Bulletin of the American Rock Garden Society

VOL. 41 FALL 1983 NO. 4

THE BULLETIN

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Cover Picture — *Dryas octopetala* — Laura Louise Foster
Falls Village, Connecticut

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Dryas In Cultivation

H. Lincoln Foster
Falls Village, Connecticut

The Mountain Avens or Mountain Dryad ranges widely both in the Old World and the New as well as into Asia. To this dwarf, creeping, shrubby member of the Rose Family Linnaeus in 1753 gave the genus name *Dryas* because he had a penchant for mythological names. He saw in the scalloped, evergreen leaves of this plant a miniature resemblance to the leaves of an oak, a tree sacred to the dryads of Greek mythology. For the species of the European plant with which he was familiar he assigned the name *octopetala*. Most members of the Rose Family display only five petals, whereas the dryas is most commonly blessed with eight, though it may carry occasionally seven or nine cupping the central gold boss of stamens and pistils.

These single rose-like flowers are usually white, but may rarely be tinged with yellow or even with pink. An added attraction after the flowers are spent is the fluffy seed head composed of many small flat seeds with long white plumose styles.

Dryas octopetala, which is the emblem of the Scottish Rock Garden Club, is an ideal plant for the sunny rock garden. It thrives most vigorously and permanently in a stony open soil with rapid drainage. Though frequently associated with rock formations of alkaline character, the plant will grow successfully under acid conditions. As pointed out in the next article, it deeply resents being overgrown by other plants.

Throughout its wide range there is considerable variation in *Dryas octopetala:* in growth habit, leaf texture and flower character. Some of these variations have from time to time been proposed as separate species, but the general consensus today is that these differences are worthy of varietal status only. One or two of the varieties are of special interest to horticulturists; such are *lanata* whose leaves are distinctly downy, and especially variety *minor,* compact in habit, small in leaf, with ample flowers on very short stems. This latter variety also has the virtue of blooming from spring through to fall.

In addition to *D. octopetala* and its variants, there are two other species generally recognized: *D. integrifolia* with narrow leaves barely scalloped on the edges and *D. drummondii* with nodding yellow flowers that do not really open their petals. Both of these species are found in northern sections of North America extending above the Arctic Circle, the latter frequently in river gravels subject to flooding.

There is also a horticultural dryas known as x *suendermannii,* purported to be a natural hybrid of *D. octopetala* and *D. drummondii.* This has flowers yellow in bud, opening to cream color, only slightly nodding. Since this form tends to come true from seed with greater or lesser intensity of yellow in the blossom, it possibly is a color variant of *D. octopetala* itself.

To assure good germination, dryas seed should be sowed as soon as possible after ripening. Then comes the problem of establishing the seedlings in a permanent site. As a woody sub-shrub it has few feeding roots, which are actively regenerating for only a short period during the growing year. The best time of year for transplanting dryas of all sorts appears to be in June and July when new rootlet initiation is most active.

This is also the best time of year to encourage rooting of stolons and of cuttings. New roots probably begin to form on the ground-hugging branches during June, but it is best to cut rooted branches free from the parent plant in mid-July and remove them as new plants in late July. Cuttings of tip shoots with a short length of mature wood can be taken in June or July. Roots will form fairly quickly, but it is wise to hold the rooted cuttings for transplanting the following June.

Once established in a congenial setting of sun and gritty soil, dryas should persist for years and years, forming ever advancing ramifications of woody ground-hugging stems, spangled in late spring and frequently into the summer with glistening white roses, full in the center with a gleam of yellow stamens, to be followed by the swirling puff of feathery seed heads. §

Dryas In The Wild

Mitch Blanton
Bellingham, Washington

The value of dryas in the garden is widely recognized. Its attributes include a pleasing growth form, intricately patterned leaves, lovely rosaceous bloom, persistent feathery styles in fruit, and an unusually long life. What is not so gen-

erally realized is that dryas is an extremely important constructive member of many alpine and arctic ecosystems.

The geographic distribution of dryas is immense. It is found at the northernmost reaches of land throughout the arctic region, in most mountain ranges of the northern hemisphere, and even in open boreal woodlands. The most important species are *D. octopetala*, *D. integrifolia*, and *D. drummondii*. As many as twenty distinct forms have been identified but their exact taxonomic placement is uncertain. For example, Porsild and Juzepczuk think that there are eight or nine intersterile species in North America, whereas Hulten and Hitchcock contend that at least several of these are interfertile races of a single species, *D. octopetala*.

Numerous field studies have revealed a number of interesting ecological roles played by dryas. In Alaska dryas has been found to be an important pioneer in recolonizing land at sites of recent deglaciation. Where glacial retreat has exposed denuded, nitrogen-poor soils of sand, gravel, and till the first plants to appear are legumes and species of dryas, the seeds of which are adapted to wind dispersal. Remarkably, it was found that roots of dryas form nodules containing organisms capable of nitrogen fixation and that these organisms are similar to those found in other non-leguminous nitrogen fixers such as alnus and myrica. The presence of the pioneers is ephemeral. In the course of about one hundred years they reach a zenith, decline, and are suppressed by plant successors that benefit from the increased levels of soil nitrogen and humus provided by the pioneers. These findings are especially significant for those who seek to determine the sequence of events that might have occurred in the establishment of a flora following retreat of the continental ice sheets some 10,000+ years ago. Dryas leaves are conspicuous in fossil formations from those times and this fact, when combined with its present day geographical distribution and aforementioned ecological role, indicates that dryas probably played a similar pioneering role in the vegetative reinvasion of the area covered by Pleistocene ice.

