



Bulletin of the
American
Rock Garden Society

VOL. 42

SPRING 1984

NO. 2

THE BULLETIN

Editor . . . Laura Louise Foster, Falls Village, Conn. 06031

Assistant Editor . . . Harry Dewey, 4605 Brandon Lane, Beltsville, Md. 20705

Contributing Editors . . . Roy Davidson, Anita Kistler, H. Lincoln Foster,
Owen Pearce, H.N. Porter

Layout Designer . . . Buffy Parker

Advertising Manager . . . Anita Kistler, 1421 Ship Rd., West Chester, Pa. 19380

CONTENTS

VOL. 42 NO. 2

SPRING 1984

Dodecatheon - L.L.S. et.al	53
The Great Fatra - Josef Halda	63
Robert Putnam	72
Little Known Miniature Conifers: Part III - Robert Fincham	73
Native Ferns in the Wild and in Our Gardens - David B. Lellinger	76
T. Paul Maslin	87
Computers and Rock Gardening - Geoffrey Charlesworth	88
Carroll Watson: The Man and the Plant - L.P.C.	90
Galanthus Elwesii or Nivalis - Barbara van Achterberg	91
Book Reviews: Kew, Gardens for Science and Pleasure edited by F. Nigel Hepper; A Giant Among the Dwarfs, The Mystery of Sargent's Weeping Hemlock by Peter Del Tredici	93
In Praise of Arabis Androsacea - Alan Slack	94
A Way to Cope with Fussy Plants - Edith Dusek	95
Viburnum Plicatum Tomentosum 'Fujisanensis' - Vaughn Aiello	97
Of Cabbages and Kings	98

Cover Picture - *Dodecatheon amethystinum* - Laura Louise Foster,
Falls Village, Connecticut

Published quarterly by the AMERICAN ROCK GARDEN SOCIETY, a tax-exempt, non-profit organization incorporated under the laws of the state of New Jersey. You are invited to join. Annual dues (*Bulletin included*), to be submitted in U.S. Funds or International Money Order, are: General Membership, \$15.00 (includes domestic or foreign, single or joint - 2 at same address to receive 1 *Bulletin*, 1 Seed List); Patron, \$50.00; Life Member, \$250.00.

Membership inquiries and dues should be sent to Norman Singer, Secretary, SR 66 Box 114, Norfolk Rd., Sandisfield, Mass. 01255. The office of publication is located at Norfolk Rd., Sandisfield, Mass 01255. Address editorial matters pertaining to the *Bulletin* to the Editor, Laura Louise Foster, Falls Village, Conn. 06031. Address advertising matters to Anita Kistler, 1421 Ship Rd., West Chester, Pa. 19380. Second Class Postage paid in Sandisfield, Mass. and additional offices. *Bulletin of the American Rock Garden Society* (ISSN 0003-0864).

Bulletin of the American Rock Garden Society



Dodecatheon

This spring issue of this our 50th Anniversary year seems a most suitable time and place to feature the genus *Dodecatheon*, the floral emblem of our society. For those who are interested, the history of how this particular plant was chosen as our emblem can be found in *Cabbages and Kings* of this issue.

In explaining the derivation of the name of this genus I can do no better than to quote Roy Elliott in his book *Alpine Gardening*:

“The name Dodecatheon (dodeka, twelve, and theoi, gods) goes back to very ancient times, when Pliny is supposed to have bestowed the name on a flower which he considered to display the majesty of all six Gods and six Goddesses. And if you wonder how on earth the worthy Pliny came to discover a plant which ranges from

Maine to Texas, the answer is the obvious one that he didn't. Many of our plant names, such as *Iris* and *Narcissus*, are of great antiquity, going back to earliest recorded times. When Linnaeus came to gather together all known names in his *Genera Plantarum* (1736), there were many names, needless to say, for which no record of the particular plant existed. Rather than waste these names, Linnaeus, much to the subsequent horror of botanists, used up the old names on new genera for which names had to be found. This is a possible explanation of Pliny's apparent visit to America some centuries before other brave men — still believing the world to be flat — sailed to the point at which the sea was supposed to vanish over the edge to Hell and found — in the words of Arthur Bryant — ‘not Hell, but America’.”

According to John Ingram in his "Notes on Cultivated Primulaceae, 2. Dodecatheon," published in *Baileya* in 1963, Phillip Miller, author of the 18th Century publication, *The Gardener's Dictionary*, claimed to have seen the Shooting Star in an English garden in 1709, though it disappeared from cultivation shortly there-after and was not reintroduced until thirty years later. Before Linnaeus published the generic name *Dodecatheon* for this plant in 1754 it had been illustrated by Plukenet and Mark Catesby and the latter had dubbed the plant *Meadia* in honor of Dr. Richard Mead, an English physician and patron of science. It was under this name that Miller described it in 1752 in *The Gardiner's Dictionary*. According to Miller, Linnaeus was unwilling to accept this generic name *Meadia* because Dr. Mead was not a great botanist. Linnaeus was, however, willing to commemorate Dr. Mead by naming the original species, *Dodecatheon meadia*, after him. Despite Linnaeus, Miller continued to use his original generic epithet *Meadia* in the eighth edition of his *Gardiner's Dictionary* in 1768 and as late as 1891 Dr. Otto Kuntze still championed *Meadia* for this genus. Dr. Kuntze believed in the doctrine of absolute priority, which means that plant names should not begin with Linnaeus's publication of *Species Plantarum*, 1st edition 1753 or *Genera Plantarum*, 5th edition 1754 (the more accepted doctrine), but should begin with Linnaeus's *Systema Naturae*, 1st edition 1735 in which dodecatheon is not mentioned under any name. As you can see taxonomic squabbles are nothing new.

At present the name *Dodecatheon* is the accepted one and the next question is: How should it be pronounced? We have all been taught that it is proper in botanical names to place the stress

whenever possible on the antepenult or third syllable from the end. Therefore most of us probably pronounce this epithet do-de-KAY-the-on, landing heavily on the "Kay" with a long "A". On the other hand the Greek word "dodeka", from which this name is partially derived, ends with a short "a", so perhaps we should more correctly speak of our emblem as do-de-KA-the-on with the "Ka" pronounced as in "cat" or "about". Another suggestion was put forward by Claude A. Barr in his article "How Shall We Say Dodecatheon?" (*ARGS Bulletin* Vol. 23, p. 33). He suggests that we should ignore the artificial ruling that the accent be on the antepenult and pronounce the name as it means — "twelve gods" — with "twelve" as the modifier and "gods" the emphasized word. Thus, when returned to the Greek, while still using the same emphasis, we end up with do-deka-THE-on (short "a", soft "th"), with the stress on the long "e" and a secondary accent on the first syllable.

As Claude Barr says in the same article: "In our botanical Latin we have, of course, endless precedent for compounding, or breaking up words, and placing the accent here or there; a freedom that would surely startle or horrify a classical Roman. One result of this, as expressed by a professor of botany: 'It is interesting to listen to a group of botanists in discussion; no two of them speak the same language.'" Yet they seem to be able to understand each other, so perhaps, fundamentally, it doesn't matter how we say *Dodecatheon*.

Giving the correct specific name to the right plant is another matter. And here, unfortunately, we run into a real puzzle. We all know a dodecatheon when we see one, but how do you give the correct specific name to

a specific dodecatheon?

Most members of the genus more or less resemble each other. They are all perennial plants growing from a short underground caudex furnished with long fleshy roots and a cluster of basal leaves, which generally wither away, frequently along with the roots, in the heat and drought of summer. As the old posterior portion of the caudex dies, new growing points form on the tip. New plants are produced vegetatively from the base of the thick fleshy roots or from rice-grain bulblets (characteristic of a few species) clustered around the caudex. Flowering stems may range in height from a few inches to about a foot and a half and can bear from one to as many as 125 (rarely), typically nodding inside-out flowers hung from the tips of gracefully bending pedicels in a loose umbel. The four or five turned up lobes of the corolla vary in color from white through shades of rose to deep red in some individual plants. From the base of these sharply reflexed petals, the corolla tube with protruding stamens (their number equal to the number of lobes) and the single pistil form a down-stabbing "beak" variously marked with bands of maroon, yellow, black and white. Once the flower is fertilized the corolla and stamens shrivel and fall away and the pedicels straighten to hold the seed capsules upright. At maturity the summit of the capsule opens either because the tip breaks off (operculate) or splits down the seams for a short distance (valvate). In the latter case the open capsule has distinct acute points at the tip.

Dodecatheons are fairly widespread, one or more species native to all States of the Union except Hawaii and those of New England. Because they usually grow in specialized habitats, from the mountains to dry, short-grass prairies,

to lush swampy lowland meadows there is considerable variation in the genus and even within the individual species. Taxonomists have been busy lumping and splitting the genus into species, subspecies, varieties and forms, sometimes creating new species with new names or alternatively reducing former species to subspecies or varieties or even reducing them to mere synonyms. As one might expect local floras are more likely to give specific status to plants considered only variations or sub-species by taxonomists studying a wider geographical range.

The most recent comprehensive study of the entire genus "The Biosystemics of Dodecatheon", Contributions from the Dudley Herbarium of Stanford University 4: 73-154 by H.J. Thompson in 1953, reduced to fourteen (with twenty-one subspecies) over 170 combinations of names which had been used for the genus. In general, Ingram, in his "Notes on Cultivated Primulaceae-Dodecatheon" follows Thompson's nomenclature. As all this splitting and lumping is very confusing to a mere rock gardener-editor with no taxonomic training, I have no intention of venturing onto the miry ground of nomenclature where even botanists hesitate to tread and shall, with no further ado, suggest you get Dr. Thompson's or John Ingram's monograph or both and decide for yourselves and, in the meantime, offer you a selection of comments about dodecatheons that have appeared in previous Bulletins.

• • •

In the September-October issue of the first Volume of the Bulletin (1943), Dr. Edgar T. Wherry discusses *Dodecatheon amethystinum* (illustrated on the cover).



Dodecatheon amethystinum at home in Lancaster County, Pennsylvania. The moist coolness of this natural garden is indicated by the moss on the limestone ledges and the abundance of Fragile Fern, *Cystopteris fragilis*.

- E. T. Wherry photograph

... "When it comes to distinguishing species, however, considerable difficulty arises. The characters used in the diagnostic keys in our floras and manuals are not easy to check; and when one tries to apply them to the plants in the field, in the western United States where the majority of the twenty or so species occur, these keys often fail to work.

"In the midland and eastern states there is no such problem; for there are only two well marked species in this region, and they are decidedly different in aspect. The commoner, more widespread one is *Dodecatheon meadia*. It was discovered in Virginia by Rev. John Banister about 1675, and named by Linnaeus in 1753. It attains its greatest abundance, however, in the prairie states where it attracted the attention of the early explorers and was mentioned in their journals. Its

flowers range from pure white to pink or purplish, and although not unattractive, it is a bit heavy for the small rock garden.

"The second midland-eastern species had to wait a long time for recognition. Regarded by the early botanists who saw it as a mere variant of the widespread one, it was named as a variety of that by professor Norman C. Fassett in 1929. Then, two years later, he raised it [to] the rank of a species and as such it is made the subject of the present study. Discovered in western Wisconsin, it has been found to grow also in Minnesota, Iowa, Missouri, as well as central Pennsylvania.

"*Dodecatheon amethystinum* is well named the Jewel Shooting-star, for it is a veritable jewel among plants both in its native haunts and in the rock garden. It is more delicate than

the widespread eastern species, and the petals are of a deeper hue, a lovely amethystine violet. It blooms in early May, a week or two earlier than the other. The capsules develop soon after the flowers have faded, and the seed may be collected in a few weeks, and used to increase the planting. The foliage then withers away, but vitality remains in the bulbous crown, and new leaves will appear with the first touch of the following spring.

"In deciding how to plant it in the rock garden, one should bear in mind that it is a northern species. It can withstand, accordingly, severe winter conditions, but is rather intolerant of summer heat. In the wild it grows on moist, mossy, north-facing cliffs, where the soil is cool throughout the growing season. It should be planted, then, in a lean soil in a sheltered part of the garden, where the summer sunlight does not fall directly on the ground.

"*Dodecatheon amethystinum* is an herbaceous perennial with a basal rosette of rather large elliptic-oblong leaves. In early spring it sends up, to a height of 5 to 10 or rarely 15 inches, a slender stem bearing a few-flowered umbel. The pedicels at first curve so the flowers assume a nodding position, but become erect as the capsules mature. The five strongly reflexed corolla-lobes are of a brilliant amethystine hue. They hide the calyx, but when this is looked for, it is found to bear five short lobes which are tipped, as are also the bracts at the base of the umbel, with tiny red points. The golden cone of anthers projects out for about a quarter of an inch. The straw-colored cylindrical capsules are thin-walled, and produce numerous small brownish seeds.

"It can be told from *D. Meadia* by the latter being coarser and taller (when fully developed 15 to 25 inches

high); the numerous flowers being paler in hue and the longer calyx-lobes not red-tipped; the anther-cone 1/3 inch long, the bright brown ovoid capsules thick-walled and seeds brown."

Ten years after Dr. Wherry wrote this article, H.J. Thompson reduced *D. amethystinum* to a synonym of *D. pulchellum*, a very widespread and variable species, mostly western in distribution. Dr. Wherry had this to say on the subject in the August issue of the *Connecticut Plantsman*, 1973:

"... [This] treatment [of *D. amethystinum*] was wellnigh incredible: although it is a typical temperate climate lowland riverside plant, it got taxonomically tossed into subjective synonymy with *D. pulchellum*, an arctic-alpine which ranges from Alaska at increasingly high altitudes down to southern Mexico. Such disregard of plant-geographic relationships seems unworthy of acceptance."

• • •

In the July, 1964 Bulletin, Vol. 22, p. 86 Frank H. Rose of Missoula, Montana wrote an article on the dodecatheons of his state. Though not much of a gardiner, Mr. Rose was a plant and seed collector of considerable note and widespread knowledge of the flora of Montana. He had been a member of ARGS for many years and many of his collected plants and seeds had found their way into the gardens of members of the society. He, too, as can be seen in excerpts from his article on Montana's dodecatheons, ran into the problem of nomenclature.

“. . . *The Vascular Plants of the Pacific Northwest* by Hitchcock, Cronquist, Ownbey and Thompson (1959) gives Montana three species, *Dodecatheon jeffreyi*, *D. conjugens*, and *D. pauciflorum*, of one, two and four varieties. This is a great simplification from the 30 or more names previously used. No sooner was Hitchcock in print, however, than John Ingram comes out in *Baileya* (September, 1963) with classification of "Dodecatheons in Cultivation" raising one of Hitchcock's varieties to full species and changing the name of the species under which the other three varieties are left. He had reasons; they all do.

"Ingram says the *D. pauciflorum* is a synonym of *D. meadia*, and that under that name [*D. pauciflorum*] should be called *D. pulchellum*. *D. radicum* seems to be another synonym [for *pulchellum*] recognized by both authors.

Ingram raises *D. cusickii* to a full species. I like that because it is here in Montana, and I am already acquainted with it. Besides I have seed and much prefer to type two words than three. Better carry a magnifier to the field with you, though, to be sure of the thickened capsule walls and the pointed valve tips that separate it from *D. conjugens viscidum* which is equally or more glandular pubescent, but usually shows clearly the operculate capsule (flat tipped points on the capsule valves) or if the [unopened] pods only are available, the style thickened at the base.

"Size, leaf shape, number of flowers, color, pubescence, and most other characteristics vary greatly, especially in *D. pauciflorum*, on different sites, and I still have a lot of plants to look at before I can always be sure.

"My *D. jeffreyi* gives me no trouble. It grows where you would expect *Primula parryi* to grow, in a wet place,

but sometimes on up the slope to where the ground dries quite hard in late summer. Its yellowish-white, thickened, brittle roots, tending downward instead of horizontally, are quite characteristic, although unmentioned by botanists. Like *D. meadia* it is too big when favorably grown for the small rock garden. Its pale flowers open only inches out of the soil but seed may ripen a yard higher up. Like all Dodecatheons, it may be dug when the seed ripens and be kept out of the soil until the following spring, and still grow. It is better with this one not to let it dry to brittleness, as some others may, but keep it damp as under a tarp on the cellar floor.

"*D. conjugens* grows all purple in some areas and half of them white in other localities. Oh well, color doesn't mean much; intergradation is accepted among plants, so note the wavy ring, the yellow to purple filaments and supposedly roughened connectives, its lanceolate to spatulate leaves, and glandular or lacking pubescence, but finally note the operculate capsule leaving square-tipped valves on the opened capsule indicated by the thickened style base in immature plants. All I know have drainage and may become quite dry in late summer with roots so brittle they can only be dug in moist weather. For yourself the root crown is all that is needed. Either full sun or the shade of a western yellow pine seems equally satisfactory. They mingle with and probably hybridize with *D. cusickii* and possibly *D. pauciflorum*. Our plant is chiefly the variety *viscidum*.

