', a double-flowered cultivar. Where in the world had this been hiding? I secured four plants with a quick phone call.

The story of this hepatica is linked to a famous lady in the history of wildflower gardening. Louise Koehler is best remembered for being the generous Minnesota gardener who grew and shared with the nursery trade Oscar Schoaf's discovery, *Anemonella thalictroides* 'Schoaf's Double Pink'. I have been unable to track down the exact details of her hepatica, but it is just now being distributed. Merv Eisel, a horticulturist with the Minnesota Landscape Arboretum, has been growing and propagating it for quite a few years. Merv first offered it at the Arboretum Plant Sale. The flowers open with an outer ruffle of bright pink and a center rosette of pale green. It remains in flower for a longer period of time than single hepaticas and then fades to a pale blue. Growth is fairly vigorous. To commemorate its discoverer, Merv intends to register it as *H. acutiloba* 'Louise Koehler' (p. 18). As of the 1966 ARGS Bulletin, Linc Foster knew of no fully double forms of the American hepaticas. It would be interesting to find out if other specimens exist.

It takes time, money, and maybe a little finagling to acquire a collection of hepaticas. We grow the more typical forms without too much worry about methods. The special varieties may need no extra care, but we refuse to gamble. The supply of plants in the trade or in gardens will never be large enough to insure absolute protection from loss. As a result, owners of the plants should take great care to preserve even a single specimen. The nursery growers provided the following information on cultivation and propagation.

Each of the species in the wild grows in humus-rich soils with some drainage. Hillsides or well-drained acid duff soils are the preferred habitat. Spring run-off benefits early flowering, but the soils of the native woodlands do not become soggy in summer or winter. Some species tend to be associated with a particular soil pH. Where their ranges overlap, hybrids develop, suggesting that pH might not be a critical factor. This is also true in gardens, provided their other needs are met.

Don Jacobs gardens in Decatur, Georgia, where winter temperatures rarely go below 10° F. and there is no deep frost. He grows hepaticas in beds in the ground and combines the native sandy, acid soil with rich humus. At planting time, he incorporates some dolomitic limestone into the soil and scatters a bit of 8-8-8 granular fertilizer around the plants, under the leaf mulch. He uses the limestone because heavy rains quickly leach it out of the soil. Plants are protected in winter with a mulch of leaves. Don takes divisions after flowering. Breeding colonies are spaced 20'-30' apart to prevent different color forms from cross-pollinating.

Pure colonies and line breeding tend to produce more seedlings of the parent type. At Siskiyou, the hepaticas are kept in flats of loam mixed with oak leaf-mold. This method facilitates propagation. Russell Graham grows hepaticas in beds of humus-enriched soil under the shade of pruned fir trees. A total of 45" of rain comes to Salem, Oregon in the winter and this nursery irrigates throughout the summer. The hepaticas bloom in February and Russell waits to divide them until fall.

Pot culture of hepaticas can lead to failure, but Steve Doonan intends to become an expert. His stock of hepaticas are raised in plastic pots with a narrow saw cut on the bottom to improve the drainage. They are arranged on the ground on top of a weed-barrier cloth, in shade. They are mulched with sawdust around the pots. To compensate for heavy rainfall (between 120" and 200" a year), Steve is trying different soil mixtures. A mix of cinders, coarse Wenatchee pumice, and some humus has helped revive the double pink hepatica from Jane Platt.

Fresh seeds are planted one per pot and covered with 3/8" of coarse sand or gravel. Divisions are made when growth starts. Seedlings and divisions are repotted and kept in partial shade with the soil moist, but not wet. Steve also places a small rock on each side of the crown to protect the roots as the divisions recover. It is essential that each division have more than one bud to minimize stress to the plant. Grand Ridge will not sell hepaticas until well-established. *Hepatica transsilvanica* has budded rhizomes that run along the surface. Root cuttings may work for this species. Steve has propagated it by removing a side-bud in midsummer without disturbing the mother plant. The bud rooted after it was set like a cutting in a pot of loose peat and grit and kept in the fog house.

Steve warns gardeners to watch for hepaticas that develop a fungal disease of the leaves. It appears almost like black leaf-spot and can very easily destroy an entire collection of hepaticas. Treatment consists of picking off the worst leaves and regular drenching with a fungicide such as benomyl or Bravo. It is a good idea to isolate new or suspect plants. Merle Kratoska, a Minnesota ARGS member and expert wildflower grower, found that after spraying, a mulch of fine, milled sphagnum moss around the hepaticas seemed to invigorate them. She thought the sterility of the moss might keep the fungus from spreading back to the plant from the soil.

Fred Case raises large colonies of *H. acutiloba* and *H. americana* in the old pasture soil of a beech and oak woodland. He doesn't grow cultivars of the European strains to avoid introducing fungal disease—*Hepatica nobilis* seems to be particularly prone to it. Special color forms of hepaticas are kept in open "corrals," from which exceptional seedlings can be easily retrieved.

The plants in our garden grow in acid, sandy loam with additions of oak leaf-mold and small, granite grit. Bonemeal at planting and liquid feeding throughout the summer have improved flowering. In autumn, fertile plants sprout seedlings around their feet. These tiny plants spend the following summer as burgundy-backed cotyledons. I have divided plants with several crowns in early September. When replanting, it is essential that the buds be at surface level to prevent rotting. The seedlings are mulched with oak leaves for winter protection. Still, they are deadly slow to increase and impatience seems to stop their growth completely.

Just as all living things, wild hepaticas adapt to the constant changes in

their environment. Beautiful variations in form and color occur often enough that gardeners will continue to search the woods for plants to add to their collections. Recently we have all been more aware of the potential for loss of native wildflowers through commercial digging. Because they are slow to propagate, hillsides of wild hepaticas present an incredible temptation. Skilled gardeners are in a position to enter this cycle and to stop the potential loss. Through responsible collection and cultivation of a cross section of all the natural variations, the botanical history of hepaticas can be preserved. I do not advocate unlawful nor indiscriminate collecting. Our fondness of plants does not justify this behavior any more than a nursery's profit motive or habitat destruction through building would. Take only divisions of special forms and leave the remainder of the plant in the woods. Here it can serve as raw material for nature's experimentation and as a resource, should the division fail. In the garden, realize the scarcity and value of the unusual forms and make it your goal to propagate and share.

Hepaticas are miniature specimens for a miniature landscape. We appreciate each plant individually. When I caught myself daydreaming about hundreds planted along the stream, I knew we had spent too many spring days trapped in our garden. Two dear friends liberated us last spring and we all spent the day like kids in a secret woods. The hillsides were decorated with millions of blossoms of *Trillium nivale* and pastel bouquets of *Hepatica acutiloba*. Hiking up and down the slopes, we called each other to come see every plant more wonderful than the next. We shared the simple, childlike excitement and love of wildflowers and promised to visit this woods again. Observing Nature's perfect garden, we returned to our own with a new perspective. We must not let our overwhelming desire to possess rare and wonderful forms of these plants interfere with the renewal and inspiration we gain from the natural woods carpeted with the most plainly simple forms of these lovely spring wildflowers.

References

Foster, H. Lincoln. 1966. "Hepaticas." *Bulletin of the American Rock Garden Society* Vol. 24(1):9-12.

Foster, H. Lincoln. 1966. "The Double Pink Rue Anemone." *Bulletin of the American Rock Garden Society* Vol. 24(3):90-92.

Myers, Michael D. "A Review of the Genus *Hepatica*." *Bulletin of the Alpine Garden Society* Vol. 58(2):144-156. 1990.

Nurseries

Ambergate Gardens. 8015 Krey Ave., Waconia, MN 55387. Owners: Mike and Jean Heger. Catalog $1.00.

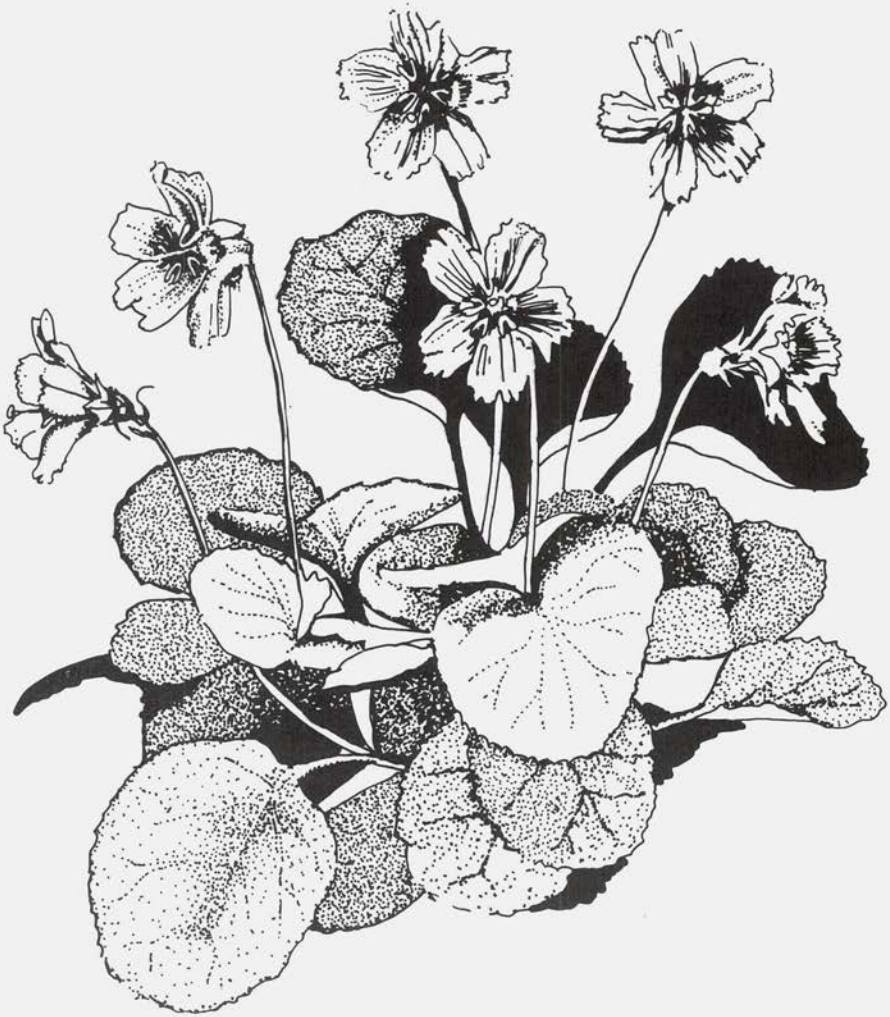
Eco Gardens. P.O. Box 1227, Decatur, GA. 30031. Owner: Don Jacobs. Plant list $1.

Russell Graham-Purveyor of Plants. 4030 Eagle Crest Rd. N.W., Salem, OR. 97304. Owners: Russell and Yvonne Graham. Catalog $2.00.

Grand Ridge Nursery. 27801 SE Highpoint Way, Issaquah, WA 98027. Owners: Steve Doonan and Phil Pearson. No mail order.

Siskiyou Rare Plant Nursery. 2825 Cummings Rd., Medford, OR 97501. Owner: Baldassare Mineo. Catalog $2.00.

(Jeanie Vesall lives and gardens in White Bear Lake, Minnesota, where a large collection of rare plants are artistically integrated among rocks, stream and woods.)



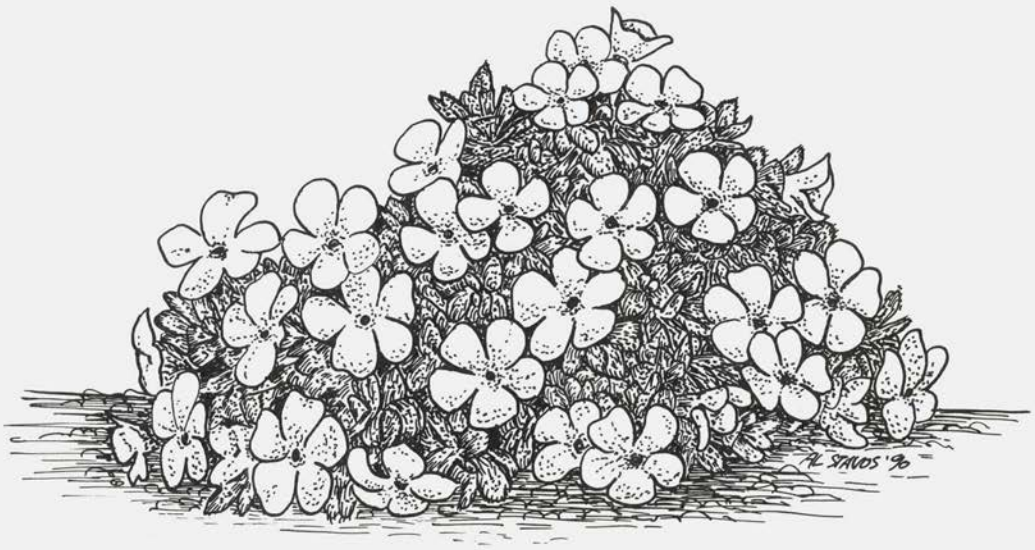
Preparing A Plant for the Farrer Medal

by Jack Elliott

When you visit the Show at the International Conference at Warwick in April, or any of the major Alpine Garden Society Shows, look out for the plant that won the Farrer Medal for Best in Show. Spare a thought for the triumphant exhibitor, for the judges who made the award, often with great difficulty, and for all the other exhibitors who thought that their plants were better than the winner's. The choice is sometimes obvious, but frequently it baffles the inexperienced observer and occasionally even the *cognoscenti*.