The constructiveness of dryas is also evident in alpine plant communities of Europe and North America, where it may occur in a successional regime, as a sort of climax community, or in a cyclical situation. In the first instance, where calcareous material is found, a unique type of succession may occur. Lime tolerant pioneers, particularly dryas, create and trap humus, which provides an ideal seed bed for grasses. The grasses form thick tufts, which, in turn, eventually suppress the pioneers. Succession continues and the accumulation of organic matter lowers the pH until, eventually, acidophilous species dominate. In the second instance, on ridges and in fell fields where wind velocities are extreme, dryas may be part of what might be considered a climax community. Thirdly, in areas where frost heaving and solifluction create an unstable soil condition, dryas stands may form islands of refuge for other plant species. The combined forces of needle ice and soil creep kill the vegetation at the edges of the dryas colonies, but within the mat-groups a stable microsite is created in which other species can survive. The continually bared soil is available for recolonization so that a stable stand of vegetation is never attained, yet the plant community present at any one time does not appear to vary in appearance or abundance.

Finally, the habitats occupied by dryas in alpine regions are replicated to a great extent in the high arctic. There dryas (especially *D. integrifolia*) is a dominant

member of polar semi-deserts, fell fields, gravelly river flats and fans, and also occurs, though to a much lesser extent, in dwarf-shrub-heath and lichen-moss-heath communities. The ubiquity of this genus in the rock desert type of landscape of boreal ecosystems has led to the naming of these areas as "Dryas barrens." It is clear, when all the available information is considered, that dryas was and is instrumental in the establishment and maintenance of the tundra as we know it today.

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Packaging Seed

Until I worked on the Seed Exchange, I would have thought these truths would be self-evident, but in terms of what comes in for the poor director to cope with, they are scarcely that at all. Do not package seed in airtight containers such as film canisters, cookie boxes, etc. It has been known to germinate en route to the Exchange. All that dark, moist air . . . Do not package seed in Scotch Tape wrapped paper tissues, Saran Wrap, or anything else that is difficult to open. It is apt to end up on the floor (where it was eaten by Bill Dilger's quail) or in someone's pant-cuff.

Many people are masters of the paper-folding origami technique of making their own seed packets. If you are not into this art coin envelopes will do nicely, but — make sure, if possible, that the seed envelope does not leak. If it does, use tape to secure the corners or, after tapping the seed to the center of the packet, fold the top and bottom of the offending envelope inward so the envelope is folded in thirds and then secure. One out of fifteen contributions has a substantive portion of the seed intermingling wantonly in the bottom of the envelope or container that held the seed packets. (When Bill Dilger did the Exchange, we packaged the minglings, offered it as the last number in the seed listing and were amazed at the number of people who ordered it as a "bonus." The next year the English group did the same thing and, with that camp British fillip, called it "Lucky Dip."

— Nina Lambert, Ithaca, N.Y.

American Botanists:

John Bartram and His Son William

James A. Collins
Hendersonville, North Carolina
Drawings by William Bartram*

Sometime during the late Paleozoic Era, which occurred approximately 220 million years ago, a large portion of the earth's crust was folded into what we now know as the Appalachian Mountains. These mountains, which are among the oldest on earth, are extraordinary for many things, the most interesting being their amazing variety of temperate zone plant life. Throughout all those millenia, and since the advent of the early angiosperms, these mountains have not been subjected to glaciation or inundation by marine waters. In such relatively favorable natural circumstances a great and diverse wealth of plant life became established, numbering into the thousands (species, varieties and forms) along with many species of animals and lower forms of life.

Inhabited by aboriginal Indians, this veritable garden of Eden awaited the arrival of the Europeans eager to flee their tired old countries, despotic rulers and often intolerable living conditions. And come they did, reaching deep into the southern Appalachians by the 18th Century, bent on pursuing the course of their "manifest destiny."

Into this developing country, in 1699, in Kingessing (now Philadelphia) John Bartram was born of Quaker parentage. John received but scant formal education early in life. His principal vocation was farming, but he was also a skilled stonecutter and stonemason and at times attended to the ills of his neighbors in the "application of physic and surgery."

In the early 18th Century, the city of Philadalphia was a seat of culture and learning in the colonies. In this setting, John the farmer, along with Benjamin Franklin, founded the American Philosophical Society in 1743. Meanwhile, and rather incredibly, John was studying Greek and Latin in order to understand the writings of foreign botanists. James Logan, founder of the Logan Library, coached John to pursue his studies in a systematic manner. During this period John botanized his entire farm and gradually became familiar with every plant in the area, meanwhile constantly extending his range of exploration. It was at this time, in about 1728, that he established his renowned five acre botanical garden, which is cited as among the first of its kind in America.

A propitious event occurred in 1734 when John sent his first shipment of collected plants to Peter Collinson, a wealthy Quaker merchant of London, who immediately spread the word about the many American plant curiosities to English noblemen, who in turn became eager to collect such plants for their estates. This plant fever quickly spread

* *Drawings were taken by permission from* Travels *by William Bartram, a facsimile reprint of Bartram's original book done by The University Press of Virginia.*

to other European countries. Many exchanges of letters, plants and seeds occured between John Bartram and Collinson over the next span of thirty-six years, lasting until Collinson's death in 1768. Sadly, the two men never met.

John travelled north as far as Oswego on Lake Ontario and as far south as the St. John's River in Florida. Concerning one of these trips, he wrote Peter Collinson in a letter dated September 30, 1763, telling of an encounter with a native. ". . . Many years past, in our most peacible times, far beyond our mountains, as I was walking in a path with an Indian guide, hired for two dollars, an Indian man met me and pulled off my hat in great passion, and chawed it all around – I suppose to show me that they would eat me if I came into that country again. . . . The most probable and only method to establish a lasting peace with the barbarous Indians is to bang them stoutly . . ." From this statement it becomes evident that Bartram's Quaker philosophy was somewhat shaken by this test. Furthermore they are in marked contrast to the convictions of his son, William, as we shall see.

Any article about John Bartram, no matter how abridged, cannot be considered even marginally complete without including the fascinating story of his discovery of a small tree related to the tea plant of China. He discovered this growing in a small area along the bank of the Altamaha River in Georgia below old Fort Barrington (near the present day town of Cox). This tree-like shrub, which bears showy white flowers and is sometimes called the "lost Gardenia" or "lost Camellia", has never been found growing in the wild since about 1800. The plant was eventually named *Franklinia alatamaha* in honor of John's friend Ben Franklin. The species name of *alatamaha* now in use was evidently applied prior to the modern spelling of Georgia's Altamaha River. The existence of this plant today is credited to specimens, cuttings and seeds brought home by John and planted in his Philadelphia garden.