"*Dodecatheon pauciflorum*, or *pulchellum* or *radicum*, if my determinations are in any way good, grows in a sunny wet meadow, timber-shaded bogs, under western yellow pine, as scattered clumps in grassland, or anywhere else. It usually has smooth

tapered leaves, but these also vary. Its size may be anything depending upon the site, but its capsules should open with valves that come to a sharp point. *D. pauciflorum* var. *watsonii* is a tiny alpine plant with a large single flower. Like many alpiners, the flower seems out of proportion to the plant and is bright colored. *D. p. watsonii* grades downhill into larger and multiflowered varieties, and perhaps would be so in your garden. Anyway this pretty little alpine is only a memory to me, as my high altitude climbing days seem to be over."



Laura E. Jezik of Seattle, Washington wrote an article entitled "Two Unusual Dodecatheon Species" for the July 1966 Bulletin, Vol. 24, p. 99, and once again the problems of dodecatheon nomenclature turn up to puzzle us:

"*Dodecatheon patulum* is not often mentioned in the literature. Farrer and Clay were both aware of it, as was Correvon. Munz now lists it as a subspecies of *D. clevelandii*. I have not seen that species, so cannot have an opinion. For the present I shall call it *D. patulum* as it has been known under that name for some time.

"This Californian, from hot adobe land in the north Sacramento Valley, is a good creamy-white or light yellow, with a prominent red-black central zone. It is about three inches tall, and is a colonizer, locally covering acres so thickly that it is difficult to avoid plants while walking through. Jepson says it favors slightly alkaline areas. I found it intergrowing with two inch *Orthocarpus erianthus*, an annual, which gilds acres with its tiny calceolaria-like pouches at the tips of its stems; *Baeria chrysostoma*, another annual, three inches of bright daisy;

Brodiaea capitata, ever present and ever lovely, and several other bulbous and annual plants, as well as perennial lupines. *Dodecatheon patulum* keeps its feet out of the water and climbs every rise, if only slight, and stays away from the occasional puddles. It grows among volcanic rocks, and without them, in full sun and under deciduous oaks in some places. It is sometimes subject to frosts of 30 degrees F. as late as mid-March.

"Occasionally genetic memories of family redness dominate and there will be a small colony of pink plants. These are fewer-flowered than the type and more delicate. The central zone is redder than black. Next to this is a golden stripe, then a short white one, and the tip two thirds of each corolla lobe is a good true pink.

"Like many another plant from the valleys of California, it has a short period of active growth. It breaks dormancy at about the end of February, is in full bloom by mid-March, has spent its seed and disappeared by the first of April.

"In the garden, in my maritime climate, this plant requires a hot scree with perhaps some attention to its liking for alkaline areas. Gardens which can provide the unbearable heat of its summer home, could grow this in clay, but water would have to be carefully managed.

"In reading Clay again, I came upon his comment on *Dodecatheon glastifolium*, which was described from California, but he implied it was apparently not in the trade. Perhaps the reason is that *D. glastifolium*, Greene has been included in the variable *D. conjugens*. It differs a bit from the latter in being very long-pedicel, and has distinct leaves, wavy, waxy, and nearly succulent, deep green. I have this in colors ranging from a good red to a hot pink, a mauve, a pale pink, and a

white good enough to be named.

"Though listed from Modoc County, in the extreme northeastern corner of California, I found quantities of it west of the Cascades, in Shasta County, where it grew as part of the foothill community with small deciduous and evergreen oaks, redbud, ceanothus, and others. It prefers a soil with more vegetable matter than does *D. patulum*, and full sun in mild climates.

"The habit of early dormancy in dodecatheons adapts them to positions in full sun. With the exception of the two wet species (*D. dentatum* and *D. jeffreyi* and its varieties), most [western] dodecatheons are better in sunny screes than in shade. All of them will be found growing in full sun, some of them are always there, and a few, like *D. hendersonii*, will grow in open glades in sunny woodlands.

"Of the more than fifteen species I grow, all, excepting the wet ones, have been found more often in clays than in any other type of soils. These native clays are prairie and hot land clays, not packed and compacted as garden clays are, and they are not often wet down. In the garden the same conditions can be obtained by using a loose soil with nourishment, both mineral and vegetable, but with perfect drainage.

"The prairie dodecatheons are good natured and tolerant plants, adapting well to garden conditions."

• • •

In the Winter issue, 1976, Vol. 34, p. 4 a note on colonizing *Dodecatheon meadia* in an Illinois woodland by Mrs. Ralph Cannon of Chicago appeared, in which she relates how she succeeded with this lovely Eastern species:

"One of our encroachments on the indigenous wild flowers that cover our Illinois woodland garden was to plant

some *Dodecatheon meadia* for which we have a fondness. My neighbor had many of these growing in his woodland where his cattle grazed and offered us all we wanted. We moved about 50 rosettes and tried to plant them in moist dappled shade of the trees whose environment was similar to that from which they were taken. We went to considerable effort to see that these plants would be happy. However, they were not. They seemed to have difficulty in growing. The next spring there was poor bloom, short stems and few colors. As the rosettes began to disappear we moved all the plants to other shady spots among the many trees. A year passed and no signs of improvement. We hated to lose these beautiful native flowers and so decided to move the plants again to an entirely different environment: a sunny meadow.

"The sunny areas in our woodland and orchard are planted with thousands of daffodils that grow in the unmowed grass. Among the daffodils and grass all the Shooting Stars from the shady locations were moved. Here they would have to grow or be abandoned. Imagine our surprise when in the following April the Shooting Stars came up briskly. What beautiful healthy plants flourishing in the grass! Hundreds and hundreds of blooms, tall stems carrying umbels of glistening white, lavender or rose flowers.

"Since we try to follow the hints that our woodland gives, we allowed the seeds dropped by these healthy parent plants to grow and form a natural figuration made by the wind and rain. This colonization of these happy Shooting Stars growing in grass in a sunny meadow has produced hundreds of new plants which ran too perfectly random to have been initially composed. I think we have made a garden within a garden. They have far exceeded our expectations and have

made a major contribution to our woodland. On a May day with cloud shadows chasing each other across the orchard grass, the full bloom of the quiet pastel tones of the Shooting Stars epitomizes a rare serenity for all of us."

• • •

Edith Hardin English, that famous botanist and plantsman from Seattle, Washington, mentions two species and one variety of dodecatheon in her article "Western Water Dabblers", which appeared on page 66 of Volume 6 of the Bulletin in 1948:

"The Primrose Family offers us several water-loving plants in the genus *Dodecatheon*. It is a pleasing sight to see *D. dentatum*, a dainty, fairy-like, little Shooting Star, growing along a mountain brook, its ethereal blossoms reflected with intricate perfection in the quiet pools. As the name suggests, its leaves are noticeably toothed, and its flowers are pure white, normally, rather than being so by albinism which is a common occurrence within this group. In cultivation, *D. dentatum* thrives and produces an abundance of flowers if given shade and plenty of moisture.

"Should we desire color, rather than white daintiness, it may be found in the robust, violet-rose blossoms of *Dodecatheon jeffreyi*. A number of strains of this species occur within our region. However, for use along a rock garden stream, it is wisest to select those with short, stout stems. A novel relative is *D. tetrandrum* which has four petals in place of the usual five. Such true water-loving plants should not be confused with the arid land species of *Dodecatheon* that we find on the prairies and on the hills of eastern Washington. These are suitable for drier parts of the rock garden but



Dodecatheon dentatum in the garden.

— E.H. English photograph

they would not display any degree of contentment if planted with their feet in water."

• • •

Ray Williams of Watsonville, California, whose articles on dryland gardening have appeared from time to time in the pages of our Bulletin wrote a brief paragraph about *Dodecatheon hendersonii*, which appeared in Volume 17, page 116 in 1959:

"*Dodecatheon hendersonii* is one of our most attractive spring flowers and is quite common in the Gabilans and the Santa Cruz Mountains. It grows best in light chalky soil often with solid rock only a few inches underneath. From the flat rosette of grayish-green leaves the flower stems,

sometimes ten or more inches high, arise to bear three to six and sometimes more Shooting Stars in a range of colors from white to purple, always with the black stamen circle which gives them their other common name, Mosquito Bills. It is not happy with summer moisture."

• • •

To conclude this anthology from the pages of the Bulletin there is a brief note on page 30 of Volume 16 in which the anonymous author of an article on growing plants from seed warns the reader, "Dodecatheons germinate easily from early spring sowings, but in a few weeks the leaves usually turn yellow and disappear. Do not throw out the seed pots, for the plants are behaving normally and will show new growth very early the next spring."

This group of articles by no means covers the entire genus or even all those grown in our gardens, but except for a few passing mentions of

one or two others, this compendium contains all the information that could be gleaned from the ARGS Bulletin. It would be remiss, however, if no mention were made of the informative paragraph, in Sonia Lowzow's article, "Don't Discount Arizona", in the Fall 1983 issue, Vol. 41, p. 185. It was not included here only because it was of such recent date that most of you have already read it or can easily look it up.

As you can see from the above, dodecatheons, though not easy to identify, are not particularly difficult in cultivation if given a suitable site. It should, indeed, be possible to grow at least one species in every State of the Union — yes, even in Hawaii and New England, where they are not native (despite Roy Elliott's assertion that dodecatheons appear in the wild in Maine. Mr. Elliott is, after all, British, and as such should be forgiven for this lapse as he, I hope, would forgive us if we made a like blunder in the plant-geography of Great Britain.

H.J. Thompson: *The Biosystemics of Dodecatheon*, Contributions from the Dudley Herbarium of Stanford University 4: 73-154. 1953. Dudley Herbarium, Stanford University, Stanford, CA 94305. Out of print.

John Ingram: *Notes on the Cultivated Primulaceae, 2. Dodecatheon*, *Baileya* 11: 69-90. 1963. Bailey Hortorium, Cornell University, Ithaca, NY 14850 §

• • •

We do not, in our gardens, need rarities, nor more land, nor a better climate (though one can conceive of improvement here). We merely need more labor and less grumbling, more brains and fewer store-bought gewgaws, and most of all more awareness of what is in front of us in the garden. What good would a whole orchard full of daffodils be, if our minds were preoccupied with palm trees?

— *The Essential Earthman*
by Henry Mitchell

The Great Fatra

Josef Halda

Horach, Czechoslovakia

Illustrations by J. Haldova

You certainly know this feeling. You lie on the top of a hill and look at the sky where white clouds are floating; keeping your eyes slightly closed, you imagine yourself flying with them to far places, nearly up to the boundaries of being.

Everybody has a place — perhaps since childhood — where he may seek solitude and dream. The name of my place is the Great Fatra, located in the western part of the High Carpathians. Surrounded by an open landscape of meadows and fields smelling of grain, this region is simple, pure and sweet. Brooks run through it and tracks and paths cross it. Then, all at once, appearing like a castle in a fairy tale, my mountains tower.

Maybe they are really hills, because their length and breadth do not exceed thirteen miles. Now I can picture you, dear reader, with a slight forbearing smile on your face, asking, what is this chap going to talk about? Why should he describe such molehills? Maybe I should not have expressed it so grandiosely, perhaps I should have stuck simply to reality. But I have a reason. I do not wish to write about the Himalaya, though I have seen a little bit of them; the Pamirs seem to be too cold and impersonal; the Tianshan too vast; the Caucasus — but why should I apologize? Simply read about the Great Fatra and that is the end of it.

We know mountains, which are appealing to many, whose peaks are

attainable by cable cars or even by asphalt roads, but fortunately there are other mountains too, that are to be visited only by expending pain and sweat yet are richly rewarding. The Great Fatra is of such a kind. There are no cables, no roads. If you want to see them — walk!

These small mountains derive their reputation for beauty from the limestone and dolomitic formations and their repeated tectonic fracturing movements. The main ridge is composed of limestone and dolomite of the lower chalk (neckom) series; these relatively less resistant rocks lend a gentle aspect to the scenery, with bare, neatly shaped peaks. Triassic limestones and especially the dolomites on the far side protrude more markedly. Dolomites, differing from limestone by their magnesium content, are more resistant to water disintegration. They thus contribute conspicuously to the landscape morphology by creation of rock towers and needles. Triassic limestones of the mountain Tlsta, as the third tectonic unit of the region, lie above the dolomites of the Choc geologic series. The differences among the structural units are apparent even to a layman passing through the rocky valleys onto the open, softly rounded main ridge.

If we set off from Blatnice north eastward along the road to Gadar, after about three-quarters of a mile we come to a small bridge crossing the Blatnice brook. After passing over it



From top: *Daphne mezereum*, *Crocus heuffelianus*, *Primula vulgaris*

we enter the Konsky (Horse) Valley and this is the very beginning of the trip up the most beautiful mountain, Tlsta (Stout); at 1414 meters above sea level it is the highest peak of the west ridge. (The main east ridge reaches 1500 meters in four peaks, the highest being Ostredok at 1592 m.) We ascend for about an hour on a twisting, steep path through a beech-fir wood. All the time, even in deep shade, we are accompanied by the lovely little stars of *Astrantia major*, the white or pink

umbels of which attempt to disown their relationship to umbelliferous carrots.

The marked route trends through Horse Valley along the high rock faces of Muran (Wall), where infinitely long, picturesque, corrugated limestone strata can be observed. If we take a path to the right we can ascend peak Ostra (1264 m.) offering a nice outlook into Turcan Valley blocked by the barrier of Small Fatra. The view from this point downward onto the lower countryside in unforgettable. Here I often come to gaze at this piece of the world where I would gladly spend the rest of my life.

Already, at the end of winter, the meadows and hillsides among the woods awake to life. At the end of March and in April there comes into bloom a many-colored carpet woven predominantly of the pale violet of *Crocus heuffelianus*, the yellow of *Primula vulgaris*, and the richly fragrant, carmine-violet shrubs of *Daphne mezereum*. In moister places the bells of *Leucojum vernalis* ssp. *carpaticum* add a touch of white to the pattern. As the snows gradually thaw, the bare mountainsides become violet due to the millions of crocus, which thrust through the snow cover as if they wished to hasten the departure of winter.

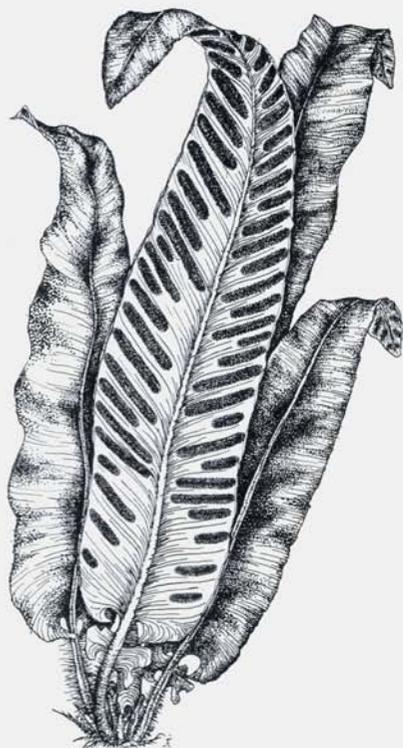
In the massive rock faces are numerous hidden caves. The most famous of these is Mazarna, situated quite high up, in which there is a spring much frequented by tourists. Good water was certainly an important precondition for human settlement and in the vicinity of Mazarna bones and tools dating from neolithic times have been found.

Now we continue on our route again. The trees become more scattered and on the rocky slopes we can find a variety of plants, more or less familiar.

On shaded rock faces are many ferns among which are *Asplenium trichomanes* and *A. viride*, whose lovely fronds decorate the rocks even in winter. *Polypodium vulgare* prefers shady but slightly drier sites and in such places covers the rocks densely with its slender chains of rusty villous root-stocks and gray-green rustling leaves decorated down their length by the cinnamon dots of sporangia. On shady boulders along the brooks and under moist rocky overhangs are lovely groups of "stag-tongues" — *Phyllitis scolopendrium*, with leaves up to half a meter long. The shape of their fronds varies from broadly lanceolate, somewhat broader at the base, to narrowly elongate with smooth or undulated margins. *Phyllitis* thrives in monocultures; in favorable conditions it produces colonies so tight that not even cortusas, frequent inhabitants of similar biotopes, can be successful among them.

At last the regular woods end and several shrub-like beeches and spruces spread on the meadow to welcome us to the terraces of Mount Tlsta. Even at a distance, before they can even be seen, the large cushions of *Dianthus praecox*, reveal their presence by their dazzling fragrance. This species has sizeable white to pink, lacinate flowers on stems seldom taller than 20 cm. It thrives on the steep or even vertical faces of cliffs, unlike *Arctostaphylos uva-ursi*, which settles on ledges and summit plateaus. In spring the latter is still decorated with shiny red, tart little berries, eaten with delight by grouse. Its whitish-pink, urnlike flowers are not very showy as they are hidden among the leaves.