I hope here to give a little insight into the work involved in producing a top class plant for exhibition, and the Best of Genus, Best of Section, and Best of Show awards. If after reading this you still do not understand why a particular plant achieved a high award, you can be comforted by the thought that judging is an inexact science (or art?).

What sort of plant wins the coveted Farrer Medal? Anything from an 18-month-old seedling of *Castilleja* (with screams of horror from 90% of the exhibitors!) to a 30-year-old *Daphne petraea* 'Grandiflora', its leaves hidden completely beneath a thousand flowers. By definition the plant must be in flower; it will usually have an exceptional number of flowers on a plant of exceptional size for that particular species; and it will often be uncommon or difficult to grow, or both. "I have never seen that plant looking better," should be the reaction. Although flower-power on the one hand and rarity and difficulty on the other are major factors, first and foremost the plant must be in perfect health and condition. Quite frequently plants appear drawn, taller, and more lax than the judges expect, often the result of "pushing" with extra heat or even artificial light, in order to get the plant in flower on the day of the Show. Holding a plant back with too much shade can have a similar effect. These methods are perfectly legitimate and often successful, but disastrous if they affect the plant's appearance at the crucial moment. Judges are often accused of "nit-picking," but remember that a few aphids lurking beneath a leaf, a couple of dead leaves, or some faded flowers may be just what they are looking for in a close competition to make their decision easier. How can



Androsace vandellii

they choose between a well-flowered rarity and a stupendously-flowered common plant, a 6" cushion of *Dionysia microphylla* covered in flowers, and a 12" wide carpet of *Gentiana acaulis* with every trumpet touching its neighbor and every one in perfect condition?

Dionysias have won many medals during the last three or four years, grown by one or two exhibitors to a peak of perfection almost unbelievable to the majority of growers. Now it is sometimes said that the fashion has swung away from them, but I suspect that the truth is that the original plants, grown from collected seed or from cuttings taken soon after their introduction, have died of old age and that in a year or two we will be seeing their progeny grown to similar perfection and winning medals again. High alpine cushion plants like dionysias and androsaces are ideal Farrer Medal plants because the public and growers alike look upon them as "proper alpines."

A study of past winners will soon convince you that almost any flowering alpine can win. Bulbous plants, other than the ever-popular terrestrial orchids, trilliums and cyclamen, rarely win the Farrer Medal, but there is no reason why they should not. I suspect that exhibitors usually have insufficient stock of the less common species to produce a spectacular pan, and judges tend to think that they are easier to grow than high alpine cushion plants. "They might only have been planted yesterday! (or last fall!)" is the comment. The wise exhibitor will make sure that among the flowering-size bulbs are a sprinkling of babies, so that any bulb-loving judge will be impressed with the natural increase. Plants lifted from the open ground are of course eligible, and one remembers in the past remarkable ericaceous plants, gentians, and Petiolaris primulas, especially from Scottish exhibitors, who grow them so much better than those of us in the South. One of the problems, apart from the fear of killing the plant, is that

a lot more work is needed to give garden grown plants that perfect finish. Dead or half-eaten leaves, or caterpillars, slugs, and snails emerging into the Show Hall are definitely frowned upon.

How does the exhibitor produce this perfect plant? It may have started as a packet of seed from a collecting expedition or from our seed lists, as a cutting or a seedling from a friend, or as a nurseryman's plant. It is grown, repotted regularly, kept free from pests, and generally cosseted for years and years until it becomes large enough to be a potential winner. At that stage, extra care and—dare one say it?—a lot of luck are required. The dedicated exhibitor turns his pots regularly in the alpine house so that they flower evenly, and as the great day approaches, he is forever putting them into the sun or into the shade to bring the flowers out or hold them back. Cold, sunny days at the crucial time are a great help in making it easier to keep plants cool outside or hot in a greenhouse, as appropriate. If all goes well and the plants are actually going to flower on the right day, the pots, usually clay, must be scrubbed clean, the surface dressing of grit, flat stones or beech leaves, as appropriate, renewed or tidied, and every dead leaf or fading flower removed with tweezers. Presentation is of the utmost, some would say excessive, importance. Plants then have to be packed very carefully for transport to the Show, unless you want to add to all those lurid tales of sure Farrer Medal winners that finished upside-down on the floor of the car after an emergency stop. Oh, yes—it *has* happened.

The exhibitor will have sent in entries a week beforehand for all the classes for which he might have suitable plants, and last minute juggling of entries between the various classes, six-pan, three-pan, or one-pan, is normal practice. The long-suffering Show Secretary is quite accustomed to late entries—you forgot that marvelous *Ramonda* under the staging—and to the tearing up of the entry cards of all the plants that have collapsed from over-forcing, been torn to bits by blackbirds—the ultimate disaster for cushion plants—or failed to fulfill their promise of the previous week when the exhibitor was in a state of optimistic euphoria.

What sort of person wins all the prizes? The typical successful exhibitor, male or female—there's not much to choose between them—has a small garden composed entirely of a large alpine house and lots of frames, a large potting shed, and a microscopic lawn that used to be big enough for the children to play on, but now has been promoted to higher things (more frames). If there is a flower garden or vegetable garden, it is rapidly diminishing in size and is looked after by a long-suffering and probably non-gardening spouse. Occasionally both spouses garden, with one exhibiting and one doing "proper" gardening. They may even give each other an occasional plant for Christmas. Holidays are spent in the mountains but are very short—who will do the watering? Exhibitors seem to be getting younger, a very encouraging trend, but they still keep going for a very long time. Although they sometimes ease up in their sixties—this means a larger garden and a smaller alpine house—we have had many passionate exhibitors in their eighties!

Now that all the meticulously prepared plants are on the staging with their discreet entry cards face down in front of them, what happens next? The local Show Secretary, possibly even with the Director of Shows breathing down his or her neck, will have had a look round for obvious errors in staging and will have tried to get the exhibitors

to correct them before judging. Exhibitors do not read schedules carefully and are quite capable of putting two species of one genus in a class for three plants of distinct genera, or of putting a saxifrage in a class for Primulaceae. The judges naturally are on the look out for such errors—it makes their lives easier if they can disqualify a few entries from a well-contested class.

Punctually at the appropriate hour, exhibitors are dragged away from their last minute titivating and the judges appear. They are arranged by the Director of Shows into three or four panels, each of three, sometimes with a trainee in tow, the senior judges normally taking the senior classes. After judging all the individual classes in their threesomes, the judges join together to pick out all the plants that they consider might be possible candidates for the Farrer Medal and for any other Best of Section or Best of Genus award. All the possible plants for each award are put together and a series of votes taken to eliminate them until only two remain, the winner then being decided by a majority vote. This method has evolved over the years and works as well as any, but at occasional Shows there have been three or four plants of nearly equal merit, with the judges deeply divided in their opinions. The final decision may then depend on the casting vote of the poor Director of Shows—an unenviable task. Fortunately most exhibitors have a sense of humor and they can fall back on the thought, "You win some, you lose some, and there is always another Show next week or next year."

Judges have a difficult task. They are always chosen from the ranks of experienced exhibitors, and many of them are still actively exhibiting; these would judge classes or sections in which they had no interest. Each panel of three has 20 or 30 classes to judge, of which many present no problems, but others can take 10 or 15 minutes of argument and discussion, especially in classes for three or six plants with several entries of, at first sight, equal merit. There is a points system whereby each individual plant in a group can be marked separately, which is occasionally used in the most difficult situations, but generally two of the three judges can eventually come to an agreement and pass reasonably happily to their next problem class. Now you know why they are not in pairs!

After the judging is over and the entry cards have been turned face upwards with their small first, second, and third prize stickers attached (no red ribbons!), exhibitors and judges alike can crowd around and see who has won what, and for the rest of the Show can enjoy the great game of finding fault with the decisions, silently or vociferously according to taste. It is a very easy game which anyone can play—much easier than growing or judging. Come to Warwick and try it!

(See photos, page 64.)

Drawings by Nick Klise, Al Stavos

(Jack Elliott has judged and staged his share of Farrer Medals. Past president of both the Alpine Garden Society and Hardy Plant Society of England, his garden is considered one of Britain's best. He exhibited plants for 30 years and now devotes his enthusiasm to a large rock garden, perennials, and shrubs.)

Stonecrop in the Nineties

by Frank Cabot

The Stonecrop garden in Cold Spring, New York, was begun in 1959 and has developed over the intervening years into what is now a series of gardens, home to a wide range of plants that survive on a hilly, wind-swept site in the Hudson Highlands. It enjoys a Zone 5 climate with reasonable snow cover in winter and endures what seems like a Zone 7 climate in summer, replete with the intense summer humidity of the Middle Atlantic States and the Hudson Valley in particular.

Stonecrop is destined to become a public garden, a series of display gardens illustrating the range of plants that can be grown here, demonstrating how such plants may be grown and combined for aesthetic effect, and illustrating the elements involved in garden design. Alpines were the original focus of the garden and its *raison d'etre*. Stonecrop was a small mail-order nursery from 1959-1964 and 1978-1983 (under the aegis, respectively, of Rex Murfitt and Sara Faust)

We started with an interest in alpines thanks to Hallie Long, who had led us to them when we lived for several years in Walpole, Massachusetts, as young marrieds. The plants moved in due course to my in-laws' garden in Cold Spring, where involvement in the ARGS and the closing of Walter Kolaga's Mayfair Nursery gave us the idea of starting a nursery. Stonecrop Nursery has functioned on and off in a very modest way to the present.

The major development of the garden began in the late 1970s and is just winding down. Somewhere in between we decided that the time and effort being consumed by the project could only be justified if the garden were to become a public garden, and for some years have been planning to that end.

As must be the case with many alpine enthusiasts, our initial garden beds soon turned into a collection of plants, jumbled together with the overall effect being that of a cemetery of labels. I don't know how one can escape this phase of a gardener's development, since there doesn't seem to be any better way to get to know plants and their idiosyncrasies. After ten years of this approach the creation of a garden, rather than a plant collection, became paramount, and the available

space began to fill with geometric raised stone beds and increasingly larger rocks.

As we all know, the trouble with alpine beds is that few plants are permanent. Every few years one is faced with the need for rejuvenation; at least that has been our experience at Stonecrop. Raised beds, supported by dry stone walls, were our first project at Stonecrop. Here, rejuvenation has not been necessary as frequently. Still, it is a discouraging matter to watch the senility and demise of a large, cushiony bun that for at least ten years proclaimed how particularly happy it was in the middle of the wall. One's alternatives are to tear down, rebuild, and replant the bed, or to let a nearby campanula take over. It is little wonder that in time the raised beds become a home for the fittest, rather than the choicest.

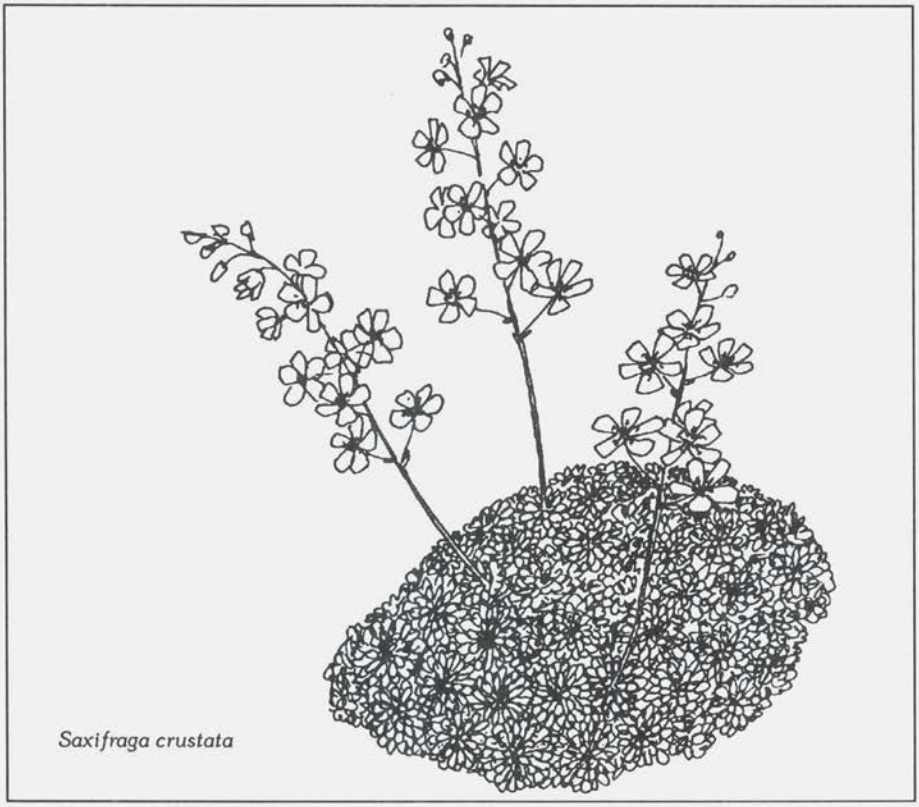
In the spring of 1990, we "grasped the nettle" and rebuilt and replanted the wall behind the two principal raised beds. However, once this wall was rebuilt, the other side of the bed looked sufficiently depressing that we elected to remove a weeping cherry and several mature Douglas firs, whose roots were competing with the miscellany of plants, and to start all over again. At the moment, it looks like Verdun in 1918. With luck, it may be neat and empty by May. In any event, the change is dramatic, and the new bed should provide a far more suitable home for alpines. The removal of trees does open up the view to a promising white oak that is gaining stature as the years go by. It will also benefit a newly planted bed of gray-leaved plants that borders the path skirting its north flank.