Carolus Linnaeus (Carl von Linne), the renowned Swedish botanist, was one of John's regular correspondents and Linnaeus, when referring to John in his writings, named him "the greatest natural botanist in the world." Peter Kalm, for whom the plant genus *Kalmia* is named, was a pupil of Linnaeus and came to Philadelphia to study native plants under Bartram's guidance.

As a result of John's contacts with Peter Collinson and other men of status in England, King George III appointed him to the position of Royal Botanist to receive an annual stipend of fifty pounds. This appointment was mainly occasioned by the Treaty of Paris in 1763, in which Florida came into British possession, causing Britain to become anxious to learn more about the potential wealth of this newly acquired territory and its possibilities for development. Perhaps we can assume that the first Florida real estate venture was being hatched.

John's health began to fail shortly after the Florida exploration. He returned to his home in Philadelphia where he remained cheerful and alert until about 78 years of age when he expired rather suddenly, perhaps because he feared that his precious garden would be destroyed by advancing British troops; the closing years of John Bartram's life were coincident with the opening years of the American Revolution.

It is estimated that John was responsible for the introduction of from 150 to 200 American plant species to Europe.

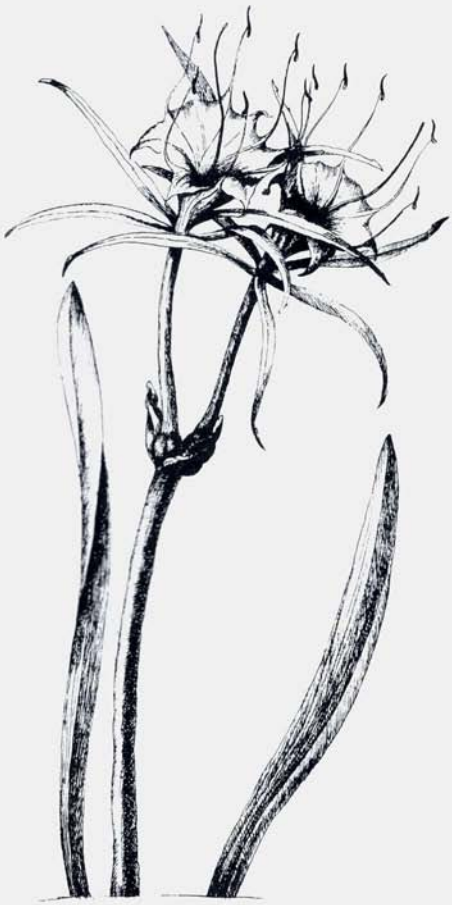
Of all the original plant specimens that John collected and planted in his garden, a Yellow-Wood or Gopherwood (*Cla-*

drastis lutea) was the final survivor. The house and garden were purchased by the city of Philadelphia in 1891 and with the help of the John Bartram Association have been preserved in their original condition. Administered by the Park Commission, the house and garden at 54th Street and Lindley Avenue are open to the public.

Among the nine children born to John Bartram and his wife, Ann Mendenhall, were twins, William and Elizabeth. About Elizabeth little is known, but William's history is well documented and scholars of the life and travels of William Bartram are growing in numbers and zeal. It is lamentable that history books tend to ignore the accounts of pioneering men such as John and William Bartram, but emphasize the lives and fancied impact of military and political figures, savory or not.

In contrast to his father, young William was quite fortunate in spending his formative years in acquiring a good formal education, meanwhile having access to his father's formidable library as well as other Philadelphia libraries. Then, too, he had the opportunity of meeting many inspiring men such as Ben Franklin, Governor James Logan, Alexander Garden, Joseph Breitnall, Peter Kalm and other naturalists of the time. Throughout his youth, while under the tutelage of several eminent scholars, botany and drawing remained his preferred subjects. William's interest in botany seems to stem from a collecting trip taken to the Catskills with his father when the boy was 14 years old.

William attained great skill in drawing native plants and animals and these drawings eventually found their way to Peter Collinson, who, in turn, shared them with eminent men such as Linnaeus and John Fothergill. William's father, being a practical sort, could discern but little hope of his son making a career of botany so enlisted the help of Ben Franklin to teach him the printing trade. William, however, would have none of this. Nor was he enthusiastic about engraving as suggested by Peter Collinson. He failed a mercantile business apprenticeship in Philadelphia, was unsuccessful in a trading post in Cape Fear, N.C., and failed to make a success in an indigo plantation venture in Florida. Obviously William Bartram was not destined to be a business tycoon.



Hymenocallis occidentalis

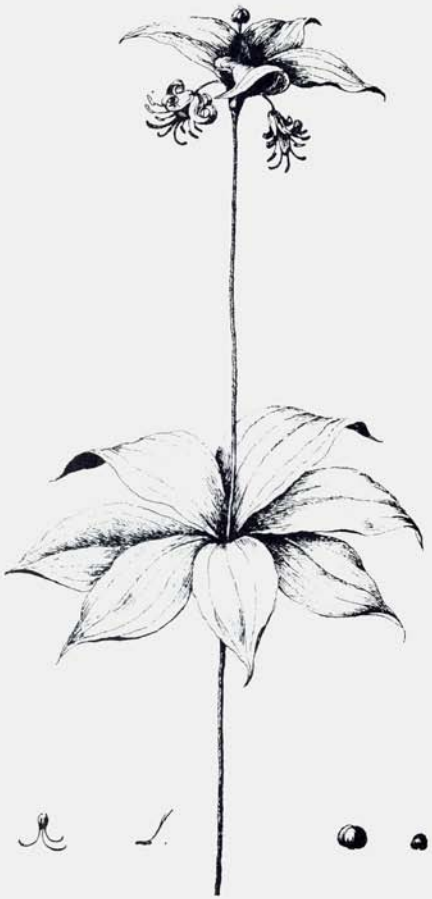
He never married, perhaps thus avoiding a failure in that field also.