In similar habitats whole colonies of houseleeks — *Jovibarba hirta* (*Sempervivum*), are nestled, often accompanied by arctostaphylos. Even though



Phyllitis scolopendrium

the houseleeks bloom only in early summer, their fleshy, many colored rosettes are decorative the whole year. Most often they are a rich green, but many are purple to chestnut brown, or they are tinted in various shades of green to yellowish. Frequently there are colonies measuring over three feet across.

The most beautiful ornament of the rocks is *Pulsatilla slavica*, which colonizes ledges, crannies and screes, preferring southward or westward slopes,



From top: *Jovibarba hirta*, *Archtophthalphos uva-ursi*

which is interesting. The largest specimens can be found on overhangs of the second terrace where the bright, fifty-flowered clumps resemble at a distance gorgeous bouquets laid aside by Wild Women of the Woods. The most frequent color is a warm pink-lilac, but violet or light blue-lilac shades are not exceptional. Only a few times have I found plants with pure white flowers. These albinos are but passing guests in our rock gardens, leaving among their offspring,

from time to time, among thousands of lilac flowered seedlings, only a few creamy white flowered plants, looking like princesses among the knights.

The whole *pulsatilla* (except the leaves) is densely villous, the hairs being mostly whitish or brownish, but there are plants to be found whose indument is markedly rusty, which contrasts beautifully with the delicate color of the flowers.

If we want to discover this species in bloom, we have to set out for the mountains as early as the beginning of May. It is at this time that the most beautiful specimens are in blossom on the steep cliffs. Later on, during June and July, when the gentians are in flower, the ripe *pulsatilla* seeds have already dispersed, gliding away on their feathery awns, or, perhaps, have even germinated.

Blooming even earlier among the rocks, *Draba aizoides* settles into any dry sunny site. Its dark green domes, consisting of ciliate rosettes, produce decorative yellow flowered scapes almost immediately after the snow has melted. The seed germinates soon after ripening, often in incredibly minute cracks in the rocks and it frequently takes ten or even more years before these starving plants can produce their first flowers.

At about a 1,000 meter altitude we find a fairly dense growth of dwarf pine, *Pinus mugo* ssp. *mughus* (*P. montana*), with occasional solitary larches, *Larix decidua*, and rowan, *Sorbus aucuparia*, and a smaller shrub, *S. chamaespilus*. Here above tree line, the dwarf pine reaches a height of three to five feet, forming an almost impenetrable thicket. With the increasing altitude these shrubby pines become even more compact and on the ridges they hardly exceed a foot in height. Hidden beneath the dense mat of branches their thick

trunks give evidence of the great age of even these small shrubs. On the boulder fields between the patches of grass and dwarfed pines are large mats of *Globularia cordifolia*, covered in June with their globular heads of gray-blue flowers. Their gnarled woody branches are often thicker than a thumb and give us some realization of the age of these plants also.

When we focus on the charms of the local mountain meadows we can see *Primula halleri* with long, tubular, lilac flowers protruding from the grass



From top: *Leontopodium alpina*,
Aster alpinus, *Campanula cochleari-*
folia, *Minuartia laricifolia*

along with shining blue *Polygala amara*. *Aster alpinus* descends from the rocks onto the stony meadows and light up the landscape even from a distance with their pink, violet or even white clumps along with the silver cushions of white flowered *Saxifraga paniculata*, whose rosettes vary from pea to hand size. Sunny rocks are draped with *Primula auricula* with white powdered leaves and masses of egg-yolk yellow blooms with a white eye. There are two kinds of



Pulsatilla slavica

grasses that dominate both the grassy rocks and the stony meadows, *Sesleria calcarea* and *Calamagrostis varia*, both typical of lime-loving communities.

White with cotton-wool, the indumented clumps of *Leontopodium alpinum* seem to say, no one but us is so well equipped against bad weather. And that crowd of lovely little bells, seemingly formed of porcelain, and those shiny, minute leaves are those of *Campanula cochlearifolia*, which



From top: *Gentiana clusii*, *Botrichium lunaria*, *Carex firma*, *Daphne cneorum*

huddles in every tiny fissure into which their fragile stolons can intrude. *Minuartia laricifolia* is a decorative, white, mat-forming plant that thrives on denuded ground, and everywhere among all these project the blue trumpets of *Gentiana clusii*. I think this is the most beautiful rock garden plant that nature could ever invent. Again and again, inspired by its ultramarine color, I am struck speechless with astonishment at the simple, pure, yet so impressive beauty of mountain flowers.

The higher we ascend the more gentians there are until at last they are practically the sole occupants of the summit. Tlsta is in the main a table mountain, an irregular cube with an extensive flat plateau on the top. And here is a gentian paradise. Perhaps nowhere else, either in the Carpathians or in the Alps, does this species occur as densely in such a relatively small area — millions of plants growing as if in some huge nursery. Only once did I happen upon the white form and, naturally, I have it in my rock garden. Though the "common" blue form is incomparably more beautiful, the white one recalls for me the hundreds, or perhaps thousands of hours spent on this small mountain range.

Here and there among the gentians grow small tufts, clumps and mats of the lovely *Carex firma*, a sedge as stiff as its name implies, which carries decorative rust brown spikelets. Among the grasses and sedges the Moon Fern, *Botrichium lunaria*, thrives; this fern may grow on all the mountains of the world where life is present. The carpets of *Dryas octopetala*, with their creamy white flowers, occupy the majority of the screes. These are later decorated with long feathered "beards". Another fair one, though perhaps too highly perfumed, is *Daphne cneorum*, growing

here as a form that is pretty uniform in flower color and size. Most frequently the blossoms are a nacreous pink, carmine in bud. Compared with lowland plants that form wide branched shrubs, some over three feet across, these on Tlsta are more dome shaped and are scarcely the width of two palms in size.

If we set off south-eastward it is possible to go along the ridge to Mount Ostra (1264 m.) and from there to Blatnice valley. Steep slopes below the summit harbor many cold loving plants, the most striking of which is the white flowered *Papaver tatricum*. This is its sole locality except for the Tatra Mountains. On wet rocks and screes grow the largest domes of *Saxifraga caesia* I have ever seen. The huge hemispherical plants, frequently one foot in diameter, with gray-green leaves decorated with white due to the pores that secrete calcium bicarbonate, flower late in spring, forming masses of flowers on filiform scapes. Often the slender *Androsace lactea* with large white flowers shares their site, as do the fleshy, yellow-green rosettes of insectivorous *Pinguicula alpina*, with its spurred, white, yellow marked blooms.

The deeper we descend into the woods the more numerous are the frayed violet bells of *Soldanella hungarica* with rosettes of round, dark green leaves, purple on the underside. Among them grow *Homogyne alpina* with violet-white flower heads shaped like those of miniature Coltsfoot, *Tussilago farfara*. Along the brooks there are widespread drifts of *Astrantia major*, umbrella shaped *Petasites album*, white flowered *Allium ursinum* with shiny, broadly lanceolate, dark green leaves, and the purple blooming beauty, *Lilium martagon*.

A paradise for orchids is situated

in the beech woods. Here *Cephalanthera alba* and *C. rubra* are common; and bright carmine *Epipactis atrorubens*, the greenish helleborina; the intoxicatingly fragrant, white *Platanthera bifolia* and *P. chlorantha* with green and white flowers are fairly abundant too. Likewise the very rare, minute *Epipogium aphyllum* with yellowish, somewhat pink, glass-like flowers, yellow *Corallorhiza trifida* and *Neottia nidusavis*, *Gymnadenia odoratissima*, and also *G. conopea* with pink spikes of flowers. In some places *Goodyera repens* forms cushions of marbled leaves with spikelets of white ciliate flowers. Various pyrolas such as *P. rotundifolia* and *P. minor*, *Ramishia secunda* and the lovely, shy, white *Moneses uniflora* add to the music their special, interesting voices.

The most striking orchid of the Carpathians, *Cypripedium calceolus*, the best known lady's slipper with its yellow lip and purple-brown perianth, blooms in the Great Fatra every year in great numbers, though nowadays this is seen in only a few Carpathian regions. Perhaps the difficult access to the localities where it still grows protects this vanishing plant against commercial collectors of plundering nature.

When speaking about the beech wood it is hard not to mention the plant most closely connected with these mountains — *Cyclamen fatrense*. When I had to invent a name for it years ago I could not choose another designation than this — after its native mountain range — despite its occurrence in the Low Tatras also. In July and August the shady wooded slopes are ablaze with the glowing pink flames of the cyclamens and all the woods are redolent with their fragrance. The scapes coil after bloom in order to get the capsules onto the

earth. This cyclamen, the only one blooming in autumn here, has unicolor, shiny dark green leaves which are purple below, entire or sporadically dentate, resembling the leaves of *Asarum europeum*, which grows with it. In gardens it thrives in a mixture of leaf-mold and limestone grit. It self-sows and if the seedlings are well cared for in a cold frame, they will bloom in their second or third year. I found the white form once, but later it was overpotted by somebody. Once (I think it was in 1972)



From top: *Astrantia minor*, *Cyclamen fatrense*, *Moneses uniflora*

my friend Dr. Sojak and I examined thousands of plants of *C. fatrense*, considered up to then to be *C. purpurascens* (*C. europeum*.)

In the last half of July we: my wife Jarmilla, Jiri, our two eldest sons Pepik and Jirka, and myself, were in Rakytovska valley at flowering time. What marvelous evenings there were.

We would sit in a glade near a pool, the mountains surrounding us. The moon rays filtered between the branches of trees and sauntered about on the pool's surface. It was a perfect summer night, mysterious and full of lightning-bugs. They bore their greenish lights among the bushes and above the calm water. The air still smelled of the sun — a fragrance expired by the trees in the warm summer evening. Then, if you partially close your eyes, you can see a crowd of dryads merrily flying above the water.

Mornings there were cold. From the bog around the pool, orchis heads nod in great numbers: *O. maculata* and *purpurea*, some white, red spotted *O. ustulata*. The white, lacinate and ciliate flowers of *Menyanthes trifoliata* and the white Lily-of-the-Valley flowers of *Triglochin palustre*, along with a pink yeast of *Primula farinosa*. These, with some patches of brilliant blue *Gentiana verna* and the greenish spikelets of *Epipactis palustris* compose a fabulous picture. In the mud around the watering place there are the footprints of red deer and some trails belonging to lynx and bear. The neighboring meadows are furrowed by wild hogs, which, protected by the night, have grubbed up the bulbs of crocuses, wild garlics, and snowflakes. Among the tufts of carex there are plenty of the pale yellow rosettes of pinguicula: the dark violet flowering *P. vulgaris*, white *P. alpina* and, in various intermediate shades, hybrids between the two. Upon some

sphagnum in the bog another insectivorous plant, *Drosera rotundifolia*, with red ciliate, spatulate leaves and small spikes of white flowers can be found. *Cortusa matthioli* occurs scattered on the cold slopes of the foot hills, but there on the bank of a brook it grows as a monoculture making it possible to admire its floods of little purple bells with yellow eyes.

The south-facing shrubby slopes are quite different — prairie-like. The sun heated hillsides resound with the buzzing of bees and are gay with the colors of glowing July. Here is the blue of *Gentiana cruciata*, the brilliant red of *Dianthus carthusianorum* ssp. *montivagus*, *D. deitoides* and the very showy *Dianthus barbatus*, the pale blue of *Globularia elongata*, the white of *Anthericum ramosum*, and the pink of *Polygala major*. They resemble peerless gardens. They harbor rare orchids of the genus *Ophrys*, and *Himantoglossum hircinum*, one of the few, last localities of this species in the Carpathians.

If we take the route northward to Gadarska valley, we shall walk under steep rock faces and wooded slopes along the Gadarsky Brook, whose bed is determined by huge cracks in the rocky substrate. Being very swift, it rushes over more resistant calcareous benches in rapids and waterfalls. The upper part of the valley is named Dedosova. From here we can reach the main ridge of the Great Fatra by several routes. By a steep ascent, using a tourist path, we can get onto Ostredok peak (1592 m.) and over Frekov (1585 m.) onto Krizna (1574 m.) the slopes of which are flooded with the white flowers of *Anemone narcissiflora* in June and July. If we walk along the ridge on Kralova Studna (1326 m.) we get over to the next valley on Skalna (1295 m.) from which a gorge descends through the



From top: *Phyteuma orbiculare*, *Cortusa matthioli*, *Pinguicula alpina*, *Pinguicula vulgaris*

only forest of *Taxus baccata* in the Great Fatra. In moist shady sites many *Lunaria rediviva* with fragrant purple flowers can be seen. There, until recently, many rare creatures could be found, among which *Parnassius apollo* dominated, being the knight among the mountain butterflies. Through Vlkanova valley we can return again to Gadar from whence a bus goes back to Blatnice and Maftin.

Dear reader, avoid the suspicion that this article was written to persuade you of the unique character of this small mountain range. I confess to being somewhat biased against the Alps and the Himalaya; it's just that I love these small mountains where I have spent the most beautiful hours of my life, hours filled with feelings of boundless freedom and happiness. Perhaps we small nations are doing the right thing by drawing attention to our small stones, which

also help support the edifice of civilization. But I should like especially to remind you that often it is not necessary to hunt for the largest, highest or most beautiful; these cannot be overlooked anyway and to them the crowds rush. What about the one boulder overgrown with moss and lichen near the path? Look at it closely. Maybe you will find in it just a bit of happiness — and it is not very costly. §

Robert Putnam

It is with the greatest sorrow that we must report the sudden death of Robert Putnam, our 1983 LePiniec Award winner, on January 28-29, 1984. Mr. Putnam died in his sleep at home shortly after undergoing an arterial operation. He will be greatly missed by his many devoted friends in the Seattle area and by those who counted on his nursery, The Plant Farm, for choice rock garden plants, many of which are unusual forms discovered in the wild or his own outstanding hybrids not otherwise available.

Bob was a real plantsman. He not only loved these living jewels under his care, he was a genius at growing and propagating them and was eager to disseminate them so others could love and enjoy them too. We mourn his passing from our lives, and those of us fortunate enough to have in our gardens some of his plants will now doubly treasure them, not only for themselves but as living memorials to this shy and generous man from whom we received them, and, in our turn, propagate and pass them on as he would have done if he had lived to do so. We extend our deepest sympathy to his wife, Evy.

Little Known Miniature Conifers

Part III

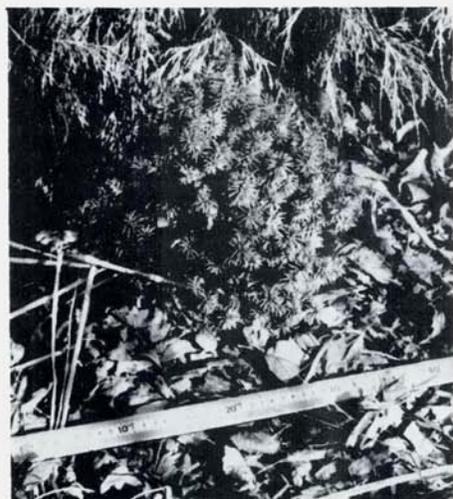
Robert Fincham

Lehighon, Pennsylvania

Photographs by the author

The first two parts of this article concentrated on the spruces, firs and pines. This final section will describe some of the miniature forms of the Douglas Firs and Hemlocks.

The Douglas Firs



Pseudotsuga menziesii 'Hillside Pride'

Pseudotsuga menziesii 'Hillside Pride'
Any size rock garden will benefit from this bewitching little Douglas Fir. The leaves are quite diminutive and appear similar to those of *Tsuga canadensis*. A specimen, twenty-three years old, was 80 cm. high and 50 cm. wide. Layne Ziegenfuss found this as a seedling mutation.

Pseudotsuga menziesii 'Little Jon'
This winsome plant forms a small, dense pyramid with dainty leaves. Growing at a rate of about 3 cm. a year, it was discovered as a seedling mutation by Joe Cessarini on Long Island, N.Y.



Pseudotsuga menziesii 'Little Jon'

Pseudotsuga menziesii 'Pumila'
Many collectors consider this plant their favorite Douglas Fir. It is a dwarf form that is very compact, upright and slow-growing at about 3 cm. per year.

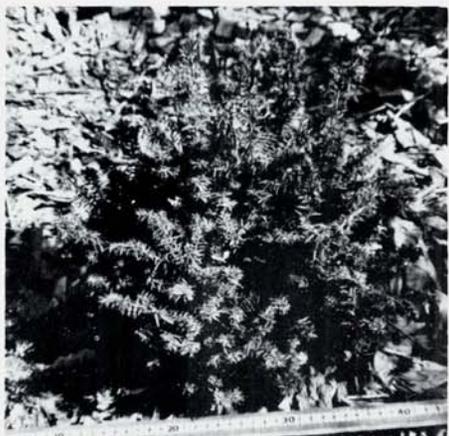


Pseudotsuga menziesii 'Pumila'



Tsuga canadensis 'Jervis'

The Hemlocks



Tsuga canadensis 'Bacon Cristate'

Tsuga canadensis 'Bacon Cristate' - A dwarf form of Canadian Hemlock, it soon will become an outstanding member of any collection. It forms a dense, upright plant with a cristate habit. This seedling mutation is a very good rock garden plant that only grows about 3 cm. a year.