For many years a colorful mosaic of kabschia saxifrages flourished on the surface of a tufa bed incorporated into one of the raised stone beds. However, the recent seasons with their milder winters and wetter summers were just too much for most of the kabschia varieties, and we have reverted to a more conventional planting. Interestingly, the saxifrages on vertical surfaces facing north or east have flourished, especially *Saxifraga crustata*, as well as an encrusted saxifrage collected from the Tre Croci in the Dolomites. These have been spread along the sides of the tufa bed and may enjoy a better longevity than their Porophyllum cousins. In time one stops fighting the inevitable.

A stream garden that was in mint condition in 1983 is now forlorn and badly in need of rehabilitation. The stream meanders across a wide shelf of rock leading to a ledge and falls some 15 feet, in a series of tumbling waterfalls, to a lake. The rock ledge contains many pockets for alpines that enjoy a western exposure and is gradually filling up with plants that soften the masses of rock.

A wisteria pavilion at the southern end of the lake stands poised over more rock ledges leading down to a rocky pool. The construction in this area was almost finished in 1990, with leaky pipe installed on the slope leading from the pavilion to the pool below. Here we plan to establish drifts of primula and other plants that may enjoy the moist setting.

The lower pool serves both as a sump for the recirculating water system and as a swimming hole. The recirculating system moves water through a 6" pipe from the sump pool and reinjects it at various points in the stream garden and the rock ledge. Fine tuning is still going on. The lake was built on fill from the redoing of the nearby county road, and we have been fighting leaks for several years—a not-too-surprising consequence of trying to build on rocky fill. Planting of the lake and pool surrounds has started and includes a copse of *Metasequoia glypto-*



Saxifraga crustata

stroboides and the beginnings of a bamboo grove newly planted with *Phyllostachys aureosulcata, P. nuda,* and *P. bissetii.*

The non-alpine sections of the garden have been, until recently, the primary beneficiaries of the horticultural expertise brought to Stonecrop by Caroline Burgess, who trained at the Royal Botanic Gardens at Kew, apprenticed at Barnsley House with Rosemary Verey, and worked with Valerie Finnis in her Dower House Garden at Boughton. An upgrading of the garden has been underway since 1986 under Caroline's direction, starting from the perennial borders and the enclosed flower garden around the house and extending through the woodland and water gardens to the alpine plantings.

The framework and setting of the gardens around the house has been altered, taking what advantage there was to be found in the existing layout, to create a suitable architectural background. This was achieved primarily through the creation of vistas, the building of walls and elements that separate the various components of the garden, and the inclusion of features such as garden seats and structures that serve as focal points. With the new architectural framework established, vines and espaliered shrubs were added to clothe the new walls, and the perennial borders were widened to a double allée 20' wide with a 30" path down its center. The perennial plantings are interspersed with a wide variety of unusual annuals, biennials, bulbs, roses, shrubs, and half-hardy plants not generally seen in gardens in North America.

The effect is of informal plantings within a formal framework.

Within the newly wall-enclosed garden is a series of square, rectangular and triangular beds. The plantings are arranged with a color theme for each bed, and at one point the full color spectrum is displayed around a circular path. A post-and-beam outdoor plant room with panelled walls and circular, fretted Chinese windows serves as an exit to the walled garden. This room is filled in summer with potted half-hardy and tender treasures, including a species *Pelargonium* collection. The plantings in both these areas come into their own in late June and early July and provide a succession of bloom well into October. The plantings Caroline has created here are unique and spectacular.

Emerging from the plant room, one enters a service area of the garden between the pit house and the greenhouse. The framing of the pit house was redone in the mid-80s, adding, at each end, enclosed beds for bulbs that require a dry summer and deep, narrow cold frames along the sides. Last autumn, the circular well tiles that had served as raised beds for alpines for many years were removed. In their stead, two experimental, covered, raised alpine display frames were built—in effect, giant troughs that are covered in winter. These will be ready for planting in April 1991.

A woodland garden has been developed along the entrance road to the property through which one now walks from what will be the public garden parking lot. There is a high canopy of shade with an understory of small trees and shrubs and Appalachian and Asian wildflowers intermingled with groundcovers and lilies. Making this garden has been quite a chore due to the rocky nature of the wooded hilltop site. To have a successful planting, we found it necessary to scrape the rocky surface and add 8" of bank run (sand and gravel mixed as it is dug from the bank) and to top this with an additional 4" of humus mixed with sand. This combination, dressed with a thick, shredded bark mulch, seems to do the trick.

Now that the rest of the garden is more or less under control and rehabilitated, more attention will be given to rebuilding the collection of alpines, both under glass and in the different sites in the garden. There should be sufficient areas planted with alpines to justify a full-time curator devoted to this aspect of the garden once it becomes a public institution.

Stonecrop is, of course, no stranger to horticultural setbacks and every year endures the tragic loss of a beloved plant. One year it was the 14"-diameter *Bolax glebaria* that we expected might outlive Methuselah. This year, after the mild 1989-1990 winter, the splendid *Dicentra peregrina* var. *pusilla*, a seedling gift from Ev Whittemore, that had flourished and bloomed happily for six years under a studied program of benign neglect (tucked in under an east-facing rock on top of one of the raised stone beds), chose to bid us a sad farewell. Such is a rock gardener's lot and there is no choice but to start again and hope that with luck the shelf of *Globularia cordifolia* will escape winter kill this year and that the *Paraquilegia grandiflora* raised from Chinese seed will have the good sense to wait until May 11, 1991 to open its first blossoms.

Drawing by Panayoti Kelaidis

(Frank Cabot gardens in Canada as well as in Cold Spring. Stonecrop will be featured at the Kaleidoscope of Gardens, this year's annual meeting. Frank has served as Treasurer of ARGS and has been very active in ARGS affairs. He is a leading spirit of the Garden Conservancy.)

Stonecrop, raised dry stone wall (p. 33) F. Cabot

Stonecrop (pp. 33, 34) F. Cabot

Epimedium 'White Queen' (p. 6)

Photos by Lauren Springer

Epimedium rubrum (p. 6)

Epimedium 'Rose Queen' (p. 6) Don Jacobs

Epimedium grandiflorum (p. 6) Lauren Springer

The Epstein Garden in spring, view from the west lawn. (p. 3-10)

View to the terrace

Photos by Harold Epstein

The Epstein Garden in autumn foliage, view from the west lawn. (p. 3-10)

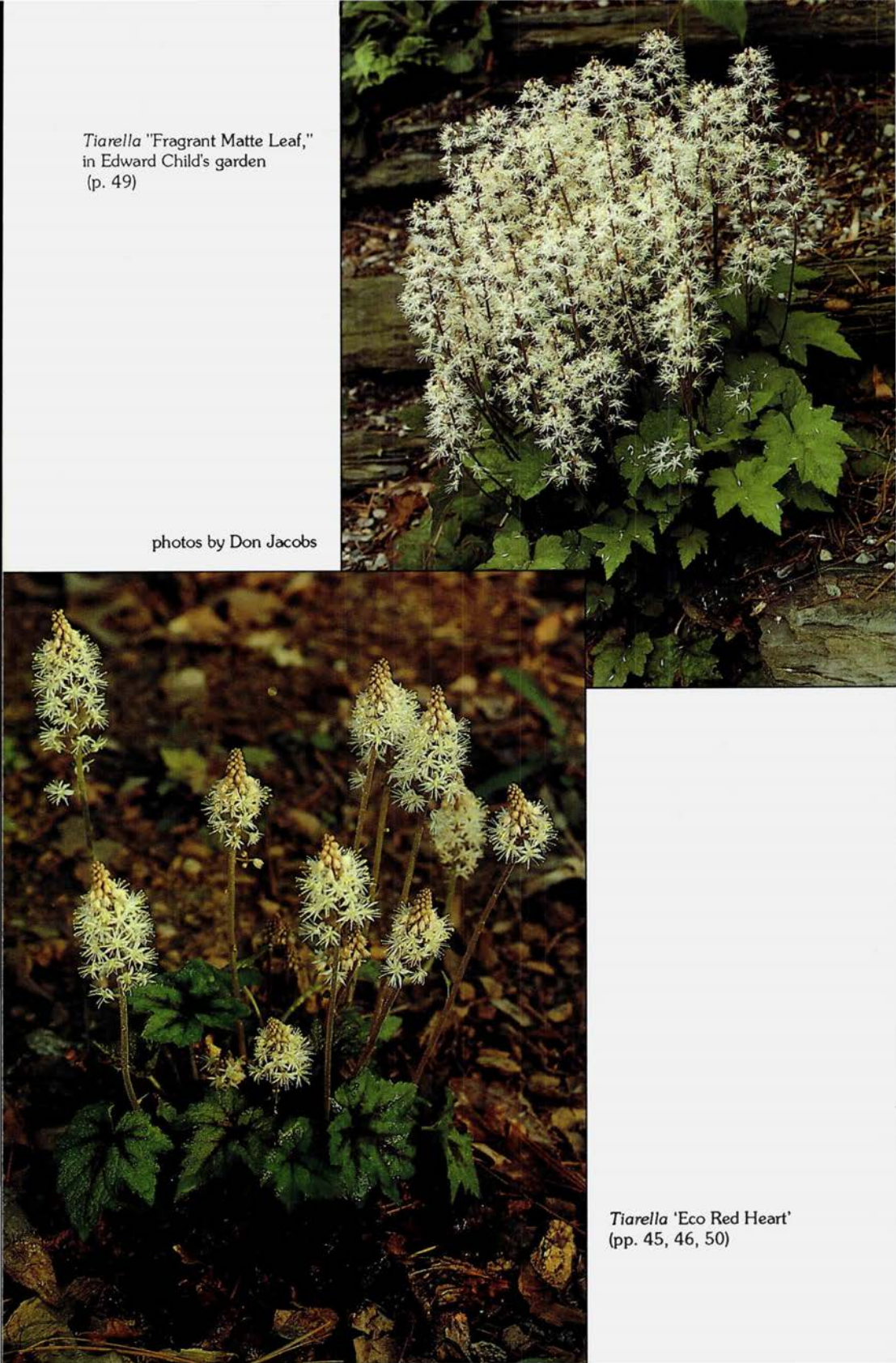
Double pink anemonella, Epstein Garden (pp. 3-10, p. 21)

Tiarella "Fragrant Matte Leaf" with *Phlox divaricata* (p. 49) Lauren Springer

Tiarella cordifolia (p. 43) Dick Redfield

Tiarella "Fragrant Matte Leaf," in Edward Child's garden (p. 49)

photos by Don Jacobs



Tiarella 'Eco Red Heart' (pp. 45, 46, 50)

The Puzzle of the Eastern Foamflowers

by Don Jacobs

Life in our modern world has become so complex that it should not be surprising that we all yearn for simple answers to every problem. Actually, few questions concerning plants or animals can be answered "yes" or "no" without equivocation. Furthermore, yesterday's "yes" often becomes today's "maybe" and tomorrow's "probably not." Our analysis of a problem is always conditioned by the limit of our experience. It is depressing to reflect on the facility with which I once could solve problems that now seem almost unresolvable. Of course, we can keep things simpler by emulating the cattle rancher visiting a zoo for the first time. He stood in front of a giraffe and said, "Don't that beat all? But there ain't no such animal!"

"Be difficult to convince, but willing to listen," I have often suggested to my students. In practicing this myself, I have often been accused of using the "third degree" to obtain all the data I want to make a decision. Despite such precautions, despite being slow to be persuaded, the world of nature is constantly dropping surprises on us. A good example is my long-time effort to analyze our Eastern American foamflowers, the genus *Tiarella*.