It remained for the London physician John Fothergill to provide the catalyst needed to unleash the latent naturalist when he wrote to John Bartram, "For his sake, as well as thine, I should be glad to assist him. He draws neatly; has a strong relish for Natural History; and it is a pity that such a genius should sink under duress." Thus the man who was to provide an important 18th Century benchmark in history, literature and the natural sciences, covering areas from North Carolina to Florida to Louisiana, launched his career in the spring of 1773.

After a tempestuous sea voyage from Philadelphia, he arrived in Savannah whence he explored the Georgia maritime area and the sea islands over a period of about one year. During this time he revisited the area near old Fort Barrington where he and his father had discovered *Franklinia alatamaha*. It is of interest to note that the Long County (Georgia) Garden Club has erected a monument to commemorate the 176th anniversary of the discovery of this plant. The monument is beside the Jessup-Ludowici Highway one mile east of the Altamaha River bridge.

William visited the St. Mary's River and the Lake Okefenokee area, noting the abundant species of trees and shrubs in such genera as *Tupelo, Kalmia, Annona* (Custard Apple), *Asclepias, Hibiscus, Lupinus, Magnolia, Ilex* and others. After spending a few days to rest at the McIntosh place in Altamaha, he returned to Savannah.

Space requires that we skip over not only a detailed account of William's travels through Alabama, Florida and Louisiana but also most of the interesting descriptions of his encounters with the Indians and twenty foot alligators of the southern swamps. He usually traveled



Medeola virginica

alone, mounted, and sometimes unarmed. In the spring of 1775 (given in error as 1776 in his *Travels*), he left Charleston bound for the Cherokee Nation and exploration of the mountains of the Carolinas and Tennessee, though he was never to reach the boundary of the state we now call Tennessee.

Traveling on horseback as usual and following watercourses or Indian trading paths, he proceeded to Jacksonboro on the Ponpon (Edisto) River, thence

crossing the Savannah River at Three Sisters Ferry (near Clyo, Georgia). From there he traveled on the "high road" leading from Savannah to Augusta, re-crossing the river at Silver Bluff to Fort Moore (now inundated) and thence re-crossing the river to Augusta. From here he proceeded to Fort Dartmouth at the confluence of the Savannah and Broad Rivers and on to Fort Prince George and Keowee above Clemson, South Carolina. He then followed Oconee Creek upstream, climbed Oconee Mountain (Georgia), crossed the Chatooga River, traversed War Woman Creek, Rabun Gap and Estatoah Falls. Today much of this historic route has been flooded by a series of U.S. Army Corps of Engineers reservoirs on the Savannah and by a public power utility reservoir on the Keowee. Along much of the remainder of the route virgin forests have been logged, Indians long since driven away, all replaced by the trappings of modern civilization.

At this point, for the benefit of those who may not be familiar with the text, *Travels Through North and South Carolina, Georgia, East and West Florida, the Cherokee Country . . .*", it is best to quote verbatim several of its passages based upon his experiences while traveling in the present day Franklin, North Carolina area:

On approaching these shades, between the stately columns of the superb forest trees, presented to view, rushing from rocky precipices under the shade of the pensile hills, the unparalled cascade of Falling Creek, rolling and leaping off the rocks: the waters uniting below, spread a broad glittering sheet over a vast convex elevation of plain smooth rocks, and are immediately received by a spacious basin, where trembling in the centre through hurry and agitation, they gently subside, encircling the painted still verge; from whence gliding swiftly, they soon form a delightful little river, which continuing to flow more moderately, is restrained for a moment, gently undulating in a little lake: they then pass on rapidly to a high perpendicular steep of rocks, from whence these delightful waters are hurried down with irresistible rapidity. I here seated myself on the moss-clad rocks, under the shade of spreading trees and floriferous fragrant shrubs, in full view of the cascades.

At this rural retirement were assembled a charming circle of mountain vegetable beauties; Magnolia auriculata, Rhododendron ferrugineum, Kalmia latifolia, Robinia montana, Azalea flammula, Rosa paniculata, Calycanthus Floridus, Philadelphus inodorus, perfumed Convalaria majalis, Anemone thalictroides, Anemone hepatica, Erythronium maculatum, Leontice thalictroides, Trillium sessile, Trillium cesnum, Cypripedium, Arethusa, Ophrys, Sanguinaria, Viola uvularia, Epigea, Mitchella repens, Stewartia, Halesia, Styrax, Lonicera, &c. Some of these roving beauties stroll over the mossy, shelving, humid rocks, or from off expansive wavy boughs of trees, bending over the floods, salute their delusive shade, playing on the surface; some plunge their perfumed heads and bathe their flexile limbs in the silver stream; whilst others by the mountain breezes are tossed about, their blooming tufts bespangled with pearly and chrystaline dew-drops collected from the falling mists, glistening in the rainbow arch. Having collected some valuable specimens at this friendly retreat, I continued my lonesome pilgrimage. . . .

. . . Proceeding on our return to town, continued through part of this high forest skirting on the meadows: began to ascend the hills of a ridge which we were under necessity of crossing; and having gained its summit, enjoyed a most enchanting view; a vast expanse of green meadows and strawberry fields; a meandering river gliding through, saluting in its various turnings the swelling, green, turfy knolls, embellished with parterres of flowers and fruitful strawberry beds; flocks of turkies strolling about them; herds of deer prancing in the meads and bounding over the hills; companies of young, innocent Cherokee virgins, some busy gathering the rich fragrant fruit, others having already filled their baskets, lay reclined under the shade of floriferous and fragrant native bowers of Magnolia, Azalea, Philadelphus, perfumed Calycanthus, sweet Yellow Jessamine and cerulean Glycine frutescens, disclosing their beauties to the fluttering breeze, and bathing their limbs in the cool fleeting streams; whilst other parties, more gay and libertine, were yet collecting strawberries, or wantonly chasing their companions, tantalising them, staining their lips and checks with the rich fruit.

The sylvan scene of primitive innocence was enchanting, and perhaps too enticing for hearty young men long to continue idle spectators.