Tsuga canadensis 'Jervis' - More correctly called 'Nearing', this plant is a slow growing, upright form of Canadian Hemlock. Its branchlets are crowded and irregular with twisted winter buds. It grows about 3 cm. a year and was discovered as a seedling mutation near Port Jervis N. Y. by Mr. Nearing.



Tsuga canadensis 'Cole's Prostrate'

Tsuga canadensis 'Cole's Prostrate'
 The name of this plant is very appropriate as it forms a flat mat upon the ground enhanced by the pattern of the exposed branches on the dark needles. Since it will suffer if grown in sun, it should be planted in a shady location. Mine is thriving under a rhododendron planting on the north side of my house. If planted above a wall or rock, it will drape itself nicely over the contours. This conifer was found as a seedling by Mr. Cole and put on the market by Gray and Cole Nursery.



Tsuga canadensis 'Verkade's Re-curved'

Tsuga canadensis 'Verkade's Re-curved' - I am including this cultivar

because of its fascinating leaf structure. It is a dwarf form with leaves that strongly curl under themselves. The branches are quite brittle and grow at a rate of about 4 cm. a year.



Tsuga canadensis 'Minuta'

Tsuga canadensis 'Minuta' - A dwarf-er plant is almost impossible to find. 'Minuta' is extremely congested and is as broad as it is high. This form was one of a group of seedling mutations and grows less than 1 cm. per year. *Tsuga canadensis* 'Pygmaea' was another of these seedlings and is almost identical to 'Minuta'.

• • •

Some seeds germinate better for me if sown directly out-of-doors; The hellebores, the annual androsace and *Androsace carnea* types being good examples.

— N. L.

Native Ferns in the Wild and in Our Gardens

David B. Lellinger
Washington, D.C.

Photographs by A.M. Evans

No plants exceed the ferns and fern-allies in symmetry and grace. Those plants, collectively called the pteridophyta (frond-bearing plants), covered the earth millions of years ago, before flowering plants existed. Since the rise of the flowering plants, the ferns and fern-allies have been in the background in most landscapes. However inconspicuous individual pteridophytes may be, they have retained their primitive, entrancing beauty, and so always are welcome discoveries in the natural landscape and make useful additions to the garden.

The Geography of Pteridophytes.

Somewhat more than ten thousand species of pteridophytes exist in the world today, roughly half in the Old World and half in the New. The majority thrive only in moist or wet, frost-free regions, and several fern families are entirely tropical, although others are nearly universal in their distribution. Tropical rain forests near sea level hold about 30% of the pteridophytes. About 40% of them are found in subtropical or montane rain forests well above sea level. Tropical deciduous forests and scrublands have only about 10% of the species, far fewer than in the wetter tropics. Tropical regions as a whole thus account for about 80% of the total number of pteridophytes. Tundra, alpine

areas, coniferous forests, and temperate deciduous forests hold about 15% of the ferns and fern-allies, many of them members of the Spleenwort and Wood Fern families. Grasslands, semideserts, and deserts account for a mere 5%, many of them belonging to the *Adiantum* family.

In the United States, the greatest density of species occurs in the warmest areas: primarily in southern Florida (one species per 434 square miles) and along the Mexican border. Many species and some genera found in the United States are restricted to one of those regions. By contrast, the United States and Canada as a whole have about 400 species and hybrids and a species density of one species per 18,500 square miles. In the temperate regions, moist areas or habitats hold more species than do dry areas and habitats. The Appalachian Mountains and the coastal ranges of Washington and Oregon are examples.

The distribution of every species is a result of limitations on its spore germination, gametophyte or sporophyte growth, or survival as adult plants. Some species are limited by low temperature, as *Campyloneurum phyllitidis* is in southern Florida. Others seem to be limited by high temperature, such as *Cryptogramma acrostichoides* in the Rocky Mountains. A few species are adapted to

grow only on a single rock type, as *Aspidotis densa*, which is confined to serpentine rock in the western United States and the Gaspé Peninsula of eastern Quebec. Many species are limited by seasonal dryness, and so are found only in moist canyons or along streams, especially in the western states. Many southwestern desert species are confined to the American West, but never occur in the moist, Southeastern states. One might think that rock type, rather than water, is involved, for water probably is not limiting in the east. Since a few southwestern species have become established in the east, like *Cheilanthes castanea* in Virginia and *Notholaena sinuata* very recently reported in Georgia, spore viability may be the limiting factor in their long-distance dispersal.

Reproduction and Dispersal.

The distributions of pteridophytes are achieved by natural means, what the plants have been able to do to disseminate and establish themselves. The mechanisms are not always obvious, and sometimes what appears obvious proves to be inapplicable. By and large, pteridophytes do not establish themselves as easily as do flowering plants, which surely must be part of flowering plants' dominance in the landscape. One possible reason is that pteridophytes have a more exposed gametophyte generation. By way of explanation, the fern plants everyone knows are called sporophytes because they produce spores in spore cases (sporangia), which are usually borne in clusters (sori) on the under-surface of the fronds. The spores germinate to form ephemeral, heart-shaped or ribbon-like plants that are smaller than a fingernail and bear sex

organs with gametes, and so are called gametophytes. When female sex cells, which are borne in sex organs (archegonia) on the gametophytes are fertilized by male sex cells, which are released from male sex organs (antheridia) on the gametophytes, a new sporophyte develops. The gametophytes and young sporophytes may require a bare substrate, or at least minimal competition from other plants, and so their establishment is by no means certain.

Spores are the most obvious means of dispersal over long distances. About the time of World War II, a scientist outfitted a small airplane with traps and took air samples up to something like 18,000 feet over Louisiana. He found spiders, various insects, and plant materials including spores. There is no doubt that spores are widely distributed. My guess is that they land just about everywhere, at least from time to time. The most spectacular instance of spore distribution in the United States is that of *Grammitis nimbata*, a small epiphyte native to Cuba and the Antilles which was discovered a number of years ago growing behind a waterfall in North Carolina. It is thought to have blown in with hurricane winds as spores and to have persisted for a time behind the curtain of falling water, which kept the temperature from getting too cold. If it has persisted in the North Carolina locality, it is only as gametophytes. In addition to hurricane winds, the prevailing west-to-east winds across the United States are responsible for the eastern disjunct populations of *Cheilanthes castanea* and *Notholaena sinuata*; east-to-west disjunctions, like east-to-west winds, are rare.

Interestingly enough, for our native eastern species, spores may be a

largely non-viable means of reproduction near the parent plants. John Mickel, Curator of Ferns at the New York Botanical Garden, has estimated that a mature plant of *Dryopteris intermedia* produces 50 to 200 million spores annually. Yet, if only one of these spores produced another mature plant yearly, the population of plants would double yearly — but it doesn't. Therefore, it is unlikely that reproduction from spores is important in established stands of the plant.

Ferns are amazing because of the variety of ways they have developed to increase their kind besides the textbook sexual life cycle with normal spore formation. Most of the alternate ways involve growing sporophyte plants directly from gametophytes without fertilization so that both the gametophytes and sporophytes have the same number of chromosomes. To make up for the lack of chromosome doubling at fertilization, there is a failure of one or more chromosome divisions during spore formation. Some truly sterile hybrids with unbalanced sets of chromosomes are able to produce spores in this manner. Failing this and vegetative reproduction, such hybrids remain rare and probably do not persist over long periods of time, but rather are produced anew by occasional hybridizations.

A few species of United States ferns, mostly tropical species belonging to genera like *Vittaria* or to the Filmy Fern family, are known in the United States mostly or entirely as colonies of gametophytes. Like *Grammitis nimbata*, the sporophytes are not at all at home in our climate. Nonetheless, the small gametophytes, which can live in well sheltered cliff crevices and in shallow caves, have spread and persisted as far north as Ohio, Pennsylvania, and Massachusetts.

The plants reproduce by budding new gametophytes along the margins of the old gametophyte, or by producing gemmae which are dislodged from the gametophyte and grow into new gametophytes. The curious part is the inability of the gametophytes to form sporophytes by any sexual or asexual means, even under greenhouse or laboratory conditions. It seems that the genetic ability to form sporophytes has been lost, although this has not yet been proved.

Vegetative propagation by rhizomes is common in many pteridophytes, as it is in *Onoclea sensibilis* and *Dennstaedtia punctilobula*, both grown widely in gardens, perhaps more widely and exuberantly than the gardeners would like. Some tropical species, especially epiphytes like *Asplenium auritum* from Florida, send out long roots which have rhizome-forming buds at intervals. Fronds themselves can bear organs of vegetative reproduction. *Asplenium rhizophyllum* regularly produces a plantlet at the rachis apex. Under moist conditions, *Asplenium exiguum*, which is native to the southwestern states, produces plantlets on the frond margins and rachis. *Lycopodium porophyllum* produces gemmae along its stems that develop into new plants after being detached from the parent plants. In *Equisetum hyemale*, disarticulated stem sections can float away from the parent colony, form plantlets, and take root in new localities. At least one sterile hybrid *Equisetum* has the same ability, which is crucial to the hybrid's continued spread.

Structural Adaptations To Native Habitats.

One of the most entertaining aspects of fern study is trying to understand

how the plants make their living and how this has influenced their structure. Unlike animals, plants cannot move and hide from the sun, wind, or a predator. They have to stand and take whatever comes along. In my opinion, this is why plants are so much more diverse than animals and why their characteristics within groups vary so much more. No butterflies look like penguins or vice-versa, but there are flowering plants that look like ferns and ferns that look like flowering plants.

Some ferns have adaptations to withstand the rigors of climate. *Woodisia* is one of the few genera that is found in cool to cold climates. It seems to me that the persistent stipe (petiole) bases insulate the ascending rhizomes from the cold and, perhaps, from premature warming by winter sunlight. Old plants of *Cryptogramma* show the same feature, whereas the younger portions of *Dryopteris* and *Polystichum* rhizomes are densely covered with broad scales.

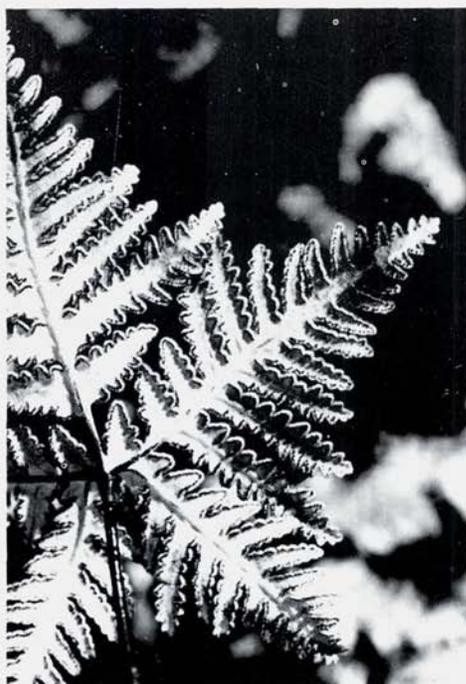
Some ferns which grow in normally moist habitats have adaptations to allow them to survive seasonal dryness. *Botrychium mormo* is known not to come up at all in dry years. The buds on the subterranean, fleshy rhizomes stay beneath the surface of the soil. *Dennstaedtia punctilobula* always appears in the spring, but the fronds die back during midsummer droughts. In other words, the plant does not fight a losing battle to evaporation, but protects its perennial rhizome by losing its annual fronds. *Adiantum tenerum* can do much the same thing, but on a segment-by-segment basis, for the segments are dehiscent. Although *Polypodium plumula* fronds are dehiscent, their segments are not. To conserve water in dry times, which are relatively infrequent and brief in southern Flor-

ida, the frond segments merely roll up from the tip toward the rachis (axis or midrib). They unroll when moisture is restored. *Polypodium polypodioides* rolls the rachis, turning the scale-covered lower surface of the frond toward the wind and sun. Quite a number of ferns are found in the dry southwestern United States and adjacent Mexico. Rainfall is the exception rather than the rule in their habitats, and so the plants have evolved a number of interesting adaptations to conserve water, often by reducing the drying influence of sunlight and wind. Many desert species of *Cheilanthes* have hairs and/or scales on the lower and sometimes the upper surface to create a moist zone of trapped water vapor around the fronds and to deflect the strong sunlight. *Bommeria hispida* accomplishes the same thing totally



Bommeria hispida

with hairs. These and many other desert ferns grow in crevices or under boulders, which gives them some respite from the desert sun. Recent ecological studies have shown that crevices can channel as much as ten times the normal amount of water to the plants growing in them, thus amplifying an uncertain five or ten inches of annual rainfall into much more.



Notholaena standleyi

Notholaena standleyi and *N. cope-landii* have abundant, wax-like exudates on the lower surface of their fronds. They turn this pale color up when the fronds are dry, and so reflect the intense desert sunlight. Some species of *Notholaena* also have scales for additional protection. The species of *Pellaea* lack scales and wax-like substances. Their stomata, which exchange water vapor and gases with

the atmosphere, are mostly or entirely on the undersurface of their fronds. To reduce water loss through the stomata, they fold the lateral halves of their segments downward until the lateral margins meet.

Sunlight can be intense in many habitats and at all latitudes. *Polypodium scouleri*, called the Leather-leaf Polypody, grows in rock crevices in full sunlight, often near the Pacific Ocean, and has very leathery leaves. *Acrostichum danaeifolium* also grows in full sunlight, but is virtually an aquatic species in Florida. It, too, has leathery leaves.

The ultimate in preventing water loss is to reduce the amount of frond exposed to the sun and wind. Both the Curly-grass of the northeastern United States, *Schizaea*, and the related *Actinostachys pennula* from Florida have only photosynthetic stipes and rachises, with terminal, sporangium-bearing sporophores; there are no expanded fronds. Most species of these genera live in tropical, white sand savannas with little vegetation and exceedingly intense sunlight.

Water as a habitat causes many interesting adaptations in ferns. *Ceratopteris* looks almost like a flowering plant, with its pale green, broad, sometimes dissected fronds. Some species have inflated stipes which help them to float. The species of *Salvinia* have minute, sometimes branched hairs on the upper surface of their oval aerial fronds. Other fronds hang down into the water, are highly dissected, and act as a root system. When the plants are turned over by waves, air bubbles trapped among the hairs of the aerial fronds act as floats and cause the plants to right themselves, resubmerging the dissected laminae.

Beyond adaptations of the laminae to climate, some ferns have other

adaptations that allow them to grow in places they otherwise could not. On some occasions an adaptation that is an advantage in one locality is a disadvantage in another. For instance, *Cheiroglossa palmata* is a trunk epiphyte in the tropics. It grows fairly high up in a variety of trees. But in Florida, it is almost entirely restricted to the trunks of *Sabal palmetto*, and when this plant is killed by fire, the fern has nowhere to grow. The Goldenrod Fern, *Pityrogramma trifoliata* does not look much like a fern and it often grows in weedy places. Perhaps predators become confused by the plant's appearance or the plant can occupy a niche usually taken by a flowering plant.

Some adaptations are nutritional. The fronds of *Azolla* have a cavity which is inhabited by nitrogen-fixing blue-green algae. The *Azolla* benefits from the nitrogen and the algae benefit from a stable, moist environment. *Ophioglossum* and *Botrychium* both have short, fleshy roots that lack root hairs but are instead inhabited by a fungus which grows between the root cells. The fungus is able to absorb substances from the soil and to pass them on to the fern roots; the fern furnishes a home for the fungus. A few pteridophytes can almost be considered weeds because they are adapted in one way or another for rapid spread. Some of them, like *Lycopodium cernuum*, can colonize bare ground; the plants spread by long-creeping rhizomes. A few other ferns with creeping rhizomes, like the tenacious *Pteridium*, spread aggressively enough to be a nuisance in pastures. Some weedy species do not have creeping rhizomes, but can reproduce from spore-to-spore in less than a year, and so are able to spread much more rapidly than most ferns. *Thelypteris dentata* is an example, although



Pityrogramma trifoliata

it is weedy mostly in greenhouses.

Finding enough sunlight is a problem for some ferns. *Lygodium palmatum* and *Sphenomeris clavata* scramble over other vegetation to intercept more sunlight. On the other hand, the filmy ferns *Hymenophyllum* and *Trichomanes* are adapted to very low light levels that occur in moist caves and dense forests. Their fronds are mostly one cell thick, and the plants require steadily moist conditions. Low levels of light would not penetrate thicker leaves, and so the thin leaves are efficient.

Pteridophytes which grow in running water almost invariably are adapted to withstand the flow. Tropical ferns from this habitat have rather streamlined leaves. The leaves of the fern-ally *Isoetes* are simple, flexible, and rush-like. Their internal structure is a little like that of a bam-

boo cane, and so they can withstand running water very well.