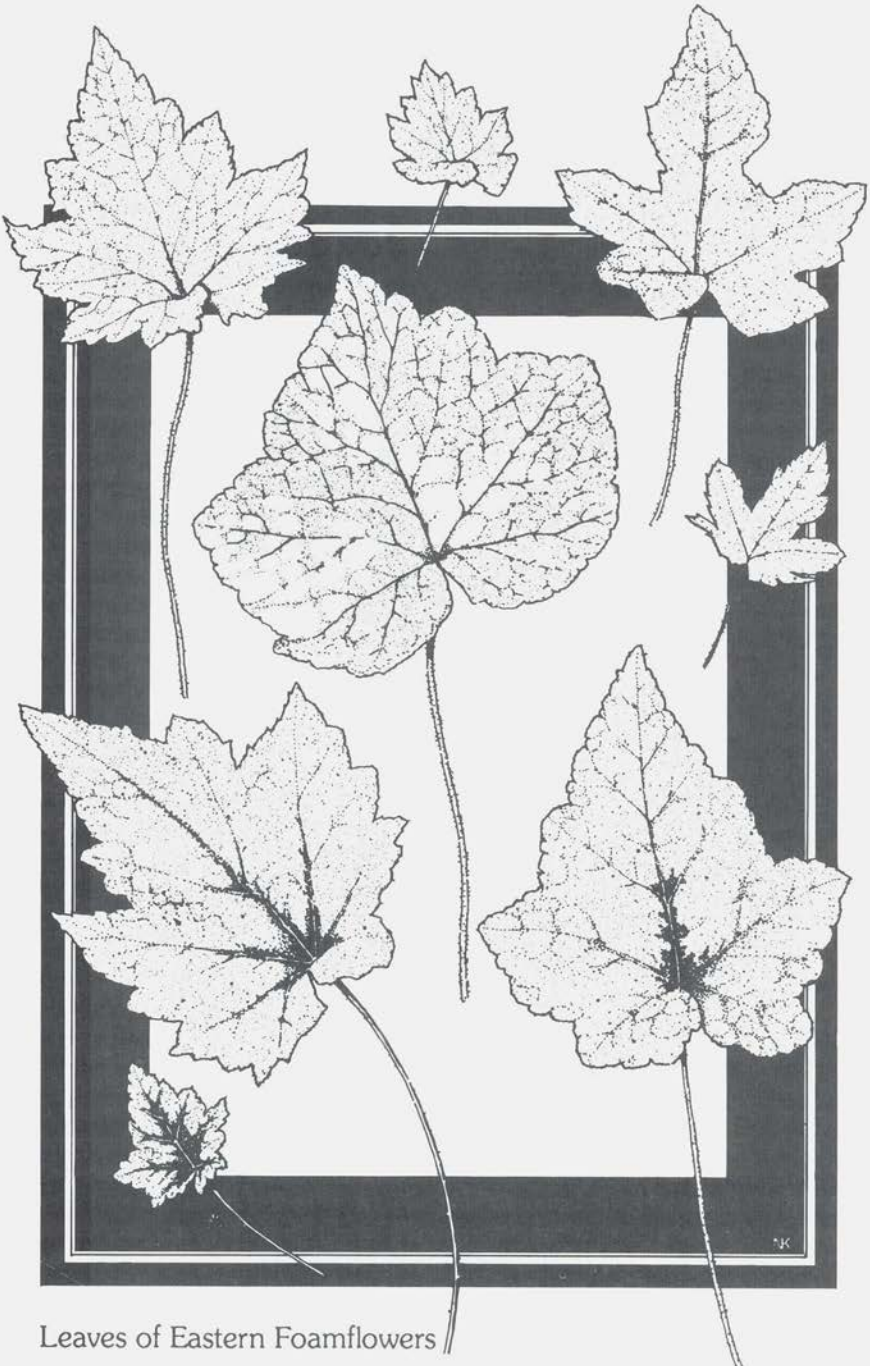
Botanist have dealt with these plants variously, as a single, complex species, or as two to four species further divisible into varieties. The characteristics used to differentiate the several types are those preservable on dried herbarium specimens. The most often relied upon character has been the presence or absence of stolons. All Eastern foamflowers have been neatly separated as "clumpers" or "runners," based on these strawberry-like runners. The runner forms furnish extensive, graceful groundcovers in the shade. The clumpers are preferred as more robust, longer-flowering specimens in woodland or semi-shady rock gardens. For more than 10 years, I have been slowly propagating a choice, very fragrant clumper, with dark red vein patterning in its large leaves. During morning rounds of June 1, 1990, I stopped to examine the *Tiarella* collection. I was suddenly startled—there was a Giraffe! Not truly a long-necked quadruped, but nonetheless surprising. A prime specimen of 'Eco Red Heart' (p. 44) was sending leafy stolons in all directions.

An equally vigorous specimen next to it had none, nor had any plant of this cultivar ever produced stolons in Eco-Gardens before. Once more I had reason never to say "never." "Usually" is such a wonderful word.

Why did this one plant, on this one occasion, behave so atypically? This was one of a group of foamflowers, representing seven distinct taxa (species, subspecies, or varieties), established the year before in a rich, woodland compost bed for analysis under uniformly good conditions. The soil is porous, rich in humus, and was given a top dressing of dolomitic limestone. High summer shade from oaks and hickories opens to bright sun in winter. The site was not allowed to experience drought during the observation period. One factor not controlled at the outset was rabbit browsing. Since the test bed produced the most lush spring growth in that part of the woods, the rabbits promptly moved in. At that time, rabbit barriers were installed, but a sister clonal division of the 'Eco Red Heart' Giraffe had been browsed completely to the exposed crown, and the giraffe had not yet been touched. Under protection, the browsed plants rapidly refoliated, and sent up fresh flower stalks. The rejuvenating 'Eco Red Heart' plant produced such large, rich-green leaves, with little hint of red pattern that it scarcely resembled its clonal partner next to it. From this I can only deduce that under uninterrupted, optimal growing conditions a clumper foamflower may express an ancestral stoloniferous habit. There still remains a possibility of a somatic (non-sexual) mutation in the Giraffe, resulting in the aberrant behavior. This will be tested by observing plants propagated from those stolons. I will be very surprised if this trait has become fixed in the offspring. Of the thousands of clumpers that I have observed in the wild and in cultivation, I have never before detected a stoloniferous individual. In the wild these plants are commonly found clinging precariously between rocks, on woodland stream banks, among mosses. I have not seen a wild specimen that exhibited the vigor of a well-grown garden plant. The old adage "You can't improve on nature," has little support when it comes to plant cultivation.

As to inheritable differences among our species of *Tiarella*, many distinct features have been largely overlooked by taxonomists. Some of these features may determine the garden-worthiness of a plant, even though they are not preservable in dried specimens. In the course of this research seven distinct taxa have been defined. How these should be dealt with in the realm of taxonomic ranking I shall leave to someone else. The importance of their recognition by horticulturists is the pertinent question here. I have attempted to untangle the present confused state of applying botanical names of foamflowers to garden plants. Botanical literature in this area is woefully inadequate and too confused to do the job at the present.

In 1903, John Kunkel Small recognized two species of "False Mitreworts" (Mitrewort=*Mitella*). He called them *Tiarella cordifolia* and *Tiarella macrophylla* and distinguished them chiefly on leaf size, 3-6cm broad for the first, 15-20cm broad for the second. But it was later determined that Small based his description of *T. macrophylla* on an herbarium sheet containing a *Tiarella* inflorescence and a large *Heuchera* leaf, so the name was abandoned. More than 180 years after Linnaeus described *Tiarella cordifolia*, this was the only valid name for all Eastern foamflowers. Incidentally, *Tiarella* flowers are much showier than those of *Mitella*, and the common name, "False Mitrewort," never became common.



Leaves of Eastern Foamflowers

Clockwise from top left: "Southern Runner," "Northern Runner," "Maple Leaf,"'Slick Rock', "Velvet Leaf" selection 'Eco Splotched Velvet', "Fragrant Matt Leaf" selection 'Eco Red Heart'; center, "Glossy Leaf"

Comparing Seven *Tiarella* Taxa	Approx. number of flowers per scape, per branch	Leaf surface: Glossy, Matt, Velvet	Anthers: Coral, Yellow	Stolons: Present, Absent	Fragrance: Present, Absent	
Southern Runner	50	M	C	P	A	
Northern Runner	35	M	C	P	A	
'Slick Rock' Runner	20, 10	M	C	P	P	
Glossy-Leaf	40	G	Y	A	A	
Maple-Leaf	60, 20	V	C	A	A	
Fragrant Matt-Leaf	50	M	Y	A	P	
Velvet-Leaf	50, 20	V	C	A	P	

In the 1930s, Dr. Olga Lakela of the University of Minnesota, Duluth Branch, studied the genus *Tiarella* with the aid of fresh collections by Dr. Edgar Wherry. In 1937, she recognized two stoloniferous types: a northern, small-leaved form occurring from Nova Scotia to Ontario, the Great Lakes and south along the Appalachian Highlands to Tennessee and North Carolina, named *Tiarella cordifolia* var. *cordifolia*; and a more robust southern type at lower elevations in the Appalachians and Piedmont of the Southeast, named *T. cordifolia* var. *austrina*. She named a distinctive clumper collected in Tennessee by Wherry as *Tiarella wherryi*. Dr. Wherry later found other types and named a clumper with broad, glossy leaves *Tiarella cordifolia* var. *collina*. He did not discover the deep-lobed type of *T. wherryi* in eastern Tennessee until 1951. I have called this the "Maple-Leaf" form. Unfortunately, Dr. M. L. Fernald did more to confuse than clarify the situation in the 1950 *Gray's Manual of Botany*. He recognized two species and several minor forms, but relegated all clumpers under *T. wherryi*, and all runners under *T. cordifolia*. This places Wherry's *T. cordifolia* var. *collina* under *T. wherryi*. The 1976 Hortus III has followed this interpretation. So much for current taxonomic status.

I believe that the seven taxa dealt with in the following summary represent most of the distinctive types encountered in the wild, but individuals representing various intergrades are not uncommon. In addition to our Eastern foamflowers, three *Tiarella* species occur from the Rockies to Alaska, and one has a wide distribution in Asia, from the Himalayas to Japan and Taiwan. I collected an interesting form of *Tiarella polyphylla* at high elevations on Mt. Emei in Sichuan, China. It is a small *Mitella*-like plant and not particularly showy compared to our Eastern foamflowers.

Three stoloniferous entities are recognizable. I am calling them "Northern Runner" (corresponding with *Tiarella cordifolia* var. *cordifolia)*; "Southern Runner" (corresponding with

Tiarella cordifolia var. *austrina)*; and 'Slick Rock'. By far the most distinctive is a diminutive, deep-lobed, rampant runner recently discovered and propagated by Jim Plyler of Chadds Ford, Pennsylvania. He collected it from the vicinity of Slick Rock Creek, which serves as a boundary between North Carolina and Tennessee and has furnished the cultivar name 'Slick Rock'. It is distinct in several features, besides leaf-lobing, from other runner forms. Flower scapes are shorter, and frequently branched, with smaller, pinkish, fragrant flowers in lesser numbers. Usually there are less than 20 flowers on a primary scape with up to 10 additional flowers on each side branch. Like the "Northern Runner," the leaves of this form have a lusterless, matte appearance but tend to be darker and often exhibit a ruddiness. All three runners have coral-colored anthers. Both "Northern Runner" and "Southern Runner" have white, scentless flowers on unbranched scapes, with up to 35 flowers on the "Northern Runner," and up to 50 on the "Southern Runner." The larger leaves on "Southern Runner" may be somewhat glossy. Stolons may initiate anytime during the growing season if moisture is adequate, but most abundant development occurs in summer from late May to August, after spring flowering.

Clumpers occupy territory ranging from Virginia to northern Mississippi at moderate elevations, but the greatest diversity occurs in the area from western North Carolina and eastern Tennessee to northwestern Georgia and northeastern Alabama. This is the home of not only "Maple Leaf" and "Glossy Leaf," but also two other equally distinct taxa which I am calling "Velvet Leaf" and "Fragrant Matte Leaf."

The flower stalks and sepals of all Eastern foamflowers are densely clothed with tiny, gland-tipped hairs, and the leaves of all have scattered hairs above with greater concentrations on veins on the underside of the leaf. All have hairy petioles, the hairs dense, long, and glandless in taxon "Glossy Leaf," and a combination of long, glandless hairs with short, glandular ones in "Fragrant Matte Leaf" plants. Leafy bracts on flower scapes are rare except where branches arise. The three runner taxa usually have one or two leaves on each scape. "Glossy Leaf" plants have no branches or scape leaves. The anthers are yellow. This taxon is quite common in eastern Tennessee and undoubtedly represents Wherry's *collina*. Typically the leaves are broader than long with indistinct, blunt lobing.

"Fragrant Matte Leaf" is my designation for a group of plants undoubtedly including Dr. Wherry's collections designated *Tiarella wherryi* by Miss Lakela. While its variability is considerable, certain features are of such constancy that it is readily distinguishable from other taxa. My reason for avoiding the *T. wherryi* usage in this discussion is that it has suffered from too expanded an application. One observation that puzzles me is the dearth of references to fragrance. No other *Tiarella* with which I have had experience is characterized by such a rich fragrance. An exceptional mention of this characteristic is found in Fritz Köhlein's *Saxifrages and Related Genera*. Under *Tiarella wherryi* he states, "Stamens orange. It has a delicate scent, reminiscent of mignonette (*Reseda).*" From this description, I deduce that Köhlein's plant fits under my taxon "Velvet Leaf," described below. Then Köhlein perpetuates the current confusion by citing *T. cordifolia* var. *collina* as a synonym.

"Fragrant Matte Leaf" is the only yellow-anthered, fragrant form that I have encountered. It is a robust plant

with large, longer-than-broad, sharp-lobed, sharp sinus leaves, with non-glossy, matte green leaves. Some plants exhibit dark red patterns on their leaves. In my cultivar 'Eco Red Heart', the pattern radiates outward over the main veins from the base. In my cultivar 'Eco Pinto' the pattern consists of red spatters in the blade, radiating away from the base. Flower scapes are usually branchless and leafless with less than 50 white to pinkish flowers of good size for a *Tiarella*. This taxon has probably been grown in England since about 1940 from seed sent by Joseph Elliott. He was studying at the New York Botanical Garden, where Wherry's first live collection was being grown. *Tiarella wherryi* grown from this seed received the Royal Horticultural Society Award of Merit and was highly praised in a report by Clarence Elliott in an October 1948 issue of the *Gardener's Chronicle*. He emphasized the attractive shape, color and texture of the leaves, the creamy pinkness of buds, and the long blooming season—April to September. The extended season is definitely not characteristic in the wild or in American gardens, but when spent scapes are removed rebloom is not uncommon.