William was now traveling deep in Cherokee country near the Little Tennessee River as he moved between the old Indian villages of Echoe, Nucasse, Whataga and Cowee (now West's Mill. Nucasse itself was within the present city limits of Franklin, where an ancient mound has been preserved and fenced.) Along the Nantahala River, near present day Beechertown, William encountered a mounted company of Cherokees led, by their illustrious chief Attakullakulla or the "Little Carpenter", bound for Charleston to meet John Stewart, Superintendent of Indian Affairs. A historical marker has been erected near this site to commemorate this important historical event.

Although William had long planned his itinerary to include the overhill towns further north into present day Tennessee, he decided that the unrest developing between the Indians and the Virginians made such a journey unwise. So he returned toward Cowee, writing in his *Travels,* ". . . upon serious consideration, it appearing plainly that I could not, with entire safety, range the overhill settlements until the treaty was over, which will not come until late in June", he proceeded no farther. Although he intended to return to North Carolina later to resume his journey, it was never to happen.

William Bartram did, however, travel to eastern Florida in 1777 where, as one authority reported, he joined a revolutionary force formed to repel a rumored British invasion of St. Augustine. The invasion never materialized and William therefore returned to Philadelphia.

In 1782 he was offered the Chair of Botany at the University of Pennsylvania but declined for reasons of health. His failing health and poor eyesight stemmed from contraction of a near fatal, mysterious fever while exploring in Louisiana.

Notable people such as Alexander Hamilton, James Madison, John Rutledge, George Mason, Thomas Jefferson and George Washington all paid visits to William and his garden. Botanists and naturalists, including Thomas Nuttall, Andre Michaux, Francois Michaux, Frederick Purch, G.H. Muhlenberg, Constantine Rafinesque, Alexander Wilson, and Thomas Say also called on William in Philadelphia.

Some people did and some still insist that William Bartram was an enigma of some magnitude. He has variously been described as being indolent, shy, gentle, and delicate of body, yet he was willing to expose himself to the most grueling hardships and unknown dangers for the sake of exploring the natural world. He must have been driven by love's labor. He had, in addition, every respect for his fellow man and had great sympathy and understanding for the problems of the Indian people; this latter is in startling contrast to the viewpoint of his father concerning the Indians and how to deal with them.

William Bartram's Quaker orientation dictated that his outlook towards nature and men be optimistic, perhaps overly so. Do you remember the works of Carlyle, Wordsworth, Emerson and Coleridge? In producing such poems as "The Rime of the Ancient Mariner", Coleridge captures the flavor of William's abilities as a naturalist-writer of epic similes. All of these poets drew heavily from William's *Travels* in composing their romantic masterpieces of literature.

As far as botany is concerned, John and William Bartram have been accorded only a paucity of official credit for their plant discoveries. This was due, in part, to the tendency of European naturalists to append their own names to John's and William's finds. Even when William did identify and publish

plant names ahead of the Europeans, they were ruled invalid and renamed. Plant genera now known as *Balduina, Befaria, Chapmannia, Chaptalia, Elliottia, Franklinia, Glottidium, Macranthera, Mayaca, Pinckneya* and *Polypteris* were all Bartram discoveries that do not bear the Bartram name as author. Reginald Farrer paid John a posthumous tribute with his observation in *The English Rock Garden* that the 10th of December, 1745 should be kept as a horticultural festival, it being the day that John Bartram sent "one sod of the fine creeping spring Lychnis to Peter Collinson in London." We presently refer to this plant, formerly regarded as belonging to the genus *Lychnis*, as *Phlox subulata*.

Just before his father's death in 1777, William returned home and thence forward lived in the family homestead, going into partnership with his brother, John, to operate the flourishing botanical garden. Fourteen years after his return from the epic journey, he published his incomparable *Travels*. And now, in the closing years of the 20th Century, we cannot help but wonder, fearfully, what lyrics William would select for setting down his observations if he made a present-day journey through this same land.

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* Although reprinted in 1967 this book is now out of print and difficult to find. §

Pinellia ternata

Beware of friends bearing gifts. Choice plants circulate among ARGS members; so do some that can become a nuisance. I now give warning that *Houttuynia cordata* 'Variegata' collected by Barry Yinger in Japan and fairly widely distributed by me, among others, does need to be watched. In rich, moist soil it becomes invasive. Not to anything like the extent, however, of *Pinellia ternata*, which came to me as *P. turbinata*. I got mine a year ago and thought it charming until I saw it in Gertrude Wister's garden, where it got its beginning as a wee fragment on the roots of something else and has now colonized acres. "Get it out," she said, and I have. It looks like a tiny Arisaema with a slender, extended spadix that makes it seem to be sticking out its tongue. It increases by bulblets (tuberlets) which form not only at the base of the stem but also at the apex where the leaflets join.

— Pam Harper, Seaford, Va.

Plant Hunting in Sichuan, China

Part III

Carla Teune
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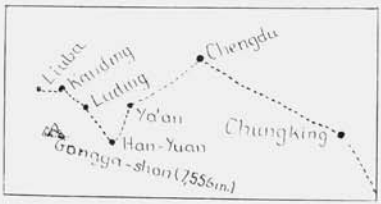
Photographs by the author



We were all rather worn out after our adventuresome trip from Chengdu over the Zhe-duo pass at an altitude of 4,300 m. to Liuba where we set up camp a short distance from that small Tibetan village. Here the altitude was only 3,500 m. This lower altitude made us all feel much better.

Alison and I, who had pitched our tents next to each other (within speaking distance), with Wolfgang nearby as "safeguard," were too tired to go with Roy on a long tour the next day, Sunday, September 13, so we took a good rest as did most of the other members of the group. Only Roy and some of the Americans went up into the surrounding mountains that day to come home with most exciting stories and collections of plants. But our day was well used. We washed clothes, cleaned and organized our tents and equipment and, as the weather stayed splendid, went for a short walk in the direction of Liuba. On the road in front of our camp we saw a huge "mani-wall," a wall built of large rocks, beautifully carved with Lamaistic inscriptions. The Tibetans walk clock-wise around these walls chanting "Oem mani padme hum" and so did we with the fond hope that our stay here would be successful.