Rainfall is sporadic in Texas and the western United States, where many species of *Marsilea*, like *M. vestita*, grow. These plants produce hard, bony sporocarps that contain their sporangia. The sporocarps split open only when there is plenty of water, exposing the sporangia and releasing the spores. Unlike most ferns whose spores cannot withstand long periods of drought, *Marsilea* sporocarps and spores can germinate after several years of dryness.

Life Cycle and Hybrid Complexes.

The complex life cycle of pteridophytes includes pathways by which these plants can reproduce themselves, even when the normal sexual pathway of spore formation, gametophyte development, zygote forma-

tion, and sporophyte development is not possible. In my opinion, the pteridophytes are best divided into sexual species and largely or entirely asexual hybrids. Hybridization is a more important phenomenon in ferns than it is in flowering plants; about one-fifth of the native species hybridize, in contrast to less than one-twentieth of the native flowering plants.

Most species of flowering plants have two sets of chromosomes (e.g., AA), one set inherited from each parent. Such a species is called a diploid, which is Greek for two sets. Although a majority of ferns are diploid species, many ferns, called polyploids, have three or more sets of chromosomes. Among polyploids, four, three, and six sets are the most common, but other numbers of sets, including five, eight, and twelve are known.

Non-hybrid diploids are, of course,



Marsilea vestita

sexual species, but so are polyploids with balanced sets of chromosomes in which there is an even number of each set (e.g., AABB). All of these plants form viable spores because they have a balanced complement of chromosomes which can separate evenly during spore formation. Fertile polyploids can be as common or more common than diploid species.

Hybrid ferns have an unbalanced complement of chromosomes which cannot separate evenly during spore formation, and so they do not form viable spores in the normal course of events. On occasion, some usually sterile hybrids will form a few viable spores, or they may produce some viable gametes and so form yet another hybrid with another species. But typically, a sterile hybrid between two diploid species with chromosome sets AA and BB would have parental gametes A and B, and so the hybrid resulting would be AB. During spore formation, this hybrid could not separate sets A and B evenly, and so spores would not form or would not be viable. Hybrid diploids and polyploids with an odd number of sets (ABC) or with an even number but of unbalanced sets (AAB) of chromosomes account for most of the sterile hybrids.

One question that is always asked is: Are hybrids species? In the usual sense of the word, hybrids are best not considered species. They do not reproduce sexually, and some of them do not even reproduce much vegetatively. Over long periods of time, most probably do not survive; and because they are asexual, they do not contribute to further evolution. Fertile polyploids, on the other hand, should not be called hybrids, but may be called species of hybrid origin.

Although it may be peculiar that something of hybrid origin should

not be considered a hybrid, it is even more peculiar that some of the plants we know today as diploid species may in fact be polyploids of very ancient origin. Much detailed genetic work will be needed to understand this, and such work is in its infancy at present.

Hybrids, as you know, may be given a formula name repeating the names of the parents with a multiplication sign between, like *Dryopteris celsa* × *goldiana*. The formula name is appropriate for rare hybrids and for those which do not reproduce themselves. Alternatively, hybrids may be given a formal species name and then are written with a multiplication sign just in front of the species epithet, like *Gymnocarpium* × *heterosporum*. In my opinion, fertile polyploid species of hybrid origin should not have a multiplication sign in their name, for they behave as if they were diploid species.

The success of hybrid ferns in increasing their numbers depends entirely on their ability to find alternate pathways around the blockages that they have to completing the sexual life cycle. Sterile hybrids that cannot circumvent blockages (specifically the inability to form spores) are often rare, and some are known in nature by a single occurrence. Fortunately, many hybrids are able to take advantage of the several types of circumvention to reproduce themselves asexually, either by producing sporophyte plants directly from gametophytes or by producing viable spores asexually. These plants are rare to fairly frequent in nature, and some form considerable populations.

Hunting hybrids is quite a sport for those who know their species and hybrids well. Professor Warren H. Wagner, Jr., of the University of

Michigan, who is commemorated by the hybrid *Asplenium* × *herb-wagneri*, knows his plants so well that he can look at a frond and tell you the number of parental sets of chromosomes it contains, which he can confirm later in the laboratory.

In the United States and Canada, there are eleven hybrid complexes in the genera *Asplenium*, *Cystopteris*, *Dryopteris*, *Isoetes*, *Lycopodium*, *Pellaea*, *Polypodium*, and *Polystichum*. In addition, there are several hybrids in the genus *Woodsia* that are too little known to know whether or not they form a complex. The smallest are the *Asplenium verecundum* and the *Pellaea glabella* complexes, with three basic species and three hybrids each. The largest is the North American *Dryopteris* complex, with eight basic species and thirty-one hybrids so far recorded. The total number of species in the eleven complexes is forty-eight basic species and ninety-nine hybrids. In addition, another thirty-six basic species, none of which forms complexes, are parents to eighteen other hybrids. The total number in the U. S. and Canada is thus eighty-four basic species and one hundred seventeen hybrids.

Some Ferns for the Rock Garden.

Among the ferns of the United States, about fifty are in cultivation and fairly easy to obtain in commercial circles that will grow in and perhaps beyond the temperate states. Of course, additional species can be obtained from private sources or grown from spores. Several fern societies, including the American Fern Society, maintain spore banks that are an excellent and inexpensive source of temperate and tropical ferns. Spore banks also welcome donations of iden-

tified, spore-bearing fronds to replenish their supplies of spores. [See "Grow Your Ferns from Spores" in Vol. 36, pg. 107 of Bulletin. — Ed.]

Not all cultivated United States species are suitable for rock gardens, which usually lack the deep, rich soils that many ferns require. Overall, those which will grow are less common and more interesting than the ordinary woodland ferns. I suggest that you consult the books listed at the end of this article to check distribution patterns of the ferns listed below and other species to discover which are best suited to your particular garden.

The true *Adiantum pedatum* var. *aleuticum* grows in partial to full sun in moist, rocky, preferably magnesium-rich soil. What passes for var. *aleuticum* in the trade is, according to Barbara Joe Hoshizaki, in reality *A. pedatum* f. *imbricatum*, not a native plant, but one which is easier to grow than true var. *aleuticum*.

Asplenium platyneuron often volunteers on sandstone rock or on limestone. There are some attractive, wild, fancy varieties and forms which occasionally are cultivated. *Asplenium platyneuron* will grow on rock or in rocky soil. *Asplenium trichomanes* grows on subacidic to basic rocks, but probably only on basic rocks at the northern edge of its range. *Asplenium rhizophyllum* (also called *Camptosorus rhizophyllum*) is confined to basic rocks. Several rarer species and hybrids in the Appalachian *Asplenium* complex are also grown, but not commercially.

Cheilanthes lanosa grows in full sun or partial shade on acidic rocks. *Cheilanthes tomentosa* and *C. castanea* are also occasionally grown, but usually with some difficulty. It is easier to grow them in soil with the kind of rock they like added as chips, rather than to grow them on a rock

ledge, which is a more difficult environment.

Cystopteris bulbifera and *C. fragilis* like partial sun and grow in moist, nearly neutral soil, often with or on limestone or dolomitic rocks.

Dryopteris carthusiana (formerly called *D. spinulosa*) and *D. intermedia* grow in shade or semi-shade in rich, acidic soil among rocks. *Dryopteris marginalis* grows among boulders and on rock ledges in shade or semi-shade in rich, moist soil. It is tolerant of a wide range of soil acidity and is easy to grow.

Gymnocarpium robertianum grows in semi-shade in moist, acidic to sub-acidic soil. *Gymnocarpium dryopteris* prefers similar conditions, but with less sunlight.

Pellaea atropurpurea is a true lithophyte. It grows in a small amount of dryish, basic soil on limy rocks in nature, but even will grow on old mortar of stone or brick walls. It may be difficult to establish.

Phyllitis scolopendrium grows in full shade in moist, basic soil underlain by limy rocks. The European varieties are much easier to grow than is the native var. *americana*. Fancy forms are known, but are not much cultivated at present.

Polypodium polypodioides is epiphytic in the southern United States, but is epipetric toward the northern part of its range. It grows in semi-shade in moist soil. *Polypodium virginianum* grows in full shade to semi-shade in acidic or subacid soil or on granite boulders. Work a little oak leafmold in around the rhizomes each fall.

Polystichum braunii grows in moist, subacid soil in the shade. *Polystichum lonchitis* and *P. acrostichoides* have similar requirements, and the latter is easy to grow.



Cheilanthes lanosa

Thelypteris hexagonoptera grows in semi-shade in deep, moist, slightly acidic soil, whereas *T. phegopteris* requires full shade and a more acidic soil. These plants can form a beautiful groundcover in deep soil or will grow more sparsely on rock ledges.

Woodsia ilvensis grows in semi-shade in moist to wet, acidic soil on granite ledges. *Woodsia obtusa* and *W. scopulina* have similar requirements, but need subacid, neutral, or slightly alkaline soil. All are naturals for the rock garden, especially in fairly cool climates.

Ferns are beautiful plants, and some of them are suitable for every garden. By all means use them both for their individual graceful and fascinating growth habit and as background and companions to your flowering plants. Ferns and fern-allies have been and

continue to be important constituents of our national flora, and as such should find a place in any well clothed garden. §

Based on a talk given at the ARGS Eastern Winter Study Weekend, January, 1983. Dr. Lellinger is Curator of Ferns, United States National Herbarium, Smithsonian Institution, Washington, D.C. He is the editor of the *Journal of the American Fern Society*.

Useful Books on Ferns

- Hoshizaki, Barbara J. 1979. *Fern Growers Manual*. Knopf.
Mickel, J. T. 1979. *How to Know the Ferns and Fern Allies*. W. C. Brown.
Mickel, J. T. & Evelyn Fiore. 1979. *The Home Gardener's Book of Ferns*. Holt Rinehart Winston.
Perl, P. et al. 1977. *Ferns*. Time-Life Books.

The Defiance of Gardeners

I never see a great garden (even in my mind's eye, which is the best place to see great gardens around here) but I think of the calamities that have visited it, unsuspected by the delighted visitor who supposes it must be nice to garden there. It is not nice to garden anywhere. Everywhere there are violent winds, startling once-per-five-centuries floods, unprecedented droughts, record-setting freezes, abusive and blasting heats never known before. There is no place, no garden, where these terrible things do not drive gardeners mad. . . .

There are no green thumbs or black thumbs. There are only gardeners and non-gardeners. Gardeners are the ones who ruin after ruin get on with the high defiance of nature herself, creating, in the very face of her chaos and tornado, the bower of roses and the pride of irises. It sounds very well to garden a "natural way." You may see the natural way in any desert, any swamp, any leech-filled laurel hell. Defiance, on the other hand, is what makes gardeners.

— Reprinted with permission from *The Essential Earthman* by Henry Mitchell, published by Indiana University Press.

T. Paul Maslin

We are deeply saddened by the death of Dr. T. Paul Maslin, a valued member of our ranks, on February 26, 1984. He was, perhaps, best known among our members as the rediscoverer of the brilliant yellow form of *Phlox nana*, the only yellow member of this genus ever found, along with the discovery of a flaming vermilion form of the same species in Chihuahua, Mexico. These extraordinary finds were reported by Dr. Maslin in the 1979 ARGS Bulletin on pages 62 to 69 where the article is accompanied by the first color photographs ever to appear in this publication.

The members of the Rocky Mountain Chapter owe him an additional debt, for it was Dr. Maslin's enthusiasm and organizational ability that instigated the revival of that chapter after many years of eclipse and his leadership that guided it through its first years to become the thriving chapter it is now.

Dr. Maslin was born in Wuhan, China in 1909, the son of American missionaries. Here on the botanically rich slopes of nearby Mount Lushan he first became inculcated with the fascinating world of plants and snakes, a fascination that remained with him for the remainder of his life. He received his B.S. and M.S. degrees in the natural sciences from the University of California and his Ph.D. from Stanford University and went on to be Professor of Zoology at the University of Colorado and Curator of their zoological collection, all the time contributing prolifically to scientific journals in his field. His studies in the field of zoology led him to renew his early interest in botany as well and he became something of an expert on the flora of the Southern Rockies and Southwest, bringing back to the exquisite garden at his home in Boulder and to the Denver Botanic Gardens many of his finds.

Dr. Maslin has written several articles for the ARGS and Alpine Garden Society Bulletins and has been a contributor to *The Green Thumb*, journal of the Denver Botanic Gardens. His excellent, informative talk at the Annual Meeting of ARGS in Colorado in 1982 on the *Phlox nana-mesoleuca* complex will be remembered by those who attended. It was at this same meeting that he was presented with the society's prestigious Le Piniec Award for his work with phlox and his introduction of outstanding forms of Southwestern plants into horticulture.

We have much to thank Paul Maslin for and he will be greatly missed by his many close friends and particularly by his devoted wife, Mary, to whom we extend our deepest sympathy.

Computers and Rock Gardening?

Geoffrey Charlesworth
Sandisfield, Massachusetts

Just about everything one can say about computers will probably be obsolete within six months, but I have had such a great time with computers over the last ten months or so I would like to share some of my experiences with other rock gardeners. It has been exciting, enlightening, and excruciatingly frustrating; in other words, rather like rock gardening.

The computer arrived in April at a time when the garden called more strongly than computer manuals written in barbaric jargon. Nevertheless, it was a relatively easy matter to master a piece of software that has now become a useful gardening tool. "Software" is the inappropriate name for a "floppy" disk containing a computer program together with a manual explaining how the program works. A floppy disk looks like a five-inch phonograph record, but it doesn't play anything; it communicates electronically the way the computer should react to each key you press on the typewriter. The particular piece of software I use is called T.I.M. (Total Information Management), but there are several readily available alternatives. When you turn the computer on and run the program the first image on the screen is a "menu" which allows you to choose among several activities. One of these is the creation of what is the equivalent of a file card system.

Imagine a file card system in which

you have selected several categories of information; the computer accepts and records such information as you type it on the keyboard and returns it to you later either on the TV monitor or on the printer.

I chose as my categories: 1. genus, 2. species, 3. location in the garden, 4. date acquired, 5. provenance (i.e. the source of seed or plant). Then followed other descriptive and cultural information. For instance: 1. *Primula*, 2. *Japonica*, 3. Dell, 4. 1981, 5. ARGS. I allowed plenty of room in category 2 for species, sub-species, variety, and fancy name where needed. The source category also required room for names of friends who have given me plants and seed. Category 3, the location in the garden, is very important because the garden has over twenty distinguishable beds and areas. I used a code name to identify each one, sometimes even subdividing the area into "top" and "bottom" or "north" and "south". If you have a smaller garden you could probably pinpoint the position of a plant exactly. My problem was to keep track of two things: where each plant was located, and what each bed contained.

When the basic data for each plant has been typed into the computer, you are ready to extract it in a form that is useful to you. This is where a computer is far, far superior to a file box.

In selecting the categories or

"fields" as they are called, one or more of them can be singled out to be alphabetized. Naturally, I chose genus and species for this role. The first list I got was a complete list of every plant in the garden in alphabetical order with location and origin. Next I needed to know what each bed contained so another short program selected all the plants which had the required code name in category 3. These were printed out in alphabetical order by genus, and in addition I had printed every other location in the garden where a similar plant was growing. This is useful if you are experimenting with several seedlings in different growing conditions.

The complete plant list is very unwieldy as there are between three and four thousand plants in the garden, but it is a simple matter to restrict the list, say, to the genus *Primula* or even to varieties of *Primula auricula* if you want to isolate this information.

Another use I have made of this program is to form my own seedlist of those seeds I have ordered, received, sown and finally germinated and transplanted during the season. Since I have sown well over a thousand packets of seed each year for the last several years, it has always been a problem trying to avoid duplication from year to year and seedlist to seedlist. Being able to run off an alphabetical list makes this a relatively simple problem. The main difficulty now is typing in the names. Also the events surrounding germination and transplanting are so absorbing that I fear the computer will be second in line for my attention at that time of year.

Finally, I have been a member of the ARGS Seed Exchange team this year and we have used a computer to compile the seedlist. This is a highly specialized product with more con-

straints than commercial software can handle without severe modification, so we have been very fortunate in having Paul Glattstein to write a program to our own specifications and doubly fortunate in using Paul's computer to make the list. Our routine went rather smoothly after a few bumpy patches. It may be tempting fate, but remembering how stale computer news quickly becomes, I will risk vengeance from whichever god punishes hubris.