The abundance of scapes produced by "Fragrant Matte Leaf" cultivars can be astounding. In May of 1987, I was treated to a memorable sight in the rock garden of Edward Childs near Norfolk, Connecticut. Beaming from a site of honor was a specimen of my 'Eco Pinto' foamflower with a veritable feather-duster of scapes. It had apparently been placed there by Linc Foster.

"Velvet Leaf" was so named because of its soft, rich velvety appearance, totally free of luster. The leaf outline is longer than broad, shallowly blunt-lobed with obtuse sinuses between the lobes. Scapes carry up to 50 white to pale pink, fragrant flowers with coral anthers. Occasionally a branch with up to 20 flowers arises from a leafy bract. Except on inflorescences, the hairs on the plant are essentially without glands. The cultivar 'Splotched Velvet' from southeast Tennessee exemplifies this taxon. It is characterized by purple spatters at the central base of the leaves. "Velvet Leaf" shares its velvety texture and coral anthers with "Maple Leaf," and the broad sinuses differ chiefly only in depth of lobing. On the other hand, "Maple Leaf" lacks fragrance, is less robust, but produces branching scapes of pinkish, smaller flowers in greater numbers. The primary scape may have more than 60 flowers plus one or two branches with additional 20 flowers on each. Its petioles are clothed with long and short hairs tipped with tiny glands, whereas those of "Velvet Leaf" are usually glandless.

Clump foamflowers are frequently associated with limestone outcrops, and while they perform well in moist woodland gardens, they benefit in acid soil regions from an occasional top dressing of ground dolomitic limestone. They can perform well from USDA zones 8 to 4, but not all cultivars are equally adaptable. A little experimenting may prove necessary. A large proportion of commercial plants are grown from wild collections from North Carolina and eastern Tennessee, so you will observe several taxa commonly mixed in these. Only division-propagated plants remain true to cultivar type, and propagation by division is a tedious and limiting process. Quite uniform examples of a desired taxon can be produced in quantity from seed from open-pollinated plants in a garden containing only that taxon. Gardens would certainly be enriched by more generous planting of our wonderful foamflowers.

Drawing by Nick Klise

(Don Jacobs gardens near Decatur, Georgia. He delights in making excellent selections of native Eastern wildflowers.)

A Letter to B. LeRoy Davidson Concerning *Tiarella Wherryi*

printed with permission from Mr. Davidson

February 15, 1969

Dear Mr. Davidson:

The reason for my note about Tiarella wherryi in the Bulletin of the American Rock Garden Society was that I now and then receive inquiries as to where it can be purchased. Unfortunately the few American dealers who claim to have it, raise their stock from seed obtained from Thompson & Morgan, a firm that used to be reliable, but that now sends out under this name the utterly different and also unlovely Tellima grandiflora. So I can not answer these letters!

I do have a few plants from the original locality, and I have been distributing them to anyone who seems likely to be able to propagate it and increase the stock. The leaves of this are narrower and more deeply cut than those of T. cordifolia collina—which is what you sent me, all right. Fernald's equating the two in Gray's Manual was a pure taxonomic monkey-business without field knowledge of the plants. Richard Langfelder who grows the correctly named plant in his rock garden at Chappaqua, New York, placed some seed of it in the ARGS seed exchange, and I hope that one or more packets will find their way into the hands of someone who will keep propagating and distributing it.

Appreciating your kindness in corresponding about this plant,

Sincerely yours,

Edgar T. Wherry


Scotland
Wales
★ Warwick
Essex
London
Kent
West Sussex
East Sussex
England

Alpine Nurseries of the United Kingdom

by Paul H. Halladin

Members of the American Rock Garden Society who attend the 1991 International Conference in Warwick in the United Kingdom will have a unique opportunity to indulge in exploratory visits into the realm of the Alpine Plant Nursery. Whether your objective is to acquire just a single living plant souvenir as mundane as a *Dianthus*, or as exalted as a *Dionysia*, or possibly to bring back an entire collection of plants, you will probably have success beyond your fondest expectations.

There are over 70 such specialty nurseries in the United Kingdom. Virtually all are tucked away into obscure corners and byways of the English, Welsh, and Scottish countryside. Even though many are small, one- or two-person operations, there are a few that have as many as eight full-time employees. You may meet some unusual people, including proprietors who are skilled seed collectors and have visited the most remote mountains in their quest for something new. You may possibly also meet student helpers, or employees who are so knowledgeable that they can tell you the Latin names of the fungi that attack seeds during the germination process. Each nursery has its own particular visual appeal. Some are located on or near historic sites, some are contained within large, mature display gardens, others have extensive collections of superb show plants in large, clay pots. The majority have planted raised beds or planted walls and virtually all have at least some spectacular specimen plants on display.

These nurseries propagate all their own plants, primarily from cuttings or from seed, as well as by division. Some growers are so skilled that a seed germination rate as high as 95% is attained. A few can even produce plants from cuttings so tiny that the minute tip of a surgeon's scalpel is required to sever and handle it.

One might justifiably ask, why are there so many specialty nurseries in the UK? There is little doubt that the UK has long been preeminent in the introduction of new and rare plants into horticulture. This is attributable to a number of factors. Certainly the majority of plant and seed collecting expeditions originate here. Then, too, the Alpine Garden Society with its 59

regional groups (equivalent to our ARGS Chapters) and their 8000 plus members resident in the UK, represent a large and concentrated customer base for the marketing of plants and seeds. Even though the weather is considered to be fickle, it is nevertheless more conducive to year-round gardening than that of much of the United States. Individual properties tend to be smaller, which forces avid gardeners to concentrate on smaller plants and specialities. This in turn results in far greater use of alpine houses and cold frames, as well as constructions such as raised beds and planted walls.

The very large number of competitive plant shows also plays a role in stimulating demand for new and unusual plants. The Alpine Garden Society has 18 large shows every year, with as many as 140 individual classes of plants. Additionally, many of the regional groups stage monthly competitive shows. Those entering shows have an opportunity to compete for a wide variety of trophies, cups and medals in a formalized system that gives a high degree of recognition and respect to the best growers. This concentration on growing and exhibiting plants in various sizes of pots has led to a greatly increased demand for outstanding plants. The alpine plant nurseries of the UK have responded admirably to this challenge. Most carry a wide range of plants, but many tend to favor certain genera. In addition to their more popular items, almost all carry an assortment of rare, unusual, obscure, or seldom seen plants that might appeal to the *cognoscenti*.

Most nurseries grow their offerings in 7cm square or round plastic pots, and the majority of their stock is sold within six months to two years after propagation. Potting soil mix formulas vary widely, but virtually all consist of variations of the same basics—loam, grit, sand, peat, and compost. Only a few use soilless mixes. Prices per plant range from 60p to about £3.00 (with current exchange rates, $1.14 to $5.70). Very rare items can range higher. Most plants are grown in the open with little protection except for winter cover against excessive rain. Some species are partially shaded during the summer against midday sunlight. Many nurseries are established and operated by trained professionals whose sole vocation has been horticulture; however, a substantial number of nurseries have evolved out of the gardening hobbies of their proprietors. The latter type of nursery will almost always be located on the home property (and personal garden) of the owner.

A fascinating account, to put you in the mood to visit the United Kingdom nurseries, is entitled "Forty Years as a Nurseryman," by the famous Joe Elliott of Broadwell Nursery, now retired. It appeared in *The Quarterly Bulletin of the Alpine Garden Society* Vol. 54 (2), No. 224: 117-129, with color photos. An account by Vic Asplund entitled, "Each to his Choice," is the story of Ron and Joan Beeston, whose nursery, presently near Worcester, is one of the few sources of the rarer dionysias. This was published in *The Quarterly Bulletin of the Alpine Garden Society* Vol. 57 (3), No. 237: 267-272.

The Nurseries

There are so many excellent nurseries that it is a difficult task to choose which ones to mention. Regrettably, just a very short selection can be briefly profiled by this article. The selection process was strongly influenced by the many factors affecting ARGS visitors to the UK. Such visitors have time limitations, in that most will be unable to extend their visit much beyond the few days after the conference. Those who

purchase numerous plants must allow sufficient time to prepare their selections, by washing all soil off roots, as well as further wrapping and packing. The stress caused by transporting plants long distances in possibly overheated cars, with insufficient light must also be considered. Therefore, all the nurseries mentioned below are located within two hours travelling time of either Gatwick or Heathrow airports. Coping with plants can be rather time-consuming. Those ARGS members who intend to return with many plants might consider staying in hotels or motels near the airports on the evening prior to the day of departure.

Oakdene Alpine Nursery,

Oakdene, Scotsford Road, Broad Oak, Heathfield, East Sussex, TN21 8TU, Tele. (04352) 4382. A four-year-old business whose owner, David Sampson, has over 25 years of horticultural experience. On display is a superb collection of Gesneriads, including *Jankaea heldreichii*, and the bi-generic x *Jankaemonda vandedemii*, as well as such rarities as x *Brigandra calliantha, Lysionotis pauciflorus, Asteranthera ovata, and Opithandra primuloides.* David was a close friend of the late G.R. Mundey, a well-known hybridizer of *Primula aureata, P. whitei* and *P. boothii*. One of Mundey's crosses, *Primula aureata* 'Tinney's Apple Blossom', was judged to be the best hybrid of 1989 and was also given an Award of Merit. David inherited Mr. Mundey's entire nursery stock, including over 400 specimens of *Primula aureata* and hybrids of *P. aureata*. David also has a large collection of show plants, including Asiatic saxifrages, drabas, androsaces, raoulias, and six different taxa of *Shortia*.

Washfield Nursery,

Hawkhurst, Kent, TN18 4QU, Tele. (0580) 752 522, was founded in 1940 by Miss Hilda Davenport-Jones. The current owner, Miss Elizabeth Strangman, started her horticultural career at Cambridge Botanic Gardens and inherited Washfield in 1972. Miss Strangman has set a policy of propagating only a highly select list of plants. Among the treasures are the rarely seen *Ranunculus abnormis* from the mountains of Central Spain, the recently discovered *Chrysosplenium davidianum,* a dwarf groundcover from China, and the dwarf *Heloniopsis orientalis* 'Yakushimana'. Don't miss the sensational *Origanum* 'Kent Beauty', believed to be a cross between *O. rotundifolium* and *O. scabrum* v. *pulchrum*, discovered as a chance seedling in 1978 at Washfield. It achieved the Award of Merit in 1982, as exhibited by Frank Tindall.

Copton Ash Gardens,

105 Ashford Rd., Faversham, Kent ME13 8XW Tele. (0795) 535 919, is a 12-year-old private garden that contains a collection of well over 2000 distinct plant species, attractively arranged in large undulating borders on about an acre and a half. It is noteworthy in that it contains a very large number of Australian, Tasmanian, South African, and South American plants. The proprietor, Dr. Tim Ingram, is a plant scientist whose specialty is plant hormones. His love of gardening motivated him to start a plant nursery two and a half years ago to introduce many of the rare plants in his garden to individuals living in the southeast of England. This relatively young nursery is experimenting by growing from seed South American high Andes plants such as the rosulate violets, *Calandrinia, Perezia, Loasa, Xerodraba,*

Adesmia longipes (a dwarf, legume with fernlike leaves), and mat-formers such as *Argylia australis* and *Chuquiraga patagonica.*

County Park Nursery,

Essex Gardens, Hornchurch, Essex, RM11 3BU, Tele. (0402) 445 205, was established over 30 years ago. Its owner, Graham Hutchins, a well-known specialist in Australian, New Zealand, and Tasmanian plants has just returned from his fourth plant and seed hunting expedition to his favorite area. This time he has collected seeds of over 800 species, of which 150 species have germinated so far, many new to cultivation. Graham is an accomplished hybridizer and is especially noted for crosses of *Clematis marmoraria* and *C. petriei*, from which some 50 selections have been developed, including a few that are believed to be hardy in the US. Graham has received numerous awards, including the Award of Merit, for *Carmichaelia enysii* 'Pringle' and *Raoulia subsericia* 'Wanaka'. Over 20 different species of *Leptospermum* are offered at this nursery, including many choice dwarf forms originating as crosses at County Park—a treasure trove for ARGS members from the West Coast.

Birch Farm Nursery

(W.E. Th. Ingwersen Ltd.), Gravetye, East Grinstead, West Sussex, RH19 4LE, Tele. (0342) 810 236, was established in 1927 on land that was once part of the historic Gravetye Estate of William Robinson. This nursery has been well known to many ARGS members because of Will Ingwersen. Will helped found the Alpine Garden Society in 1929 and later became its president and editor of its journal. He was also believed to be the last survivor of those who attended the first Chelsea Flower Show held in 1913. As an eight-year-old boy, he helped his father transport plants from their nursery (at that time in Croyden) by pony cart, to stage them at the show. He also accompanied his father to almost all the high mountain places of the world. One of his most famous exploits was designing and constructing the largest rock garden in the world near Tehran, for the Shah of Iran. Over 10,000 tons of large stones were used on a 50-acre site. Will Ingwersen died in June, 1990. The famous nursery continues under the expert guidance of his half-brother, Paul Ingwersen, known for heading annual AGS-sponsored trips to the high mountains for the past 11 years. Birch Farm Nursery contains much of interest, including over 100' of planted walls constructed of Sussex sandstone, as well as sections of limestone and tufa. There are also over 30 planted troughs on display. Four alpine houses are used exclusively to display the superb Ingwersen show plant collection, one each for *Primula allionii, Lewisia*, and cushion plants, and one for all the other show plants. Will and Paul Ingwersen and staff have, over the years, won every conceivable award and honor at shows and meetings. This historic site contains one of the largest selections of alpine plants and bulbs, more than 1500 species. About 20 varieties of *Primula allionii* are offered, as well as more than 20 lewisias. A more complete history of Birch Farm Nursery can be found in *The Quarterly Bulletin of the Alpine Garden Society* Vol. 55(3), No. 229: 220.