After this we felt strong enough to take a longer walk around our camp into the little valley that looked so attractive. Rosamee joined us and we took some food and boiled water so we could stay away for a few hours.

It turned out to be a very slow walk. Hardly any progress was made as there was so much to see; we walked on our knees part of the way because many of the alpines were so tiny. Following a small stream we came to a little swamp with treasures such as a mini-parnassia, a selection of minute gentianellas, and some *Primula sikkimensis*, all in flower. We realized that it was very late for these plants to be still in flower and succeeded in collecting masses of jet black seeds, as well as some from another *Primula* species, which was out of flower,

but we had the impression that this last one had purple flowers; the leaves were powdered. There was also a pale blue *Gentiana veitchiorum*.

Here were low growing *Leontopodiums* ("Edelweiss"), beautifully mixed with very dark blue flowering *Gentianas*, just as they grow in the European Alps. We counted three different kinds of very low-growing *Pedicularis* spp.: one with red-purple flowers, one with sulphur-yellow flowers and another one with pale-yellow flowers. Another treasure was the tiny *Caltha scaposa*. Although very late in the season, it still had some flowers, dark yellow in colour and we managed to collect seeds. There was an *Allium* sp. (leaves smelling like onions) very much like the blue flowering *A. caeruleum*, a *Spiranthes chinensis* from the Orchid family, very much like the European *S. spiralis*. Here we found another *Sausurea* sp., 15 cm. high and with purple flowers. On the bank of the stream stood a yellow flowering *Senecio* sp., very rich flowering. The shrubs that we found were a *Lonicera deflexicalyx* with transparent orange berries, and again we found the Hippophae with the yellow berries. As the fruits from this shrub are edible and contain a lot of vitamin C, we ate some, because we were very thirsty. There was a wild apple, *Malus toringoides*, with beautiful little apples with pink cheeks, and the rocks surrounding "our valley" were covered with low growing, grey leaved *Rhododendrons* and *Quercus semecarpifolia*. The rhodo's belonged to the Lapponicum series and one had only one purple flower left. *Betula utilis* with its beautiful peeling bark grew here and I found a *Prunus* sp. (Prunus ?serrula) with glossy red cherries; I thought that this could be interesting for Roy, so I took off my shoes and socks and stepped in the stream as that was the only way to collect the cherries. The water was so

A pale blue Gentiana *veitchiorum*.

cold, that I could not stand long in the stream and had to go back for another try. Finally I managed to collect a pocketful of these cherries resulting in icy feet and a happy heart. Our "find-of-the-day" was a young *Sorbus* tree, with leaves like *S. intermedia,* but covered with big, pure white berries. Roy was delighted (we shared, of course) and we hope that this may be a good introduction into horticulture. It looked very much like a form of *Sorbus hupehensis.* In exchange Roy gave me pink fruits of *Sorbus hupehensis.*

We also found *Rosa willmottiae,* with only one flower (enough to make identification an easy job) and with some good rose-hips on it. *Spiraea* sp., a *Cotoneaster* sp. with black fruits, a ground-covering *Cotoneaster cochleatus, Juniperus, Quercus ilicifolia* and a *Caragana* with many thorns.

When we arrived "home" there was a fresh cup of tea, very welcome after this hot day, and there was a lot to be told about new plants. We dried our plants, first the freshly collected items from today, and later the plants collected the previous day, but most of the "old" plants were rotted: kept too long in plastic bags under too hot conditions. The seeds looked good, so I put them in small paper bags and dried them under my cot to save room in the small tent. The Americans were so kind as to present me with *Arisaema* corms and I collected a lot of ripe, orange colored berries of this genus. I am very much interested in aroids, so this was very welcome.

The evening meal was reasonable. There was enough cooked rice, some meat and vegetables, and very good soup. Salted peanuts were always plentiful, at breakfast, lunch and supper. A very excited group of Tibetan hunters entered our camp. They had killed a young black bear and wanted to show us the poor animal. It was most astonishing to see the very old (and dangerous looking) gun, but the young animal looked very sad, we all thought. After this we were warned never to go into the mountains on our own, or in very small groups, as it could be dangerous. Not only bears could be dangerous we discovered one day when Wolfgang killed a poisonous viper.

That evening there was a "Tibetan special." The men with their horses came from Liuba to make their own camp, not very far from ours and they invited us to come and sit around their campfire. They were not very enthusiastic about Chinese people and stayed away from our camp. They were very kind people, interested in strangers like us and very hospitable. They shared their yak cheese with us. It is white, chalk-like cheese, very tasty, and they roasted potatoes for us all in the hot ashes of their fire. The weather was fine, cold and fresh, and gradually we started to sing songs, which the Tibetans liked very much, though they did not sing. More and more curious villagers joined our group. The girls were very shy, so Theresa, Alison and I took them into our little group to make them feel more safe. We shared cigars. I had bought some of the little Omei cigars at our hotel in Chengdu. The Tibetans liked them, they are used to their own tobacco.

The night air felt very cold in our thin nylon tents and during the night the weather changed. It started to rain heavily and some tents leaked. As we were camped on a slight slope I slid down out of my nylon camp bed several times during the night and woke up with cold, wet legs in my sleeping bag – very uncomfortable.

We were all cold, wet and shivering the next morning, September 14, as the rain poured down and there was no fire

in our camp. (There was a good fire in the Tibetan camp, they had spread a tarpaulin over their fire, but we could not intrude as they were praying.) We now discovered that our Chinese group was not the best at making breakfast; in fact there was hardly any breakfast. We could have some hot tea (and very weak coffee that we did not want), there were small, very hard cookies, an egg for each of us, salted peanuts and an apple. Not much fuel to warm us. The rest of this "breakfast" (the cookies), an apple plus an egg plus two pieces of chocolate were meant as "lunch." This was not what we hoped for, but each member of the group had brought things like nuts and raisins, and that was the food on which we survived during our walks that whole week in Liuba-camp.