First Ev Whittemore received the seed from our donors. This year a record number of 472 sent seed. Ev read, interpreted and translated the names on the packets and typed the list in more or less alphabetical order. She then sent this list to me to check for typos and to look up names in encyclopedias, journals, plant books in an attempt to get acceptable uniformity (nearly impossible). The list next went to Judy Glattstein who typed the list into the computer; simultaneously the computer was printing the list exactly as Judy entered it. This list then came back to me for proofreading. We thus got the clear advantage of continuous proofreading and listing. It was burdensome, of course, but not the eyeball-breaking chore of proofing the complete finished list. Judy then combined the most recent list with all the previously entered names, put them in alphabetical order (using the computer, of course) and eliminated duplicates. Donor numbers were added to those retained. If in the process of proofreading and name-verifying a received name was changed, the change went back to Ev and Bruce Whittemore who then changed the name on the original envelope. In the meanwhile Ev and Bruce were packaging the seed and stacking it in alphabetical order in the seed file.

Our next job was to cut and paste

the computer printout, which was run assigning each name a number (all 4708 of them). This was where Buffy Parker's talents entered. The sheets (mechanicals, they are called) were then sent to the printer. Norman Singer was printer liaison and mailer-outer.

We ran into a number of snags in all this novel activity. The computer had one gross temperamental fit and a few minor hiccoughs. Paul's program, beautifully thought out though it was, didn't anticipate every angle and had to be modified a few times. The final program fills pages and pages of computer paper and is a mystery to all of us except Paul. The seedlist of 1982-83 was used as a guideline for the amount of storage space the data would need, but there were over a thousand more names this time. This threw our plans awry late

in the day and necessitated more subdivisions of the alphabet to accommodate floppy disk data storage. There were problems with new requirements from the postal department which delayed the mailing to overseas members and increased the cost of the postage, but that is another story.

The time element in preparing the seedlist has been reduced considerably by using the computer and if everything had gone smoothly we could have had the list out in early December. Next year, maybe. A side effect of the increased speed will be a reluctance to accept late seed. Getting the seed out as early as possible is worthwhile for the people working on the list as well as the members getting the seed; next year we anticipate the work will be even more of a pleasure and less of a chore. §

Carroll Watson — The Man and the Plant

In 1960 or thereabout a form of *Lewisia cotyledon* with immaculate, clear yellow flowers was found in what is, perhaps, the most northerly known location for this species, the foothills of the Umpqua Mountains about forty miles north of Medford, Oregon. This was a most exciting and unusual color break; up to this time this species, except in an albino form, had only been seen with flowers that bore on each petal a central stripe of red-pink on a ground of various shades ranging from white to pale yellow to pale pink. This newly discovered plant must have been a fairly ancient specimen as its

caudex was over eight inches long and one inch in diameter. From this sprang numerous rosettes and from base to apex the flowering stems carried hundreds of the lovely pure yellow blooms.

Understandably the finder was thrilled by this beautiful plant, the like of which he had never before seen in his many years of wandering the mountains. Very carefully he dug it from its site and brought it to a friend, Marcel LePiniec, who, he knew, would appreciate its beauty and rarity and at that time ran a nursery just outside Medford. M. Le-

Piniec had never seen a lewisia resembling it and he was particularly pleased that it carried so many offsets for propagation purposes. He named it after its discoverer 'Carroll Watson' and in due time propagated it, returned a plant to its finder, and disseminated it through his nursery to the intense pleasure of rock gardeners everywhere.

Interestingly seedlings of this plant tend on the whole to come true to color, the same clear yellow of the parent. Crossed with normal *Lewisia cotyledon* it frequently imparts this same yellow to its progeny to create lovely blends of orange.

The discoverer of *Lewisia cotyledon* 'Carroll Watson' was a man of keen intellect, fascinated by all phases of natural history. He spent his time

roaming the mountains, hills, and plains of Oregon and contiguous states collecting plants for horticultural and medicinal purposes. His interests included archeology and geology and among his other finds was the first specimen of the fossil monocot, *Rex Oxylon*, to be discovered in the northern hemisphere. Mr. Watson discovered this plant fossil, dating from very ancient times, in a deep strata of sedimentary rock near Escalante, Utah. It was ten feet long and when cross-sectioned resembled half a grapefruit. He donated it to the University of Southern California.

Carroll Watson died this past summer after suffering months of crippling illness. But his name will long be remembered by grateful rock gardeners. §

— L.P.C.

Galanthus Elwesii or Nivalis

Barbara van Achterberg
Easton, Connecticut

Drawings by the author

Every gardener knows what a snowdrop looks like, and there is no other bulb that resembles it. But most gardeners do not realize that there are between ten and twenty species of snowdrops, depending on who is doing the counting. Some kinds even bloom in the fall.

Probably ninety-nine percent of snowdrops grown in American gardens are *Galanthus nivalis*, the beloved dooryard bulb that is the first flower to bloom in most gardens that

have it. An even earlier species that is rather frequently offered by bulb dealers is *Galanthus elwesii*. This snowdrop is not only earlier but larger than the common species, making it especially desirable.

I knew I had planted *Galanthus elwesii* several years ago, but found myself late this winter with two drifts of snowdrops. The more massive clump consisted of smaller flowers with narrower leaves — certainly the common snowdrop. But the other



Galanthus elwesii flower with two outer tepals removed (life size).



Galanthus nivalis flower with two outer tepals removed (life size).

clump seemed to contain large and small snowdrops. I wanted to save seed of *Galanthus elwesii*, but wished to be sure which species was which. Perhaps the larger flowers were growing out of richer soil, or had started blooming earlier because of being in a sunnier spot.

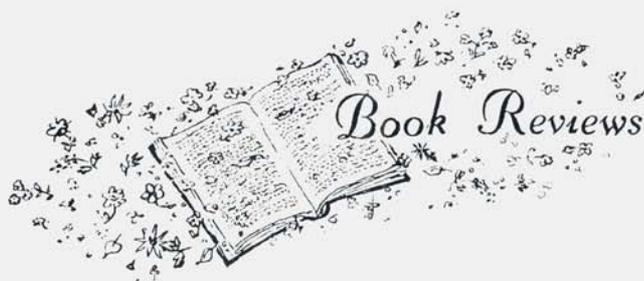
I picked a flower from the drift of small snowdrops, and then picked one of the larger flowers from the clump of mixed sizes. Pulling off two of the three outer tepals on each flower, I immediately noticed a difference. Each inner segment of *Galanthus elwesii* was marked with a small green shape that reminded me of a fan-tailed fish. On the *Galanthus nivalis*, only the tails of the fish appeared on the inner segments.

Immediately I identified all the larger flowers in the mixed clump as *Galanthus elwesii*. The smaller ones all turned out to be *G. nivalis*. These I transplanted to another section of the garden, reserving the place of honor for *Galanthus elwesii*.

A later check of Brian Mathew's *Dwarf Bulbs* gave me a description of the markings on the two species in technical botanical terms. The book also noted that most snowdrops grow best in rich soil, appreciate a little shade and do not like to dry out completely in the summer. It also confirmed my experience, that *Galanthus elwesii* usually increase at a much slower rate than the common type. Even so, they are not difficult to raise. I would recommend growing *Galanthus nivalis* for its early charm and rapid increase, and *Galanthus elwesii* for its even earlier showier flowers. §



The very best time to remove a weed from the garden is the moment you first notice it.



Kew:

Gardens for Science and Pleasure

Edited by F. Nigel Hepper, 1983;
Stemmer House, Owings Mills, MD.
\$24.95

Kew Gardens is nationally owned and is accessible by public transportation from central London. It is the most frequently visited garden in the U.K., possibly in the world, with over a million visitors a year and one of the largest horticultural collections anywhere. The rock garden and alpine house alone are worth a day's visit being rivalled only by Edinburgh and Wisley for grand design and wealth of material.

This book *Kew: Gardens for Science and Pleasure* edited by F. Nigel Hepper is a collection of articles written by people closely connected with Kew and its satellite, Wakehurst Place. The articles range from the history of Kew including very interesting insights into the history of gardening, through a description of the gardens themselves with glances at horticulture in general, and finally a collection of pieces on research, plant hunting, and conservation. The wide-ranging nature of the subject matter makes for fast but interesting reading and the illustrations, many in excellent color, add a great deal to the pleasure. The book's aim is to be more than just

a tour of Kew. The other side of the coin is that one is left wanting to know more about nearly every topic. The rock garden itself is disposed of in one short chapter shared with the alpine house and the woodland garden. Perhaps someone will expand some of these articles into full length books.

The gardens date from the eighteenth century and contain a few buildings dating from this era of faddish tastes and conspicuous consumption, the most prominent features being a large pagoda and an orangery in classical style. The early nineteenth century saw the development of the Botanic Garden and the building of vast and elaborate greenhouses; the beautiful temperate house is one of the survivors of this period. It is in striking contrast to the alpine house which opened in 1981 and always appears to be about to take off from its berm with ventilator wingflaps flying. This airy building houses an astounding collection of plants only hinted at in this book.

In fact as handsome and valuable as the book is, it is only an introduction to a visit in person to Kew and Wakehurst, but it would make such a visit an even more rewarding experience. Here is a book worth a prominent

place on the coffee table but is also actually worth reading. — G.C.

A Giant Among the Dwarfs — The Mystery of Sargent's Weeping Hemlock

by Peter Del Tredici. 1983. Theophrastis, Little Compton, R.I. \$12.00.

Here is a work of horticultural history as fascinating as a detective story. We have as detective the keen minded Peter Del Tredici and as subject the true source and subsequent history of the famous "Sargent's Weeping Hemlock". The hemlock in the previous sentence is put in quotation marks because by way of persistent research and close reasoning Del Tredici convincingly demonstrates that what we had always supposed was a single weeping hemlock, long ago found in Fishkill, New York and

subsequently propagated by cuttings or seed from that ancient original is not at all the whole story.

After investigating all written records and visiting existing ancient weeping hemlocks, Del Tredici concludes: "Putting all the new information and references together, I would like to propose a new scenario for the discovery and distribution of the original seedlings of Sargent's weeping hemlock . . . — You'll have to read the book. I can't spill the beans.

In this book there are handsome photographs of the extant original weeping hemlocks and of other notable specimens. There are chapters devoted to the physiology of hemlock growth and an excellent chapter on propagation.

Peter Del Tredici, a propagator at the Arnold Arboretum, has produced a fascinating book, packed with information, presented in a wonderfully fluid style. — H.L.F

In Praise of Arabis Androsacea

Alan Slack
Media, Pennsylvania

Drawings by the author

In ancient and horticulturally innocent times, my rock garden was planted with a quantity of varieties not exceeding the number of fingers on one hand. At that time my very favorite was the single white arabis (*A. albidula*). It walked and sometimes ran around the rockery much to my delight, blooming and blooming longer than the other four varieties put together. "Rock-ress" as it was listed in the only reference I owned, Wise's

Garden Encyclopedia, Victory Garden Edition, described it as a mustard and of easy culture.

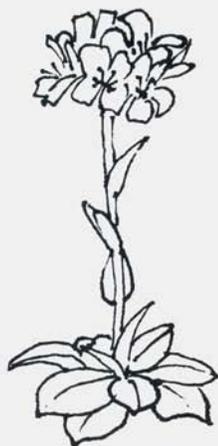
Then in the late sixties, a fellow by the name of Lee Raden introduced my wife and me to the world of alpines via a table-top display of drabas and fari-nose primulas in full bloom, barely inches high, in early March at the Philadelphia Flower Show. There certainly has never been a couple of enthusiastic, born-again sinners that

met a challenge more zealously than we have in trying our newly discovered world of alpiners. We're now sowing between 150 and 200 varieties of seed each spring and our references have grown from my old copy of Wise to dozens of volumes on the subject.

After several years of dissecting texts, trisecting seed lists and attempting to grow every alpine that will survive Delaware Valley climes, I still grow that same arabis that topped my list all those years ago. Since then, I have been introduced to and tried, but not always successfully grown, many of the crucifer tribe dubbed "Arabis." Along the way there came one variety that I must confess is about to challenge my old friend to first place, *Arabis androsacea*.

This little treasure is from the heights of the Turkish mountains and rarely exceeds two inches (see illustration). Aptly named, Farrer describes it as closely resembling *Androsace villosa*. I don't know that it is quite that miniscule in my garden but, it does behave extremely well and has more bloom per plant than any of the others of the arabis tribe that I have met.

Easy from seed, it blooms the second year from a furry tuft of leaves looking for all the world like the best androsace that you have ever encountered. Its needs are simple enough . . .



Arabis androsacea

APs
'81

good drainage, sufficient sun and moisture. Hill's *Propagation of Alpines*, describes the best means of propagation is by division or greenwood cuttings in spring. However, I find it a good seed producer and it almost always is listed by the seed exchanges.

Fantastic as a trough or container alpine, *Arabis androsacea* also lends itself extremely well to the scree or the mound garden. Watch for it on the next ARGS Seed List and when it first comes into its spectacular bloom in your garden, I'll bet it makes it to the top of your list of favorite alpiners, too. §

A Way To Cope With Fussy Plants

Edith Dusek

Graham, Washington

Frequently discussions of plants center around their needs when grown in pots. Many of the same plants may be grown successfully in this area of the Northwest outdoors, but potting

has proven to be difficult. The problem with pots here stems from the need to balance the water needs of the plants successfully. Too often our winters will alternate bright sunny

days with extended periods in which the air is heavily impregnated with moisture. Sun on greenhouses results in high water requirements for the occupants within regardless of outdoor temperatures. If one fails to water, the plants die. If one waters, the gods take great pleasure in immediately ordering up a protracted spell of weather in which it would be nice if one could wring out the air like a soggy towel. Naturally molds move in and the plants die. In a number of cases, the solution has been to grow the plants outdoors permanently.

South of our house the stairway down from the main floor has below it a rock wall. It stands on the hardpan which passes for topsoil here. Originally to keep the "lawn" from invading the rockwork, a narrow border was kept at the foot of the wall. Purple pulsatillas and golden achilleas made a pleasant picture in spring, but hardpan notwithstanding some weeds insisted on encroaching also. Chipping them out was a tedious and finger damaging proposition and, since the height of the wall made it look a bit awkward, we decided on a new arrangement.

With more than a little difficulty, the thin sod of the lawn was stripped away for some distance back from the foot of the wall. We then put in a low irregular wall of rock between the edge of the new sod line and the base of the old rock wall, leaving room at the perimeter for a gravel path. Between the new low wall and the original high one, we tossed cobbles of a size much too coarse for use in paths but not large enough to use in the rock work. When roughly a one foot depth was achieved, we went down to the river where we "liberated" some material from one of the bars. The stuff had minor amounts of clay but

for the most part consisted of coarse sand and small gravel. No topsoil, compost, or other enriching material was added. Final depth was two feet, more or less.

We were to discover that in a bed such as this it was difficult to establish plants, particularly so if they were of any size. Best results accrued from planting after fall rains had set in. Quite by accident it was discovered that much better results were obtained when the chaff from seed cleanings was broadcast on the surface. Inevitably some seed remains in such debris and from these plants germinated readily and proceeded to make fine specimens with no particular effort on their behalf. Plants retained the concise size which endears rock plants to the gardener and flowered freely. Among the contented residents are species of androsace, pulsatilla, saxifraga, phlox, draba, lychnis, lewisia, tulipa, desert alliums, and numbers of others.

The sharp drainage gives good protection in our often drippy winters and springs but makes it necessary to provide artificial "rains" when the natural ones fail in the hottest days of summer. Weeding has not been much of a problem; indeed, the less the surface is disturbed, the better. One rocky particle leans companionably against its neighbors and provides a tenuous path for water to travel through the mass. If the continuity is broken, it takes a long time for it to be renewed. Fragile roots follow these surfaces just as they do in the wild.

Aside from the ease of maintenance, there has been no invasion from our ever present mole population. Squeamish visitors occasionally take fright when they catch sight of garter snakes enjoying the warmth of the rocks.

These harmless creatures sometimes congregate in a heap of a dozen or so with a fence lizard perched on top like a cherry on a cake.

No fertilizers of any kind are used on this bed. To do so would only encourage the plants to grow soft and less able to cope with our winters. Despite the general scarcity of weeds, mosses do move in. Most of them are quite harmless. In fact they make excellent seed beds for various cushion plants. Since one not infrequently finds this association in the wild, it would seem to be a natural one. There is only one moss which, by its ability

to go deeply underground and achieve tall strangling growth above, is kept weeded out. As the less vigorous mosses break down, they create a condition which is very reminiscent of the Rough and Ready Reserve in southern Oregon. Those who are familiar with it will know the astonishing array of small plants which are at home there.

That a bed such as the one described would work for everyone under all conditions is highly unlikely. The only way to find out would be to experiment. §

Viburnum Plicatum Tomentosum 'Fujisanensis'

Vaughn Aiello
Chicago, Illinois

This viburnum of recent introduction is well worth inclusion in a shrub border or treatment as a specimen plant. The original Double-file Viburnum brought into cultivation was sterile and was named *Viburnum plicatum*. When next found in the wild it was a fertile form that was discovered and it was named *Viburnum tomentosum*. Botanists clarified the situation by using both appellations together, thus creating no difference between the fertile and sterile forms. When this new, arresting form of the Double-file Viburnum was discovered on the slopes of Mt. Fuji in Japan it was therefore named *Viburnum plicatum tomentosum* 'Fujisanensis'.