Practical Considerations

First-time visitors to the United Kingdom will note that most nurseries are in locations difficult to reach via public transport, so it will be necessary to rent a car to reach them. Rental procedures are similar to those in the US, except that the rental car will have the steering wheel on the right-hand side of the car and all driving is done on the left. This is not as formidable as it sounds. Thousands of Americans visit the UK and drive cars uneventfully everywhere. However, it is recommended that drivers unaccustomed to driving on the left start out by practicing on the less congested roads.

It is absolutely essential to have decent maps, as well as precise instructions as to how to arrive at any destination. One must write down carefully, word for word, the exact driving sequence to be followed. Do not hesitate to ask a nursery owner to repeat directions. Roads are often unnamed and houses not numbered. Rural England is beautiful, but one must remember that pay phones in the country can be few and far between and the occasional person on the roadside may never have heard of your destination.

Once you have seen the plants offered for sale at British nurseries, the temptation to bring home plants will be almost irresistible. Once outside the borders of the US, returning with live plants can create a problem. The US Department of Agriculture has extensive regulations controlling such imports and they apply to everyone, even to the hobbyist and collector. One hears the occasional story about an acquisitive plant lover who has returned with a few choice plants, secreted in luggage, without any problems. The principal risk in this procedure is that the plants will be confiscated if discovered; a fine may be imposed as well. One hears that dogs are sometimes present in customs areas, dogs that have been specially trained to detect contraband or undeclared items in luggage, including plants. Travellers who have a considerable investment in a large number of plants can't afford to take such risks and must have a USDA plant permit. They will also have to familiarize themselves with the regulations concerning the importation of live plants. A phytosanitary certificate from the country of origin may be required. In the United Kingdom, such certificates are issued by the Ministry of Agriculture and must be obtained from the branch closest to the nursery where the plants were obtained. Such branches are located throughout the UK. These certificates cost £7.00 if the plants are taken directly to the Ministry office for inspection (bare-rooted), or £18.50 if the inspector visits the nursery. Another requirement is that the soil mix used by the nursery for potting must be tested for nematodes, at a cost of £40.00. Such tests are normally performed annually. Few nurseries bother with this test unless they develop an export business. If a nursery has not had such a test, the inspector can use the soil from the pots of your plants, but he must have a sample that weighs at least 500 grams (about 1.1 lbs.). This test cannot be done the same day you bring in the soil.

All inspections of plants for phytosanitary certificates are done on bare-rooted plants or on plants that are in soilless mixes. If peat moss is present in the soilless mix, there is a possibility that the inspector may require a test to determine if the minute peat fly is present before the certificate can be issued. Therefore, it is recommended that plants be bare-rooted. Note that the Ministry of Agriculture does not require a phytosanitary certificate for export and it is not required to declare that plants are

being taken out of the UK. It is the United States government that requires the phytosanitary certificate.

There are a few nurseries that do cater to the export trade and have their soil tested every year. They will facilitate the obtaining of phytosanitary certificates for their clients. However, they must have advance notice of four or five days as to your need of these certificates and must know the approximate number of plants desired, as well as the name of the airport of exit in the UK and the airport of entry in the US. Holden Clough Nursery, Holden, Bolton-by-Bowland, Clitheroe, Lancastershire, BB7 4PF and Potterton and Martin, Moortown Road, Nettleton, Caistor, Lincolnshire, LN7 6HX are two nurseries that have their soil tested and can assist with certificates.

The group of nurserymen who will be exhibiting and selling plants at the International Conference in Warwick in 1991 are attempting to arrange for a Ministry of Agriculture inspector to be present at the conference to inspect plants for ARGS members and to issue phytosanitary certificates at a special rate.

Within the country, it is best to transport plants inside the car and to provide at least some daylight and ventilation. When sightseeing, do not leave plants in full sunlight inside a closed car. If it is impossible to park your car in the shade, it is preferable to temporarily place the plants in the trunk of the car. Plants kept in hotel or motel rooms should be placed as near as possible to a partially opened window. In all cases, it is prudent to purchase plants a week or less prior to departure and to bare-root only the day or two before departure.

Travelling with plants that have been properly bare-rooted is not too difficult. Anyone who has experience in transplanting seedlings or has repotted small plants can do all the tasks necessary. Removing the soil without damaging the roots is easier if the soil mix is neither too wet nor too dry. If the soil mix is too wet, you can reduce the moisture by taking the plant out of its pot and standing the root ball on a stack of newspapers. The paper will act like a wick, and a considerable amount of moisture will be absorbed within an hour, usually enough so that the soil mix easily falls away from the roots. Any remaining soil can be washed off by dipping the roots in a pail of water. Great care must be taken not to damage roots. It is best to avoid touching them, if possible, and to handle the plant instead either by its stem or by the leaves.

Once the roots have been washed, place them on a piece of moist paper towelling, pre-cut to size, and wrap the roots loosely. Then wrap the paper towelling with either clear plastic wrap (called cling wrap in the UK) or with a soft, heavier plastic similar to that used in plastic bags. A slightly heavier gauge plastic is easier to work with, if it can be found. Such wrappings should be fairly tight at the neck of the plant where the roots join the stem. Try, as much as possible, to have the plastic wrap completely cover the moist paper, and remember that any moist paper protruding will act like a wick and possibly result in drying out and a lost plant. Leave the upper portion of the plant free of wrap. Care must be taken that moist paper does not rest against soft leaves or the dense foliage of cushion plants. Scotch tape or masking tape can be used to secure each wrapping so that it does not unravel. The plant label can also be attached by such tape.

The plants should be laid flat on their sides in a small, corrugated cardboard box, in layers. As many as seven layers can be stacked inside such a box without harm. Hard-leaved and larger

plants should be placed on the bottom. If internal support is necessary to prevent shifting, use either clear plastic wrap or plastic bunched up and loosely held together with tape. Do not use bunched up newspapers inside the box, as they will absorb far too much moisture from your plants. Wrapped plants can also be fastened together in groups of three to five, to prevent shifting in the box. Do not close the box too tightly, but allow for some ventilation. Such a box is best carried onto the airplane as personal baggage. Checking the box with luggage may result in damage by freezing or the box could be crushed during baggage handling. It is also best to plan ahead and bring all packing materials from home. It may be difficult to find such materials on short notice in the UK, especially outside of normal business hours. Time spent hunting for such materials could better be spent preparing your plants.

One must allow ample time for bare-rooting, because there can be complications. Plants may be pot-bound or have roots imbedded in chunks of peat. It may be difficult to wash all soil off roots. I can vividly recall one occasion when I was still packing plants at 3 a.m.! Disposal of debris can also be a problem. It is best to have a very large supply of old newspapers available and a large plastic sack or bag.

One must not fear customs. If you have a plant permit, the inspector will usually examine a few of your plants to ascertain that they are bare-rooted. He will then check your list against the official list of forbidden plants. After a few minutes you will be waved through. If confronted by an unsympathetic inspector, by all means resist firmly, but politely, any suggestions to leave the plants at customs for further inspection or possible fumigation. Remember that fumigation with powerful chemicals, as performed by customs, may damage or destroy many of your plants.

On arrival home, all plants should be treated like cuttings. Unwrapping should be done within 24 hours after arrival, and roots of plants should be inserted and firmed into moist, coarse sand. Plants should be kept in a cool, well-ventilated place, out of direct sunlight, until repotted into an appropriate potting soil mix. The survival rate on bare-rooted plants properly handled can be as high as 95%. A final caution: those desiring to import for the first time, items such as Aretian androsaces, dionysias, or other expensive, rare plants, should seek out expert advice from those that have had actual experience in transporting such plants into the US.

(Paul H. Halladin is a long-time member of the Hudson Valley Chapter of ARGS and a former chapter chairman. He is currently residing and gardening in London.)

Alpine Plant Nurseris of the UK

Paul Halladin has compiled a list of 75 British Nurseries for those interested. This includes information on the genera in which each nursery specializes, what garden features may be seen at each nursery (rock gardens, show plants, planted walls, and so on), as well as addresses and phone numbers. This list will be available soon through the ARGS Bookstore at a cost of $5.

Variations in *Aquilegia jonesii*

by Jerry DeSanto

Jones columbine is one of the most desirable and most desired of all alpine plants, but few gardeners, or even botanists, are aware there is significant variability in the species. This variation is particularly pronounced among populations in and near Glacier National Park, Montana. Paul C. Standley of the US National Museum, collecting in the Park in 1919, was the first to report on this phenomenon.

When Standley found the atypical columbines, he believed there were two species of blue columbines in the area. One, the typical *A. jonesii* (p. 61), was recognized as a dwarf, pubescent plant. C. C. Parry had written of *A. jonesii* as a "remarkable and most distinct, very dwarf species" with blue sepals and petals in his original description in 1874.

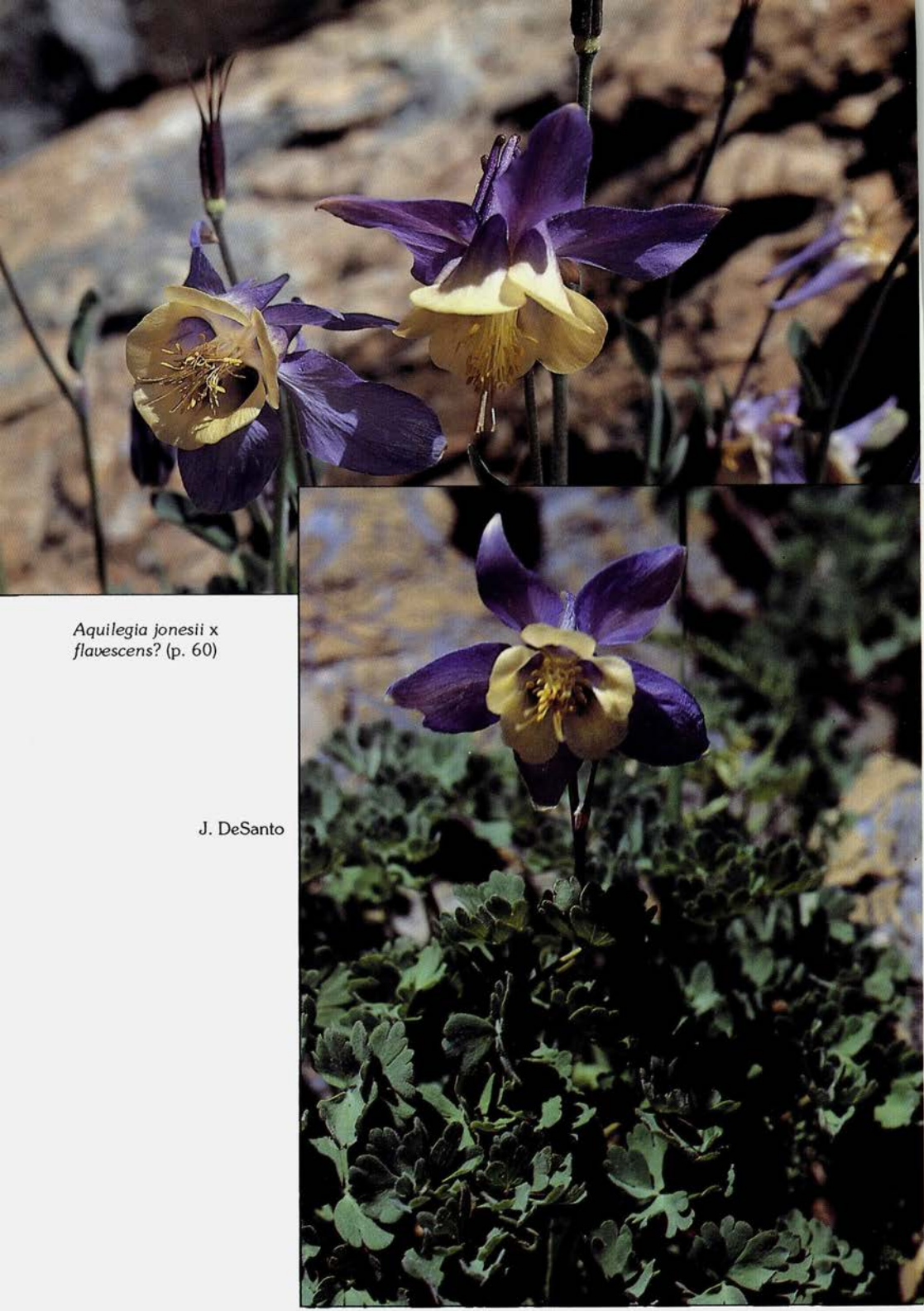
The other, atypical columbine was eventually given subspecific status by Standley in 1921 as *A. jonesii* ssp. *elatior.* In this form, the stems were taller than in the species and the leaflets were larger and less crowded. Many flowers, according to the original description, had white petals. Standley thought it best to regard this "only as a form of *A. jonesii,* a view confirmed by Mr. Edwin B. Payson, who examined the material." In a later, and more popular work on the flora of Glacier National Park, Standley made no mention of the subspecies. In 1934, Standley's subspecies was listed as a variety, but modern floras recognize no subspecific taxa for *A. jonesii.* All blue-flowered or partly blue-flowered columbines in the vicinity of the Park are now considered to be *A. jonesii.*

This species is probably composed of a complex assemblage of biotypes that find expression, for unknown reasons, in the Park area. Or there is the possibility that *A. flavescens* is somehow involved. This yellow-flowered columbine (p. 63) is also variable in the Park area, where flowers with white or red-tipped sepals and petals are known. *Aquilegia jonesii* and *A. flavescens* are found together at the lower elevational ranges of *A. jonesii* and it is tempting to speculate that hybridization between the two species occurs.