First we walked to Liuba and waited in the official (and very dirty) guest house for our things to come. All our ponies were there, very wet and with very small and hard-looking wooden saddles. As the rain continued, we decided to mount our horses and leave. I had a bad-tempered pony, which threw me off onto my back on the stony path. I was lucky to fall on my rucksack, but for two days my right arm was not in "optima forma." Rosamee was not so lucky; she had a large bruise from the middle of her back to her right knee after a fall from her pony and could only walk short distances for some days so she had to stay home. I decided to dismount and walk as I was stiff from the cold rain and other members of the party did also. After a short walk and climbing in the mountains we felt much warmer.

We were now in another valley, trending in the direction of Mt. Minya-Kongka. This mountain was "only a ten days walk from our camp," so we only saw this beautiful mountain in the distance and never reached it.

We came in to a fascinating *Juniperus* woods where the atmosphere was very humid. There were large curtains of pale yellow moss hanging from the branches of the trees; it looked mysterious and fairy-like.

Our ponies waiting in the rain outside Liuba guesthouse.

We found many *Sorbus hupehensis* with pink fruits, a wintergreen *Daphne* with bright red fruits and only one remaining cluster of pink flowers (in my herbarium), but it was impossible to identify, as with so many herbaceous plants, trees and shrubs that we saw. It was not easy to take pictures in these dark woods as it was still raining continuously, but we all collected seeds and plants. We found *Cotoneaster bullatus, Viburnum* sp. and *Podophyllum emodi var. chinense*. The bright red fruits of this plant are a delicacy to the Chinese, just as some Americans like the fruits of the endemic American May-apple.

There was also *Triostemum himalayanum* with bright green, woolly-haired leaves and clusters of bright red berries, *Quercus ilicifolia, Spiraea trilobata, Syringa ?potaninii, Polygonatum cirrhifolium,* a *Lobelia* species, *Cimicifuga, Roscoea alpina, Clematis* (not *C. tangutica),* a purple flowering *Aster* species (but not *Callistephus sinensis*), three different, unknown specimens of *Berberis, Betula* sp., *Berberis poiretii,* a number of different kinds of *Gentiana, Spiranthes sinensis.* A rich harvest today.

When we returned to camp, very tired and satisfied (Theresa had stayed in camp to activate the Chinese in preparing hot tea and food), we discovered that Ray Evison, our clematis specialist from the famous nursery of Treasures of Tenbury, was very ill. There were more members who did not feel very well because of the rain and the cold, but Theresa, as an ex-nurse, had all kinds of medicine and tried to help our "patients" as best she could.

Triostemum himalayanum with holly-red berries.

My mountain boots were wet inside as well as outside and the problem was how to get them dry again as we had no camp fire. The Tibetans were so kind as to solve this problem for me by putting my boots in the warm ashes of their fire every evening and returning them to me every morning nice, warm and dry. Only one evening I made the mistake of interrupting their evening prayers. From my shocked face they must have understood how painful I found my interruption. I hope so.

The Tibetans are very religious and, though a minority group, they are allowed to keep their religious traditions. The big temple in the middle of Liuba is closed, however, and there no longer are yellow or orange-robed monks in the street. There are still monks, though, even very young ones, but they are hard to distinguish from other men or boys; only by their shaven heads could we recognize them. And everywhere we went we saw prayer flags and maniwalls.

This night was another cold and wet one (on my next trip into the mountains I certainly need a better sleeping bag), and even after taking a sleeping pill, I woke up several times from the cold and I still slipped down from my nylon cot so I became rather desperate.

Tuesday, the 15th, was another rainy day with hardly any breakfast, so we left camp early and tried to warm up by walking. Theresa stayed at home again to look after the very ill Ray. Poor man, his main purpose for coming on this trip was to collect clematis for his nursery and now he was lying in his tent. Rosamee and I joined forces to collect young plants for him and seeds if these were available, but it was still early for seeds. Rosamée is a very keen amateur

who learns quickly. In a very short time she became quite a clematis expert, so I re-baptised her Clematamée.

We had a choice between walking or going on horse-back. Alison, Rosamée and I walked, to keep warm (and not to fall off a second time). Today's tour is in "our own" valley, the one that the three of us explored last Sunday, but today our walk was much longer and we travelled a greater distance into this very interesting valley. During the first part of the walk we act as "experienced" guides – very funny.

The "big and strong Americans," Tim and Paul, collected lots of seeds from every tree or shrub we came to, enough to start a seed-firm when they get back home. I was also lucky to collect good amounts of seed, but not as much as the Americans, as I have only six or seven "clients" to share with. Also I realised that I would have to carry all these seeds myself in my rucksack and our average walk lasts eight to ten hours. It is interesting to see the different collecting techniques. Roy Lancaster usually has a very big and strong plastic bag hanging at his side. In this he puts all the branches and parts of plants he collects and sorts them when he is back in his tent. I walk with a strong plastic shopping bag hanging from the belt around my middle. In this I collect plant material for pressing and also keep my paper bags, my water resistant felt pens, the stapler and extra staples. The Americans have small linen bags with a little rope.

Today we found a *Potentilla fruticosa* shrub, *Delphinium* species, *Polygonum* species, some *Rhododendrons*, and plants of *Panax*, probably *pseudo-ginseng* which did not grow very high (25 cm.), with red and black seeds. There

Unknown miniature gentian species.

were very prickly *Morina* plants with seeds; a *Juniperus* (Paul as the tallest man was able to climb the tree and collect fruits for all of us); some *Gentiana* and *Gentianella* species, and some *Gentianopsis* (a plant, new to me). There were also *Clematis* species and I found a plant with pink-coloured, tubular flowers, which made Ray very happy when he felt better as he did not know that a tubular flowered clematis existed in this part of China. We found a number of *Rosa* species, one with very strangely formed rose-hips: one with bright yellow hips that were hooked in form. On another shrub there were bright red hips of the same hooked shape, and on several shrubs there were red and yellow hips. We all were very excited by these as they could be interesting for nurseries and gardens.