It has many intriguing habits that make it outstrip its relatives. It is much smaller than the type and has smaller foliage. When spring arrives

and the leaves unfold, the flower buds start to form and within a month the plant begins to bloom. However, unlike the type it keeps on forming new flower buds for the entire growing season and thus is in full bloom from early spring until late fall. After two frosts down to 27 F. it has continued to bloom in my garden, but it will not blossom with lower temperatures. There is no appreciable fall color; it just defoliates with harder frosts. It is difficult to prune as all its branches are flowering branches, but it is sufficiently small in stature to require little cutting back. In good light it behaves marvelously well.

All the plants I know of have been propagated from tip cuttings, so there is no need to graft it onto other roots. It is perfectly hardy and will make a beautiful addition to any planting. §

Ht?
Spaced?
flower color & size

Pellaea atropurpurea

Plants often thrive in cultivation under growing conditions quite different from that of their natural habitats. *Pellaea atropurpurea* (purple cliffbrake) is an especially notable example. Its natural habitat is calcareous rock, especially crumbly outcroppings. While we have many ferns in The Dawes Arboretum's collection growing in atypical habitats, *Pellaea atropurpurea* is not only thriving, but is freely propagating itself in a sandstone rock garden with a pH of about 6.0. Cracks and crevices in the near vicinity of the adult plants are filling up with gametophytes and young sporophytes of the species.

— Charles T. Gleaves
Newark, Ohio

• • • of Cabbages and Kings • • •

Once upon a time, when the ARGS was in its infancy, in the days prior to the advent of the Bulletin, the affairs of the Society were published as a column in the *Gardener's Chronicle* through the courtesy of Dorothy Hansell, one of our founding members and our first secretary, whose father owned and published that magazine.

An aquilegia, somewhat resembling the Northeastern *Aquilegia canadensis*, decorated the heading of this column. This flower also appeared on the face of the Gold Medal, which was awarded by ARGS to an outstanding rock garden exhibited in the International Flower Show held in New York City every spring.

The aquilegia had never been officially adopted as the floral emblem of the society, however, and it was not until 1943, the year in which the *Bulletin of the American Rock Garden Society* was started, that the board of the society felt the need of such an

emblem. Our sister societies, the Alpine Garden Society of England and the Scottish Rock Garden Club, both had adopted floral emblems, *Gentiana acaulis* and *Dryas octopetala* respectively, and the board of ARGS felt we too should have a flower as our signature. Therefore, in an announcement in the May-June issue of the new Bulletin, the membership was asked to send in nominations for such an emblem. In this announcement it was suggested that it might be better to choose an individual species rather than a genus for the emblem and that it would be appropriate to choose one from a genus more characteristically North American than aquilegia. It was pointed out that the genus *Aquilegia* ranged throughout the northern hemisphere with about 15 species in Asia, 10 in Europe, and only 12 in North America.

In letters to the editor and discussion at meetings, the members, with

very few exception, agreed that, indeed, it would be most suitable to choose a genus of primarily North American distribution and preferably one that had representatives native to all or nearly all states of the Union. It was also urged by a number of members that the plant displayed as our emblem should be capable of being grown without special difficulty throughout the country. Four genera were suggested that more or less agreed with these criteria: *Dodecatheon*, *Lewisia*, *Penstemon* and *Phlox*. A ballot listing these genera was therefore sent out to all members with the 1946 July-August issue of the Bulletin, requesting that these be returned to the secretary by September 15. Returns were slow coming in however, and by October only 17% of the approximately 440 members had marked and returned their ballots. A further plea to vote was sent out and a wait of several months ensued, but no more ballots were forthcoming and the board, feeling that such a low percentage of returns was not sufficiently decisive, quietly dropped the idea of having a floral emblem. It was not to be resurrected until 1964.

Shortly before leaving office in that year, the incumbent president, Harold Epstein, at the request of one of the members, Harry Logan, again brought up the question of the floral emblem. It was discussed by the board, and a committee, headed by Mr. Logan, was appointed to handle the matter. In view of the Society's previous abortive experience of trying to reach a decision by vote of the membership, the committee decided it would be unrealistic to follow the procedure used in the 1940's for fear the results would be equally inconclusive. Therefore the editor of the Bulletin, A. Merle Sutton, was asked to write an article in the

January, 1964 issue of the Bulletin announcing the renewed search for a floral emblem, explaining the futility of the previous attempt and suggesting that one of the more common species of *dodecatheon* be selected. In the article Mr. Sutton pointed out that the genus had native representatives in all states of the Union with the exception of New England and that some species, particularly *Dodecatheon meadia*, were not difficult in cultivation. Then in an attempt to provoke a response from the membership, the editor, in the final paragraph, pronounced that unless there was violent opposition expressed by a representative number of members, and if the committee and Mr. Epstein approved, that the October, 1964 Bulletin would declare *Dodecatheon meadia* the official floral emblem of the American Rock Garden Society.

The reaction was immediate. Not that the letter writers disapproved of *Dodecatheon*, though a few still stumped for other favorite genera such as *Lewisia*, *Penstemon*, *Phlox* and *Aquilegia*. The majority agreed that *Dodecatheon* would make an ideal emblem, but objected strenuously to the species *D. meadia* as being too large and coarse and not suitable for the average rock garden. A few members wrote in suggesting it might be wiser to have as an emblem a stylized design based on the genus *Dodecatheon*, but depicting no particular species. The committee agreed and urged members to send in drawings for consideration, advising would-be artists that the design should be simple and suitable for pins and badges as well as for letterheads.

A number of designs were submitted, many of excellent caliber, and were turned over to a selection committee chaired by Harold Epstein, who

was by this time no longer president. This committee chose a group of the most suitable designs and turned them over to an American firm that specialized in the manufacture of pins and buttons for societies and fraternal organizations. Combining features from several of the drawings they came up with the design now familiar to all ARGS members. Unfortunately they were unable to supply enamel colors considered suitable by the committee. Unwilling to compromise, the committee sent the design to

several other firms, one being in England. After lengthy correspondence, conferences, and the submission of color samples, the final decision was made and a contract was signed with the English firm, which produced pins and lapel buttons; these were made available to members in the spring of 1967.

And so, finally, after a twenty-four year gestation the floral emblem of the American Rock Garden Society burst into bloom. A long seed dormancy, indeed. §

CHANGING YOUR ADDRESS?

Please send prompt notification of change of address to the Secretary, Norman Singer, SR 66 Box 114, Norfolk Rd., Sandisfield, MA 01255

If you do not do so we must charge you for the additional postage needed to forward Bulletins and notices returned to us because of non-delivery at your former address.

Notice must be received 4 weeks before scheduled mailing dates of the 15th of January, April, July and October.

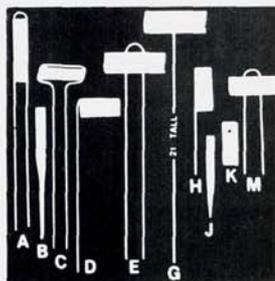
PACIFIC HORTICULTURE

a magazine about plants and Gardens of the West

Illustrated Color Quarterly

Annually: U.S. \$10; Canada & Mexico \$12; Overseas \$14 in U.S. Currency

Write to P.O. Box 22609, San Francisco, CA 94122



THE PERMANENT METAL LABEL

A—Hairpin Style Markers	30	for \$6.90
B—Plant/Shrub Labels	100	for \$5.70
C—Cap Style Markers	30	for \$7.00
D—Swinging Style Markers	30	for \$5.95
E—Rose Markers	30	for \$6.60
F—Tall Display Markers	30	for \$9.25
G—Tall Single Staff Markers	30	for \$6.75
H—Flag Style Markers	30	for \$5.50
J—Small Plant Labels	100	for \$5.65
K—Tie-On Labels	100	for \$6.60
M—Miniature Markers	30	for \$5.60

PAW PAW EVERLAST LABEL COMPANY

P.O. Box 93 — E

Paw Paw, Michigan 49079-0093

Quantity Prices Available

Postage Prepaid

RARE AND UNUSUAL BOOKS OF THE GARDEN

One of a Kind and Out-of-Print

Write for free Catalogue containing special section for

Alpines and Rock Gardening

Sweetgrass & Co., Booksellers - P.O. Box 711, Alhambra, CA 91802

THE AMERICAN CONIFER SOCIETY

In January, 1983 the American Conifer Society was formed. The purposes of the ACS are the development, conservation, and propagation of conifers, with an emphasis on those that are dwarf or unusual. Standardization of nomenclature and education of the public will also be emphasized. The society publishes a quarterly bulletin and holds an annual meeting.

Annual membership runs from July 1 to June 30 with anyone joining during a year receiving back issues of the bulletin for that year. Individual annual membership is \$12.50. Commercial membership is \$100.00.

Since our membership is very diverse and includes both new collectors and experienced plantsmen, our bulletin contains information for the novice as well as the professional. The ACS already has more than 300 members. Why not join us?

Checks should be made payable to the American Conifer Society and mailed to:

William Schwartz, ACS Treasurer

1825 North 72nd St.
Philadelphia, PA 19151

COLLECTORS DWARF BULBS

Our 1984 Catalogue will include:

ANEMONE tschernjaewii and A. petiolulosa, ARUM albospathum,
CORYDALIS cashmeriana and C. glaucescens, COLCHIAM umbrosa,
CROCUS alatavicus, C. scharejanii and C. gargaricus,
CYCLAMEN fatrense and C. parviflorum, EMINIUM lehmannii,
ERYTHRONIUM caucasicum, FERRARIA undulata, PLEIONE yunnanense,
FRITILLARIA eduardii, F. stenantha and F. walujevii, LEUCOJUM nicaense,
IRIS afghanica, I. orchioides and I. pamphylica, NARCISSUS bulb. cant.
petunioides and N. bulb. 'Julia Jane', TULIPA ferghanica and T. tshimganica.
MERENDERA raddeana, OXALIS lobata, STERNBERGIA candida,
TECHOPHILLEA cyanocrocus.

Full and descriptive catalogue \$1.

POTTERTON & MARTIN

Nettleton, Nr. Caistor, North Lincs. LN7 6HX, England. Tel. 0472-851792

ROCK PLANTS - WILD FLOWERS PERENNIALS - HERBS DWARF EVERGREENS

For sale at nursery only.

No Catalog

Open Tues. thru Sat. (July - August by Appointment)

FAMOSI NURSERY

Lowell Davis Rd., Wilsonville, CT 06255

1½ miles after taking Exit 100 off Rte. 52
Go west toward Wilsonville - first left

Fjellgarden

(The Mountain Garden)

Selection of fine Alpine and Sub-alpine plants, including a few Arizona natives not known in cultivation. All hardy in the Southern Rockies at 7,000 feet.

\$1.00 for Descriptive List

P.O. Box 1111

Lakeside, AZ 85929



**DIFFERENT, EXCITING
GREAT FUN TO READ**

*For the gardener who wants to get more out of gardening! Subscribe to the **AVANT GARDENER**, the most useful, most quoted of all gardening publications. Every month this unique news service brings you the newest and most practical on-going gardening information — new plants, products, techniques, with sources, evaluations, feature articles. Now in its 15th year. Awarded Garden Club of America Medal. Curious? Sample copy \$1. Serious? \$10 for a full year (reg. \$15).*

THE AVANT GARDENER

Box 489 A

New York, NY 10024

**Catalog
for
Gardeners**



Issued
spring and fall,
each contains an abundance
of hardy plant varieties and
useful cultural information.

Denothera missouriensis
Ozark Sundrops

Perennials • Wildflowers
Bulbs • Selected Woody Plants



**Holbrook Farm
& Nursery**

Route 2, Box 223B, 2004
Fletcher, N.C. 28732

I'm interested. Enclosed is \$2.00 which is deductible with my first order. Please send me your new catalogues starting with the spring 1984 issue.

Name _____

Address _____

City _____

State _____ Zip _____



**SMALL BEARDED IRISES
FOR THE ROCK GARDEN**

Specializing in true *Iris pumila*, other small bearded *Iris* species. Introducing for several U.S. and European hybridizers.

Free Catalog available in April
No Orders Accepted After July 15

DAVID B. SINDT — IRISES

1331 West Cornelia, Dept. R
Chicago, Illinois 60657

forest.farm grows...



an EXTENSIVE SELECTION of QUALITY
containerized starter-plants:

- * HARDY AMERICAN NATIVES
- * WILD-FRUIT PLANTS
- * UNCOMMON ORNAMENTALS
- * HARDY EUCALYPTUS
- * CONIFERS, many others

A wealth of information in our
descriptive catalog — \$1

FORESTFARM / Ray & Peg Prag
990 Tetherock Road
Williams, OR 97544



Grower of
**ROCK PLANTS, HERBS
PERENNIALS
ANNUALS**

Large Selection

No Catalog

All Plants for Sale at Nursery Only

SAMUEL F. BRIDGE, JR.
437 North Street
Greenwich, Conn. 06830

COENOSIUM GARDENS

Rare and unusual dwarf conifers, standard conifers, and deciduous trees are available from the Coenosium collection.

For descriptive listing
send 2 first class postage stamps to

Robert Fincham

425 N. Fifth St.

Lehighton, PA 18235

1-215-377-1495 Evenings

THE CUMMINS GARDEN

**DWARF RHODODENDRONS
DECIDUOUS AZALEAS
DWARF EVERGREENS
COMPANION PLANTS**

YES, We Ship!

Custom Propagating

Catalog \$1.00

(Refundable With Order)

Phone (201) 536-2591

22 Robertsville Road

Marlboro, NJ 07746

Hardy Named
**SEMPERVIVUMS SEDUMS
JOVIBARBA & ROSULARIA**
Red, Pink, Purple, Blue & Gold
New American Hybrids — Imports from Europe
Wholesale and Retail

OAKHILL GARDENS

1960 Cherry Knoll Road
Dallas, Oregon 97338

(Same location — new address)

CATALOG — 35¢

Visitors Welcome — Picnic Area — Garden
Clubs Welcome (please by appointment)

Helen E. & Silm Payne

**PLANT JEWELS OF THE
HIGH COUNTRY**

Sempervivums and Sedums
by Helen E. Payne

111 Full Color Photographs
Autographed Copies \$9.50
Shipping Charge \$2.00

Oliver
NURSERIES, INC.

Specialists in

**Azaleas,
Rhododendrons,
Dwarf Evergreens
and Rock Plants**

For sale at nursery only.
Catalog 50¢

1159 Bronson Road
Fairfield, Conn. 06430

A \$95⁰⁰ VALUE
FOR ONLY \$19⁹⁵
WHEN YOU JOIN
THE GARDEN
BOOK CLUB

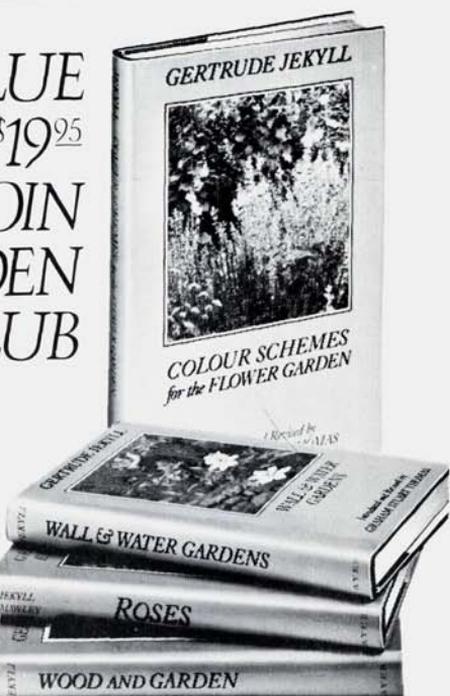
This extraordinary money-saving offer is our way of introducing you to the distinctive advantages of the new Garden Book Club.

Gertrude Jekyll was one of the most passionately inventive gardeners England has ever produced. At last, four of her most admired works—long out of print and prized by collectors—have been reissued: *Colour Schemes for the Flower Garden*, *Wall & Water Gardens*, *Roses*, and *Wood and Garden*. These profusely illustrated editions—updated for present-day American gardeners by Graham Stuart Thomas—will enable you to transform your garden, no matter how daunting the conditions.

Publisher's price for the set: \$95.00

Charter Member's special price for the set: \$19.95

As a member of the new Garden Book Club, you'll be offered selections of similar merit ten times a year. You'll choose from among the best books in every gar-



den category—garden history and design, illustrated reference works and encyclopedias, hard-to-find technical and specialty books. Your savings are significant—often as high as 30%—so you can build a fine library of elegant and indispensable gardening books.

To become a Charter Member and receive your set of four superb books by Gertrude Jekyll, just send the coupon today.