Although the color of sepals and petals in typical *A. jonesii* ranges from blue to purple to mauve, white forms are frequently found. The white flowers are generally pure white (p. 63) but

Aquilegia jonesii, above, typical color form; below, white with lavender tips (pp. 60, 65)

photos by J. DeSanto



Aquilegia jonesii x *flavescens*? (p. 60)

J. DeSanto

Aquilegia flavescens, dwarf (p.60) photos by J. DeSanto

Aquilegia jonesii, pure white (p. 65)

Plant Show, Nottingham, England, 1981 — Panayoti Kelaidis

Plant Show, Perth, Scotland, 1989 — Phil Pearson

occasionally, as in populations near Chief Mountain at the extreme northeast corner of the Park, sepals and petals are tipped with blue, red or purple (p. 61). It is interesting to note that George Bird Grinnell, in 1903, reported three columbines from his camp beneath Chief—"a yellow, a white, and a purple."

The blue-and-white-flowered columbine described by Standley in 1921 is not the only bicolored form in the area. More common is a blue-and-yellow-flowered form that ranges in height from dwarf size to 20 or more centimeters. It is superficially similar to *A. brevistyla*, a species not known from the Glacier National Park area.

Blue-and-white-flowered columbines have been found in only a few locations in the Park area. They seem to be most abundant (but are by no means common) in the vicinity of Mt. Siyeh and occur sparsely elsewhere. Blue-and-yellow-flowered columbines (p. 62) are more frequently seen and appear to be centered near the Mt. Siyeh area.

In my library, only Royton E. Heath in *Collector's Alpines* mentions *A. jonesii* var. *elatior*, and he describes it, at least in part inaccurately, as "a lowland form from the Glacier National Park." Actually, the form described by Heath as var. *elatior* occurs at the *highest* elevational range of the species. Reginald Farrer, Lawrence D. Hills, Will Ingwersen, H. Lincoln Foster, and Alpines '86 Committee's *Rocky Mountain Alpines* all mention *A. jonesii*, but suggest no variation. Wilhelm Schacht in *Rock Gardens* notes, as apparently no one else does, that *A. jonesii* has "blue and white flowers." It is unclear if he means that some flowers are blue and some flowers are white (as they are) or that all flowers are blue and white.

Whatever the true taxonomic situation may be (if there is such an answer among columbines), it is clear that the species *A. jonesii* is phenotypically complex. This complexity is well expressed in columbine populations of the Glacier National Park area.

References

Farrer, Reginald. 1919. *The English Rock Garden*. Vol. 1. 1980 reprint, Theophrastus: Sakonnet.

Foster, H. Lincoln. 1968. *Rock Gardening*. 1982 reprint, Timber Press: Portland, Oregon.

Grinnell, George Bird. 1903. Diary. Microfilm: University of Montana.

Heath, Royton E. 1964. *Collector's Alpines*. 1983 reprint, Timber Press: Beaverton, Oregon.

Hills, Lawrence D. 1959. *The Propagation of Alpines*. 1976 reprint, Theophrastus: Sakonnet.

Hitchcock, C. Leo and Arthur Cronquist. 1964. *Vascular Plants of the Pacific Northwest*. Part 2. U. of Washington Press: Seattle and London. (Synonymy covered).

Ingwersen, Will. 1983. *Alpine and Rock Plants*. J.H. Dent & Sons Ltd: London, Toronto, Melbourne.

Parry, Dr. C.C. 1874. "Botanical Observations in Western Wyoming," No. IV, Appendix: Descriptions of New Species, Etc. *American Naturalist*. Vol. 8.

Schacht, Wilhelm. 1981. *Rock Gardens*. Translation. Alphabooks: Dorset, England.

Standley, Paul C. 1921. "Flora of Glacier National Park, Montana." *Contributions from the U.S. National Herbarium*. 22(5).

Standley, Paul C. 1926. *Plants of Glacier National Park*. USDI. NPS. Washington: Govt. Printing Office. (Popular revision of technical flora of 1921).

Williams, Jean, Ed. *Rocky Mountain Alpines*. 1986. Timber Press: Portland, Oregon.

(Jerry DeSanto is retired from the National Park Service and lives and gardens in southwest Alberta. In addition to gardening, he is interested in natural plant distribution and flower photography.)

Gardening in Old Age

by Geoffrey Charlesworth

When we took the Czech visitor to Linc Foster's garden, we were given the usual comprehensive tour. Linc was his usual informative, enthusiastic self and the garden looked pretty much as I always expected it would—relatively tidy, expanding at the boundaries, nibbled by the deer, and full of familiar plants. Also full of rare plants that one had seen time and time again in Linc's garden and therefore thought of as familiar. It came as quite a surprise as we were driving off when the visitor said out of the blue: "It is an old man's garden." I didn't agree or disagree; I wanted more time to think about his estimate before asking for an explanation or an amplification. Did he think *my* garden was an "old man's garden"? Was it judgmental or descriptive? What exactly is an old man's garden? Is it something one has by default because one isn't 40 anymore? Or is it something to aim for, something I should be doing? Am I doing it and don't know?

Thoughts of age are irrelevant to the young. They hardly ever think about it seriously—like death, old age only happens to grandparents and other people's great uncles. Usually old age is equated with sickness and disability, especially the visible effects on skin, hair, muscle, and bone, and the unmentionable effects on sex and food processing. It may never occur to the young and healthy that inside every slightly worn body is a kindred spirit, possibly hiding behind a veneer of pompousness and privilege. Similarities are there nevertheless; learning never stops, even though memory becomes more selective; unsureness and insecurity are never far away. By now I am at the end of my seventieth year, so I shall qualify for Old Man status this year. Isn't it time my garden began to look like an old man's garden? So far it has been just a middle-aged man's garden, growing a little more portly year by year. Isn't it time to settle down? To decide exactly what kind of garden I want?

I confessed to Ellie Spingarn that I was cutting back on seed sowing this year. Well under the 2000 packets I sowed last year, it will be more like 1700 when all the orders are in. The fact is, I still keep trying species that I know will not do well for me. This isn't a fault so much as a strategy. You are not wasting time when you grow slightly tender plants that you end up getting rid of for one reason or another, or plants that you already have. You may want to see a different form or check a name.

There are many valid reasons for growing plants that will not be permanent residents of your garden. The process is interesting whether or not we learn anything new. There is pleasure in repetition. So what shall I do if I sow fewer seeds? Well, it will give me more time to propagate plants from cuttings, more time to move plants around in the garden, time to try for artistry instead of rarity, to make containers, to make a bog that works, time to start a bulb frame. Stop! Isn't the idea to do less, not just to do different? Absolutely not. I only want to do less if I have to. As Ellie said of Linc, he had the right idea. He cut down on sowing seeds by being selective; he stopped growing revolving door alpines—those he had grown many times for all-too-brief periods. Instead he moved over to hybridizing rhododendrons. Presumably, the aim was to grow a collection of *long-lived* plants that would take care of themselves without too much attention. Except for his extraordinary deer problem, this worked.

I don't think rhododendrons are for me, though, so I can't follow Linc's path to an old man's garden. I can admire the results of this obviously engrossing hobby only with many reservations. I concede that in the doing of it grows the love of it—plenty of first-rate, intelligent gardeners have been captivated by the genus. Surely it was this aspect of Linc's garden that revealed it as an "old man's garden." The reduction of one activity to almost zero and the proliferation of another that in theory would lead to a permanent but still developing garden. I wonder if the visitor had fully understood the process; perhaps he saw only the dearth of aretian androsaces, alpine *Dianthus*, and western drylanders.

It doesn't matter what he was looking at, the fact is the alternatives to not eventually having an old man's garden are two, neither very attractive. I can think of five or six gardeners in their eighties and scores in their seventies who are still gardening and only a few who chose to leave their house and garden for a retirement home without a garden. The big question is whether to retreat gradually, purposefully, and rationally, or whether to hold on to every activity, every inch of cultivated ground, every pot and plant, until a muscle pops, a joint freezes, or a final catastrophe strikes one down.

I hope that when visitors leave my "old man's garden," they understand this very real problem and do not drive away exchanging glib observations: "He took on too much." (I was already doing that when I was your age); "What a mess!" (this has *nothing* to do with age. I know at least one middle-aged man's garden that is worse); "Too many plants to absorb." (Next visit plan to stay longer); etc., etc. Actually, doesn't everybody face the same problem? We all try to do slightly more than we have time for, we try to grow unsuitable plants, we are overwhelmed by the garden for at least one week every year.

So here are a few resolutions to be put into effect on my seventieth birthday: 1. Give up one bed each year from now on. 2. Sow at least 200 fewer pots of seed each year. 3. Stop trying to grow *Dianthus alpinus, Eritrichium nanum, Physoplexis comosa.* 4. Hire a landscape architect for an hour a year. (Just for weeding.) 5. Stop photographing every penstemon as it flowers. 6. Sit on a bench once a week. 7. Stop buying dwarf conifers and rhododendrons.

So if that Czech comes around again, he will say: "There's another old man's garden."

(Geoffrey Charlesworth, author of *The Opinionated Gardener*, gardens near Sandisfield, Massachusetts. He reports that since writing this article he has made eight new garden beds.)

Books

A Rock Garden in the South. Elizabeth Lawrence, edited by Nancy Goodwin with Alan Lacy. 1990. Duke University Press: Durham and London. 8-1/2" x 11", hardbound; 344 pp., 159 pp. color, 7 black-and-white photographs, 46 line drawings, 5 maps. Price, $54.95.

by Ev Whittemore

This is a pleasant book of interest to anyone who enjoys reading garden books and more essential to those who yearn for rock gardens and live in warm, southern climates unacceptable to plants requiring a winter-dormant period.

There is a brief introduction to rock gardening in the South, with many quotes from other gardening experts. Those of us who suffer and sweat to place our rocks correctly will be amused by the author's references to having her talented, rock-laying houseboy arrange the rocks for her garden. The pages on planting the garden have practical ideas on mulching, labels, and propagating. We can always use those.

The next, larger section lists non-woody plants for sun and shade, including many for those unable to grow the more challenging alpine plants. It would be difficult for a rock garden purist living in colder parts of the country to accept *Tagetes tenuifolia, Cooperia pendunculata,* and *Diascia barberiae* as substitutes for *Aquilegia jonesii, Silene acaulis*, and *Eriogonum ovalifolium*. Elizabeth Lawrence makes her choices acceptable by her enthusiasm. Approximately half the plant descriptions here are written or expanded by Nancy Goodwin, who discusses some of the basic and more recently introduced rock garden plants. This is a vital addition to the book. The section on dwarf conifers and woody plants is greatly improved by the additions of Nancy Goodwin and Paul Jones, both horticulturists of great merit. In a listing of 57 plants, only 19 are the sole work of Elizabeth Lawrence.

A chart near the end of the book gives the reader a quick reference to the cultural requirements of plants mentioned in the text. It is followed by an excellent listing of seed and plant sources, a bibliography, and an index.

If I were a gardener in the South planning a rock garden, I would certainly use the information gleaned from the author's growing experiences and be assured my garden would benefit.

Errata

#@!☆@#☆@!!!

Bulletin of the American Rock Garden Society 48(4):255, Fall 1990.
Don Hackenberry resides in Reedsville, PA.

Obituaries

William J. Hamilton, Jr. 1902-1990

by William Dress

Bill Hamilton, a long-standing member of the Adirondack Chapter of the ARGS and highly respected for his horticultural knowledge and experience, died July 27 at his home in Ithaca, New York. His long illness prevented him from enjoying his garden during the past two years, but he generously passed on many of his choice plants to friends during this time. He bequeathed his large collection of dwarf and slow-growing conifers to the Cornell Plantations (the Cornell University Arboretum).

Bill was Professor of Zoology at Cornell, where he earned his doctorate in 1930 and taught from 1926 to 1963. His chief research interest was in mammalian behavior, about which he published over 200 scientific papers. For many years, however, even as a student, his avid avocation was gardening. The native soil of his home grounds was a heavy clay, but over the years he replaced much of it with good loam, hauling away the clay in bushels and bringing in compost and loam the same way. His horticultural interests were wide-ranging, and for many years he would concentrate, each year, on one particular genus or group. In this way he built up nice collections of spring- and fall-blooming crocuses, dwarf willows, unusual maples, lilies, daffodils, trilliums, and the dwarf conifers, among others. He ordered material from esoteric nurseries and seed lists or hunted out rare things from his far-flung professional contacts and former students. He did not actually have a rock garden as such. He grew many plants of short stature at the front of his borders or, in the case of truly miniature conifers, choice ferns, and other delicate things, in an array of half-barrels on the protected west side of the house.