The Garden Book Club

Membership Service Department
250 W. 57th Street, N.Y., N.Y. 10107

How membership works: you agree to buy four club selections during your first year of membership. You'll choose books from our club bulletin that offers you a wide selection of garden books ten times a year. When you want the main selection, do nothing and you'll receive it automatically. If you want any other book listed—or none at all—indicate your decision on the reply card enclosed with the bulletin and return it by the specified date.

Should you ever receive the main selection without having had 10 days to return the card, you may return that selection at our expense. After fulfilling your initial obligation, you earn a bonus credit with every book you buy. Four credits entitle you to a Bonus Book (most of them available at no extra charge, a few for a nominal sum). Unless you prepay, you will be billed on all orders for postage and handling.

Name _____

Address _____

City _____

State _____ Zip _____

Payment enclosed. Please send my introductory books right away. Charge my credit card as follows:
 MasterCard American Express

Card # _____

Expires _____ MasterCard Bank # _____

Signature _____

The club reserves the right of membership approval. ARG01

SOUTHERN SEEDS

offers you

UNUSUAL and RARE ALPINE PLANT SEED
of the

WAIMAKARIRI CATCHMENT, SOUTHERN ALPS
NEW ZEALAND

Seed List Available: N.Z. \$1.00 postpaid

**The Vicarage,
Sheffield, Canterbury, New Zealand**

RARE SOUTHERN OFFERINGS

Large selection of hard-to-find

TREES, SHRUBS & PERENNIALS

native and exotic species

ALL NURSERY GROWN

Please send self-addressed stamped envelope
for free mail-order list or \$1.50 to include
Descriptive Catalog.

WOODLANDERS, Dept. RG

1128 Colleton Avenue, Aiken, SC 29801

**Alpines, Perennials, Sedums,
Dwarf Conifers and Shrubs,
Bonsai Starter Plants.**

Comprehensive Descriptive Catalog

\$1.00

Deductible first order

RAKESTRAW'S GARDENS

3094 S. Term St., Burton, Mich. 48529

BEAUTIFUL — COLORFUL

SEMPERVIVUM

(Hen and Chicks)

Hardy Semps are great decor for between
rock edgings, borders, containers

Send 50¢ (coin or stamps) for
descriptive listing



COLVIN GARDENS

R. R. #2, Box 272

Nashville, Ind. 47448

ORCHID GARDENS

Mrs. Clair Phillips spent 1983 writing
a book about wildflower culture. It is
expected the book can be published in
time to offer in a revised Wildflower
Culture Catalog available in spring
1984.

Catalog price is 50¢
No foreign plant orders please

6700 Splithand Road
Grand Rapids, Minnesota 55744

AMERICAN PRIMROSE SOCIETY

offers

Quarterly publications beautifully illustrated, an
international Seed Exchange of approximately 100
different Primulas and a culture chart to assist in
the growing of species Primulas.

U.S.A. \$7.00 per year

G. K. Fenderson, Treasurer

Grout Hill

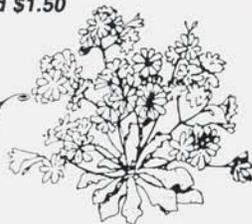
South Acworth

New Hampshire 03607

An ever-changing 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 \$1.50
to:**

SISKIYOU
RARE PLANT NURSERY



Dept. 41

2825 Cummings Road

Medford, Oregon 97501

Phone: (503) 772-6846

VISITORS WELCOME BY APPOINTMENT

J. Cobb Colley and Baldassare Mineo, proprietors

SHIPPING WITHIN U.S. ONLY

DWARF CONIFERS

Over 140 **Dwarf Conifers** and **Dwarf Companion Plants**. Many suitable for **Bonsai**. Send for our 50 page catalog (\$1.00) describing plants by **size, shape, color and texture**. Particular attention is given to plant sizes after 10 years growth. Dwarf conifer books and plant collection locations listed. 1983 Plant and Price List is free on request.

Washington Evergreen Nursery
P.O. Box 388 RG, Leicester, North Carolina 28748
Telephone: 704-683-4518



Maver
Rare Perennials

For Rock Gardens, containers, borders and specialty gardens. Vast choice for the discriminate(d) collector. Also we introduce —
New *Campanula* Hybrids never offered elsewhere.

Wholesale list available for growers
Visit by appointment (206) 725-9823

For descriptive catalog,
send \$1.00 (deductable first order) to

Maver

P.O. Box 18754, Dept. A,
Seattle, WA 98118



ROCKNOLL

SEND FOR OUR SPECIAL LIST OF
Unusual Rock Plants, Shade Plants, Hosta,
Perennials, Hemerocallis, Sempervivums,
Native American Plants, Shrubs, Iris &
Dwarf Evergreens

24 page Catalog
Please send 40¢ in stamps
WE SHIP

Attention — Eleanor Saur or Dorothy Parker

ROCKNOLL NURSERY
9210 U.S. 50 - Hillsboro, Ohio 45133
1-513-393-1278

Daylilies

Hosta

Siberian Irises

Peonies

Perennials

Busse Gardens

"The Minnesota Perennial People"

635 East 7th Street
Cokato, Minnesota 55321



(612) 286-2654

Catalog \$1 (Refundable on First Order)

OWL RIDGE ALPINES

Choice Alpines & Native Wildflowers

Open Weekends
or by appointment

Send 50¢ for List

5421 Whipple Lake Road
Clarkston, Michigan 48016
1-313-394-0158

FOXBOROUGH NURSERY

growers of

Dwarf & Unusual

CONIFERS and BROADLEAFS

by appointment only

W. David Thompson

(301) 836-1872

3611 Miller Rd. Street, Md. 21154

COLLECTOR'S CATALOG

Thousands of different Seeds
from every continent
Many collected in the wild.

* ALSO *

BARNHAVEN SILVER-DOLLAR PRIMROSES
Seeds & Transplants

Catalog plus Collector's Seed List
\$1.00 (deductible)

FAR NORTH GARDENS

15621 AR Auburndale, Livonia, MI 48154

Dwarf Evergreens Uncommon Trees

Visitors Welcome Displays Labeled
Browsing Encouraged

Please send a stamp or two for our list
(No shipping)

DILATUSH NURSERY

780 Rte. 130

Robbinsville, N.J. 08691

THE CYCLAMEN SOCIETY

For gardeners interested in Cyclamen species and
cultivars. Free Seed Exchange includes most species
and the list increases regularly.

Journal Twice Yearly

For further details contact:

Dr. M.P. Summers - 24, Westell Close
Clothall Common, Baldock, Hertfordshire
England SG7 6RY

THE SEEDLIST HANDBOOK

3rd Edition 1980, Reprinted 1982
With Paging Errors Corrected

BERNARD HARKNESS, COMPILER

246 pages. References to Illustrations.
Bibliography

\$8.50 ppd. — RETAIL ONLY

KASHONG PUBLICATIONS

P.O. Box 90, Bellona, New York 14415



NATURE'S GARDEN

Species Primulas — Gentiana
Alpine Show Auriculas
Ramondas — Lewisias
Sedums and Sempervivums

New Plant List — \$1.00

Route 1, Box 488
Beaverton, OR 97007

We-Du Nurseries

Route #5 Box 724
Marion, NC 28752

TRILLIUM, EPIMEDIUM, IRIS
FERNS, ORCHIDS

ROCK & WOODLAND PLANTS:
ORIENTAL COUNTERPARTS

CATALOGUE 50¢

THE SCOTTISH ROCK GARDEN CLUB



Offers you . . .

its twice yearly Journal, well illustrated and containing authoritative articles on all aspects of rock gardening, rock plants, and their world wide haunts. Its excellent annual scheme for the distribution of rare & unusual seed, amongst its international members.

*for \$12.00 U.S. Currency per year or £5 British Currency on Bank in UK
or
£5 International Money Order*

Hon. Subscription Secretary Mrs. R. Law
Kippielaw Farm, Haddington, East Lothian EH41 5PY, Scotland

THE ALPINE GARDEN SOCIETY

Membership of the Alpine Garden Society puts the American alpine gardener in close touch with those throughout the world who share his interest in one of the most absorbing branches of horticulture.

The Quarterly Bulletin of the A.G.S. is respected internationally as one of the most informative publications of its kind. It will bring into your home a distillation of the experience and ideas of some of the finest gardeners, plant explorers and horticultural thinkers of our time.

Amongst the many other benefits of the Society, its uniquely comprehensive seed list alone is worth more than the modest subscription of \$15.00 for Overseas Members. Apply to:—

The Secretary, the Alpine Garden Society
Lye End Link, St. John's, Woking, Surrey, England

THE ALPINE GARDEN SOCIETY'S PUBLICATIONS,

WRITTEN BY ACKNOWLEDGED EXPERTS IN THEIR OWN SUBJECTS, OFFER OUTSTANDING VALUE

HANDBOOK OF ROCK GARDENING	\$4.00
THE GENUS LEWISIA	By R. C. Elliott \$4.50
SAXIFRAGES	By Winton Harding \$6.00
ALPINES IN SINKS AND TROUGHS	By Joe Elliott \$2.25
THE GENUS CYCLAMEN	By D. E. Saunders \$3.25
ASIATIC PRIMULAS	By Roy Green \$12.00
DAPHNE	By Chris Brickell and Brian Mathew \$11.25
ANDROSACES	By George Smith and Duncan Lowe \$12.00
MOUNTAIN FLOWER HOLIDAYS IN EUROPE	By Lionel Bacon \$17.00
DWARF SHRUBS	By Harold Bawden \$9.00
A BEGINNERS GUIDE TO ROCK GARDENING	By Winton Harding \$3.75
PROPAGATION OF ALPINES	By Ken Hulme \$2.75

AGS Publications are available ONLY from AGS Publications Ltd.

(All prices postpaid)

D.K. HASELGROVE, 278/280 Hoe Street, Walthamstow, London E17 9PL, England

DIRECTORATE
AMERICAN ROCK GARDEN SOCIETY
President Emeritus
 HAROLD EPSTEIN, 5 Forest Court, Larchmont, New York

President ROBERT L. MEANS, 410 Andover St., Georgetown, Mass. 01833
Vice-President KENNETH J. LOVE, 3335 N.W. Luray Terrace, Portland, Ore. 97210
Secretary NORMAN SINGER, SR 66 Box 114, Norfolk Rd., Sandisfield, Mass. 01255
Treasurer FRANCIS H. CABOT, Cold Spring, N.Y. 10516

Directors

Term Expires 1984		
Patricia Lou Carson (Mrs. Orel Dale)	Mamie Flook	Dr. Robert McDermott
Term expires 1985		
William S. Folkman	Andrew Pierce	Waid R. Vanderpoel
Term Expires 1986		
Marvin E. Black	Iza Goroff	Howard W. Pfeifer

Director of Seed Exchange
 Mrs. D. Bruce Whittemore
 90 Ridgecrest Drive, Westfield, MA 01085

Director of Slide Collection
 Mrs. Lois E. Ecklund
 Route #5, River Haven, St. Cloud, Minn. 56301

ARGS-PHS Library Service
 Pennsylvania Horticultural Society Library
 325 Walnut St., Philadelphia, Pa. 19106

CHAPTER CHAIRMEN

Adirondack LEE NELSON, 8 Peer St., Binghamton, NY 13901
 Allegheny ANNE TOUMEY, Cole Road, Wexford, PA 15090
 Arizona SONIA LOWZOW, Rte. 2, Box M365, Lakeside, AZ 85929
 Columbia-Willamette FRED NILSEN, 2744 SE 30th Ave., Portland OR 97202
 Connecticut GEOFFREY CHARLESWORTH, Norfolk Rd., Sandisfield, MA 01255
 Delaware Valley ROBERT WAY, P.O. Box 116, Kennett Square, PA 19348
 Great Lakes ROBERTA CASE, 7275 Thornapple Lane, Saginaw, MI 48603
 Hudson Valley ROBERT M. COLE, 60 Benedict Ave., Tarrytown, NY 10591
 Long Island JOANNE and FRED KNAPP, Kaintuck Lane, Locust Valley, NY 11560
 Minnesota STEVE KELLEY, 2325 S. Watertown Rd., Long Lake, MN 55356
 New England SAM RYBURN, 33 Wilsondale St., Dover, MA 02030
 Northwestern MARGERY A. KEPNER, Apt. 203, 915 East Harrison, St., Seattle, WA 98102
 Ohio Valley MICHAEL D. COLE, 730 Carlsbrook Dr., Beaver Creek, OH 45385
 Potomac Valley LYNN MAKELA, 5408 Yorkshire, St., Springfield, VA 22151
 Rocky Mountain RAY RADEBAUGH, 335 Gorham Ct., Louisville, CO 80027
 Siskiyou LIBBY PINKHAM, 551 Ash St., Central Point, OR 97502
 Watnong DIANE McNALLY, 7 Ski Hill Rd., Bedminster, NJ 07921
 Western TED KIPPING, 540 Melrose Ave., San Francisco, CA 94127
 Western-No. Carolina SAM CHILDS, 3410 Brevard Rd., Hendersonville, NC 28739
 Wisconsin-Illinois GWEN MOORE, 807½ Oakland Ave., Madison, WI 53711

YOUR ARGS BOOKSTORE

All Books Paperback Unless Otherwise Noted

* Plus Handling and Mailing

1. ALPINES '81 — Report of Fifth International Rock Garden Plant Conference. 229 pp. 32 pp. color plus black and white photos \$18.00*
2. ALPINES OF THE AMERICAS — Report of the First Interim International Conference, 1976. 327 pp., 20 pp. color plus black and white photos \$15.95*
3. BULB BOOK — Martyn Rix and Roger Phillips. 192 pp. A photographic guide to over 800 hardy bulbs. A must for the bulb grower \$13.50*
4. FERNS TO KNOW AND GROW — F. Gordon Foster. 2nd revised edition. 282 pp. Line drawings and photos \$3.00*
5. HANDBOOK OF ROCK GARDENING — 77 pp. Published jointly by ARGS and Brooklyn Botanic Garden. \$2.25*
6. JEWELS OF THE PLAINS — Claude A. Barr. 226 pp. Hardcover. 119 color photos. Wildflowers of the Great Plains grasslands and hills. The author's personal experience flavors the plant descriptions \$17.00*
7. PLANTS OF ROCKY MOUNTAIN NATIONAL PARK — 168 pp. Color photos \$6.95*
8. ROCK GARDENER'S HAND BOOK — 1965. 138 pp. Hardcover. Compilation of the best of early ARGS articles. Only 30 copies from a former Secretary's attic \$8.00*
9. ROCK GARDENING — H. Lincoln Foster. 466 pp. Written for American rock gardeners by THE expert. A MUST for your library \$22.00*
10. ROCK GARDENS — Wilhelm Schacht. 192 pp. Well illustrated with color photographs ... \$8.00*
11. SEEDLIST HANDBOOK — Bernard Harkness. 3rd ed., 246 pp. Indispensible to all rock gardeners \$7.50*
12. SOURCES OF NATIVE SEEDS AND PLANTS — 35 pp. Listed by state and type of material or seed \$2.50*
13. WILD FLOWERS AND HOW TO GROW THEM — Edwin F. Steffek. 186 pp. Color and black and white photos. Enlarged and revised edition. Includes Western natives \$18.50*
14. WILDFLOWERS ACROSS THE PRAIRIES — 214 pp. Color photos \$8.50*
15. ROCK PLANTS FOR SMALL GARDENS - Royton E. Heath. 144 pp. Hardcover. Reprint of "Miniature Rock Gardening" plus new color photos \$15.00*

*Handling and Mailing — \$1.00 per 1st book plus 50¢ per additional book

Overseas — \$1.50 per 1st book plus 50¢ per additional book



16. ARGS PRINTS of Laura Louise Foster's pen and ink drawings. Inquire for prices.
17. ARGS NOTE PAPER. 12 cards and envelopes. Reduced to .. \$3.50 All postpaid.
18. ARGS LAPEL PIN \$3.35 Overseas add
19. ARGS SHOULDER PATCH \$2.25 50¢ per order
20. ARGS BULLETIN LIBRARY BINDERS \$4.00 plus \$2.00 mailing charge for 1; \$3.25 mailing charge for 2. Overseas add 50¢ per binder.
21. ARGS BULLETINS — Back issues. Inquire about availability and price.
22. CUMULATIVE INDEX for ARGS Bulletins, Vols. 1 thru 34 75¢
23. SEEDS — 3 Methods of germinating seeds. Xeroxed from ARGS Bulletins \$2.50
24. TROUGHS — Construction and lists of plant material to use. Xerox \$3.50

Nos. 21, 22, 23, are all postpaid. Overseas add 50¢ to order.

All orders must be prepaid in U.S. funds. Payable to ARGS.

U.S. destinations must show ZIP code. Airmail billed at cost.

ARGS BOOKSTORE WILL BUY BACK ISSUES OF ARGS BULLETINS

Contact for offer. Postage for shipping will be refunded.

ARGS BOOKSTORE: Anita Kistler, 1421 Ship Rd., West Chester, PA 19380