Like many ARGS members, he raised hundreds of unusual things from seed, including trees, and liked to experiment in acclimating border-line-hardy plants to his own grounds. Bill also made a great point of contributing quantities of seeds of all sorts to the annual exchanges of several societies. In fact, it was his delight to try to be the first in the list of ARGS donors each year, with the most kinds of seed, and in that he succeeded quite often. In recent years, I have been told, the number "1" was actually reserved for him. He was especially diligent in collecting seed himself and in encouraging others to collect seed of crocuses, cyclamen, and other plants often overlooked by contributors. His own garden in the fall displayed hundreds of flowering *Cyclamen hederifolium*, grown over the decades from his own seed, or, later, self-sown. Cyclamen in the gardens of many chapter members will long remind their possessors of Bill's generosity with seed and tubers.

The Marcell LePiniec Award, given to Bill in 1985, was one of his most cherished honors. The seventh annual William J. Hamilton Lecture was presented early this past October at Cornell. It was the latest in a lecture series named in Bill's honor and funded by gifts from his friends, colleagues, members of the Adirondack Chapter of

the ARGS, the Cornell Plantations, and the University itself. The series is meant to bring, each year, an authoritative speaker to lecture on a topic of general interest to the horticultural public.

Bill's legendary off-beat humor and preposterous stories and his considerable contribution to the camaraderie of our local chapter, as well as his great enthusiasm and knowledge of things botanical and horticultural, are greatly missed. Bill is survived by his wife Nellie, daughters Ruth and June, and son Bill and their families.

ARGS Coming Events

1991 Western Winter Study Weekend

Alpines at Home

Growing in Small Spaces

March 1, 2, 3, 1991
Vicotria, British Columbia

Our speakers are all people with a lifelong enthusiasm for plants, who will take pleasure in sharing their experience and knowledge with you. They include Don Elick, Cy Happy, Walter Ostrum, Doris Page, Rodney Richards and Pat Seymour. There will also be garden tours, plant and book sales, and displays. Registration $85 Canadian, $77 US.
Registrar, Claire Hughes Tel. (604) 388-6594
2901 Colquitz Ave.
Victoria, British Columbia V9A 2M2 CANADA

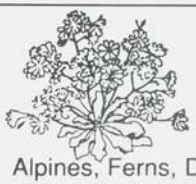
1991 Annual Meeting

A Kaleidoscope of Gardens

White Plains, New York
May 10 through May 12, 1991

Featuring the gardens of *Wave Hill, Stonecrop, The New York Botanical Gardens*—and more!

For more information write:
Michael Donovan, 214 Highbrook Avenue, Pelham, NY 10803



SISKIYOU
RARE PLANT NURSERY

An ever growing collection of over 1,000 varieties of Alpines, Ferns, Dwarf Conifers, Northwest Natives (as Lewisia cotyledon, pictured), and other hardy plants for the Woodland and Rock Garden. For our Annual Mail Order Catalog and Fall Supplement send $2.00 refundable.

Dept 1, 2825 Cummings Road, Medford, Oregon 97501
Visitors Welcome by Appointment - Phone (503) 772-6846
SHIPPING TO U.S. and CANADA ONLY

A Distinguished Collection

Over 1500 hard to find and useful plant varieties

ROSLYN NURSERY
211 BURRS LANE, DEPT. R
DIX HILLS, N.Y. 11746
124 page Mail Order Catalog $2.00

TIME TESTED HOSTAS including VARIETIES suitable for ROCK GARDENS

Fresh Hosta seeds available from January 1 to June 1.

Homestead Division
9448 Mayfield Road, Chesterland, OH 44026
Catalog $1.00 deductible from order

RICE CREEK GARDENS, INC.

Rare & Unusual Perennials
Rock Garden Plants
Dwarf Conifers
Hardy Rhododendrons
Shrub Roses
Wild Flowers
Herbs & Water Plants

Catalog $2

Nursery Sales
11506 Hwy. 65
Blaine, MN 55434

Mailing Address
1315 66th Ave. NE
Fridley, MN 55432

We Build Authentic Rock Gardens and Complete, Distinctive Landscapes

---

DWARF & RARE CONIFERS
ALPINE & ROCK GARDEN PERENNIALS
PLANTS FOR BONSAI

Catalog: $2.00 refundable on first order

PORTERHOWSE FARMS
41370 S.E. Thomas Rd.
Sandy, Oregon 97055

Telephone/FAX (503) 668-5834

CHAPTER TREASURERS

How much did your newsletter cost last year? How much should you budget for meeting expenses next year? What are your dues receipts to date this year? Are your administrative costs getting out of hand? Computerize your accounting, avoid errors, and save hours of work.

The Delaware Valley's highly successful accounting system, designed for novices, is now available from:

PCCP, P.O. Box 28, Kingston, NJ, 08528.

(Or leave a message on 609-924-9427 for a descriptive brochure.)

$49.50 for the complete system for ARGS chapters; $85.00 for others.

A • R • G • S BOOKSTORE

A Rock Garden in the South, E. Lawrence, ed. N. Goodwin, A. Lacy	$17.00
*Miniature Gardens**, by Joachim Carl, trans. M. Kral	21.00
*Cuttings from a Rock Garden**, by H. Lincoln Foster & L. L. Foster	23.00
*Alpine Wildflowers of the Rocky Mountains**, by J. Duft & R. Moseley	7.00
*Auriculas**, by Brenda Hoyatt	14.00
The Genus Lewisia*, by Brian Mathew	23.00
*The Iris**, by Brian Mathew	23.00
*Iris**, by Kohlein	27.00
*The Genus Cyclamen**, by Christopher Grey-Wilson	22.00
Vascular Plants of Wyoming, by Robert Dorn	15.00
Vascular Plants of Montana, by Robert Dorn	9.00
*Utah Flora**, ed. Stanley Welsh et al	36.00
*Orchids of the Western Great Lakes Region**, by Fred Case	26.00
*The Opinionated Gardener**, by Geoffrey Charlesworth	14.00
*Rocky Mountain Alpines**, publ. Alpines '86 Int'l. Conference	30.00
Rock Gardening, by H. Lincoln Foster	18.00
The Bernard Harkness Seedlist Handbook, by Harkness et al.	23.00
*Sucessful Southern Gardening**, by Sandra Ladendorf	18.00
*A Manual of Saxifrages**, by Webb & Gornall	40.00
*A Manual of Alpine and Rock Garden Plants** by C. Grey-Wilson	22.00
The Rock Garden and its Plants *, by Graham Stuart Thomas	26.00
*Modern Miniature Daffodil Species and Hybrids**, by James Wells	26.00
*Campanulas**, by Peter Lewis and Margaret Lynch	22.00
Rare Plants of Colorado, by Colorado Native Plant Society	6.00
Alpine Wildflowers of the Rocky Mountains, by Willard, Smithson	3.50

* denotes a hard cover

Please mail inquiries and orders to:

Jean Stevens
American Rock Garden Society Bookstore
Route 6, Woodland Drive
Eau Claire, Wisconsin 54701 USA

All orders must be prepaid in US dollars by check on a US bank or by international money order. Add postage and handling:

First Book, US	$3.00
Outside US	$4.00
Each Additional Book	$1.50

Your zip code or postal code must be included.

Chapter Chairpersons

Adirondack	William Dress, 716 Elm Street Ext., Ithaca, NY 14850
Allegheny	Al Deurbrouck, 6915 Hilldale Drive, Pittsburgh, PA15236
Berkshire	Geoffrey Charlesworth, HC 66 Box 114, Sandisfield, MA 01255
Columbia-Willamette	Diana Reeck, 1602 NE 162 Avenue, Vancouver, WA 98684
Connecticut	Richard Redfield, RFD 1, Hampton, CT 06246
Delaware Valley	Morris West, PO Box 75, Brogue, PA 17309
Emerald	Ernest O'Byrne, 86813 Central Road, Eugene, OR 97402
Great Lakes	Ken Nitschke, 1071 South Acaule Lane, Midland, MI 48640
Hudson Valley	Edith Young, Box 332, RFD 3, McDougal Ln., Peekskill, NY 10566
Long Island	Shelley Herlich, 43 Greenfield Lane, Commack, NY 11725 Lillabeth Wies, Box 233, Cold Spring Harbor, NY 11724
Manhattan	Lawrence Thomas, 340 E. 74th, #11G, New York, NY 10021
Minnesota	Florence Keller, 6412 Indian Hills Rd., Minneapolis, MN 55435
Mt. Tahoma	Doreen Pohlman, 10623 125th Street East, Puyallup, WA 98374
New England	James L. Jones, 45 Middle St., Lexington, MA 02173
Newfoundland	Bodil Larsen, Site 78, Box 36, St. John's, Newfoundland A1C 5H4
Northwestern	Micheal Moshier, 815 17th Ave., Seattle, WA 98122
Ohio Valley	Harry Butler, Rt. 1, 2521 Penemit Rd., Spring Valley, OH 45370
Ontario	Cyril Baker, 258 West St., #506, Brantford, Ontario, N3R 6N1
Piedmont	Bobby Wilder, 1213 Dixie Trail, Raleigh, NC 27607
Potomac Valley	Don Humphrey, 6540 Oakwood Drive, Falls Church, VA 22041
Rocky Mountain	Dick and Ann Bartlett, 1569 S. Holland Ct., Lakewood, CO 80226
Siskiyou	Joseph Shelton, PO Box 8311, Medford, OR 97504
Southern Appalachian	Ruth Samotis, 2618 Hebron Road, Hendersonville, NC 28739
Watnong	Barry Yinger, PO Box 565, Far Hills, NJ 07931
Western	Marion Reeve, 4325 Mountain View Ave., Oakland, CA 94605
Wisconsin-Illinois	Tom Horner, 25706 Malchine Rd., Waterford, WI 53185

Bulletin Staff

Editor	Gwen Kelaidis 1410 Eudora Street, Denver, Colorado 80220	(303) 322-1410
Advertising Manager	Al Deurbrouck 6915 Hilldale Drive, Pittsburgh, Pennsylvania 15236	(412) 653-0281
Proofreading Assistants	Barbara and Ted Cochrane, Madison, Wisconsin Bernice Petersen, Littleton, Colorado	
Editorial Advisors	Brian Bixley, Toronto, Canada Margery Edgren, Woodside, California Douglas Macdonald, Evanston, Illlinois	
Guest Artists	Vickie Danielsen Lisa Moran Nick Klise Al Stavos Phil Pearson Panayoti Kelaidis Frank Cabot	Baldassare Mineo Lauren Springer Harold Epstein David Vesall Dick Redfield Don Jacobs Jerry DeSanto

Officers

President	Sandra Ladendorf (919) 942 1734 123 High Hickory Road, Chapel Hill, NC 27516
Vice President	Norman Singer (413) 258-4486 HC 66, Box 114, Sandisfield, MA 01255
Membership Secretary	Carole Wilder (612) 437-4390 221 West 9th Street, Hastings, MN 55033
Treasurer	Diane D. Kern (212) 799-2337 (518) 392 3516 20 West 86th Street, #12A, New York, NY 10024
Administrative Member-at-Large	Ernest O'Byrne (503) 935-3915 86813 Central Road, Eugene, OR 97402
President Emeritus	Harold Epstein (914) 834 1551 5 Forest Court, Larchmont, NY 10538

Directors of the Board

1988—1991	Muriel Milsted, Downers Grove, Illinois Nickolas Nickou, Branford, Connecticut Ramona Osburn, Jacksonville, Oregon
1989—1992	Nancy Goodwin, Hillsborough, North Carolina Joan Means, Georgetown, Massachusetts Sandra Snyder, Littleton, Colorado
1990—1993	David Vesall, White Bear Lake, Minnesota Morris West, Brogue, Pennsylvania Barrie Porteous, Agincourt, Ontario

Managers

Executive Secretary	Jacques Mommens PO Box 67, Millwood, NY 10546
Seed Exchange	James L. Jones 45 Middle St., Lexington, MA 02173
Bookstore	Jean Stevens and Carole Wilder Route 6, Woodland Drive, Eau Claire, WI 54701
Archivist	Marnie Flook RD 3, Box 278A, Chestertown, MD 21620
Slide Collection	William Plummer 10 Fox Lane East, Painted Post, NY 14870
Library	Janet Evans, c/o Pennsylvania Horticultural Society, 325 Walnut Street, Philadelphia, PA 19106

You are invited to join the American Rock Garden Society. Membership includes a subscription to the *Bulletin* and participation in the seed exchange, as well as other benefits. Annual dues, to be submitted in U.S. funds by check on a U.S. bank or by International Money Order, are: General Membership, $25.00 (domestic or foreign, single or joint); Patron, $50.00; Life Member, under 55 years old, $350.00; over 55 years old, $300. Membership inquiries and dues should be sent to Secretary, ARGS, PO Box 67, Millwood, NY 10546.

Address editorial matters pertaining to the *Bulletin* to Gwen Kelaidis, Editor, 1410 Eudora Street, Denver, Colorado, 80220. Advertising matters should be addressed to Al Deurbrouck, Advertising Manager, 6915 Hilldale Drive, Pittsburgh, Pennsylvania 15236. The *Bulletin* is published quarterly by the American Rock Garden Society, a tax-exempt, non-profit organization incorporated under the laws of the State of New Jersey. Second Class postage is paid in Millwood, New York and additional offices. Postmaster: Send address changes to *Bulletin of the American Rock Garden Society*, (ISSN 0003 0864), PO Box 67, Millwood, NY 10546.