After coming home we heard that Ray was still very ill and that the cold and the rain had claimed more victims. Roy felt very sniffly and Theresa looked pale and felt feverish. While we had been away, the stay-at-home ladies had arranged that those who wanted to move into the village school were welcome to move. Many tents were leaking and floors were wet, so the greater part of the group decided to leave camp. After packing, collecting seeds, and other paraphernalia, we climbed into the bus and were driven to the main street where curious Tibetan onlookers were waiting.

It was a great improvement. The gentlemen's sleeping quarters were in the big classroom. The ladies (only five of us, as Fiona Clarke-Hill did not want to be separated from her husband and stayed in camp) occupied the smaller classroom. It was dry, yes, but not very warm because there was no stove and there was no glass in the windows, though some very kind soul had glued old newspapers over the windows of the "ladies' room." We had a loo, outdoors of course, but reasonably clean – only some holes in the ground, but separated from the "gents."

There was no water in the school so we brought boiled water every evening from camp in a thermos for drinking purposes and had to wash in the stream at the camp. The floors were dry, however, made of thick wooden planks so we were able to walk in socks and dry our seeds on the floor and we were able to sit on it or on our beds as there were no tables or chairs in the classroom. As there was no electricity we worked by candle light and pocket lanterns – very romantic! The greatest luxury was the small tape recorder that Didi had brought with her so we could hear some classical music. This was nice, although I do not feel the need to bring such a machine on a plant hunting tour.

The school teacher was a Chinese and thus a form of suppression as far as the Tibetans are concerned, as school education is only in Chinese, by Chinese. He and his family lived in the school house. They were very modest and kind. They gave Ray E. a small stove. It was a Second World War model, only a big round pipe with a lid on top and a hole for poking, but this gave the "men's room" a very cosy atmosphere. Here we all sat around in the afternoon when Ray was doing better and we came home after a long, cold and tiring day.

During the night we were awakened several times by sneezing and muttering from Theresa Atkins, and yes, by morning she was ill and had to stay in bed with all her clothes on, two sleeping bags on top of her and a warm, woolen Nepalese cap of Rosamee's on her head. It was very wise of her to stay in bed, and during this day our "hospital" was looked after by Rosamee, who still felt sore from being thrown off her horse

some days before. Roy had the good idea of using one of our mini-buses to take us over the only road in the mountains in the direction of the Zhe-duo Pass, to explore another section of the mountains. This was a good suggestion as the weather in Liuba was still very bad while in our new spot it was warm, sunny and dry though only a two and a half mile drive from camp. In the mountains the weather changes rapidly, we noticed.

We enjoyed this trip very much though our new slope was not as rich in plants as we had hoped. However, we saw *Cornus macrophylla*, its branches heavy with big clusters of dark purple berries; rosettes of an *Androsace* (not in flower), a *Salvia* species with tiny blue flowers and *Salvia glutinosa* both a yellow flowered and a blue flowered form. This plant feels very sticky, hence its name. I collected a good number of fern spores and was called a fern-o-fiel. I explained to the others that I was interested in ferns as they are the focal point in the collections of the Leiden Botanic Garden and we "germinate" and grow them in a specially built climate-room, our phytotron.

As this hunting place was not very rewarding we went back to another place, not very far from a stream, and here our harvest was considerably richer: *Euonymus* sp.; *Acer davidii* (with "unhealthy" looking fruits); *Sorbus* sp.; *Prunus persica* (with fruits); *Prunus serrula* with a beautiful, shining brown bark; a member of the Borage family, (*Onosma* sp.); beautiful purple-flowering *Asters*, and lilies. Wolfgang Kletzing (from Germany) is our lily specialist, so his name was changed into "Liligang." In a very high Poplar tree I saw some plants of *Viscum* (Mistletoe) with yellow fruits. This parasitic plant is dioecious and I was very sad that I could only collect material from the male, berry-less plant. The female was too high in the tree; we could not reach it.

A Tibetan village

On our way back our bus gave up. (We would have felt slighted, I think, if a day had gone by without an accident.) We thought that the driver had been going much too fast in order to keep up with the jeeps and, with a big bump, our bus hit a hole in the road. Peter Addington hit his head on an iron bar, and started bleeding profusely, but Wolfgang quickly applied first aid and so we came home with a pale looking victim wearing an army-green turban.

Back home, Theresa was still in her bed but Ray felt much better, thanks to the good care that Rosamée had given him. She had walked up and down from camp to village with huge thermos flasks of hot soup and hot tea and she "managed" camp, so we had nice hot tea to

refresh us and some very good soup (the only specialty our "cook" can produce). In the evening I had to do a lot of work on the collected plants and seeds while we told Theresa about the adventures of the day. Our school was very cosy and looked quite nice by candle-light. My seeds were drying beautifully, except that some paper bags looked wet and miserable and had to be changed to prevent the seeds from rotting.

A problem when pressing plants under such damp conditions is how to dry used and slightly humid newspapers. To get the best results in drying plants it is necessary to replace the plants every day between fresh newspapers for the first five days. If you do not do this, the plants turn dirty brown or black or even start to rot. I solved my newspaper problem by sleeping on them so that every day I had a supply of dry paper. I went to sleep at 10:00 p.m. and it was very cold. §

(to be continued)

Sedum pilosum and *Gentiana verna*

Howard N. Porter
Guilford, Connecticut

My two subjects may seem to be oddly conjoined. One is a member of a succulent, roly-poly, plebeian race that is only too anxious to grow and take over the garden; the other is aristocratic, its blood as blue as its blossoms, demanding and difficult. But both have been highly praised. The late Anna Griffith described the sedum as "the beauty of the genus" (*Collins Guide to Alpines*) and Dr. Bacon, who normally is the very model of British decorum and restraint, when he reaches *G. verna* in his list of plants, adds to the regular technical description "the best alpine!". It is the exclamation point that I find startling and moving.

More to the point, both plants need special attention to keep them going year after year. *S. pilosum* is monocarpic. It dies after flowering and leaves no offsets to carry on. *G. verna* is truly perennial but, in our lowland gardens, a short-lived perennial, probably, as Brinsley Burbage tells us, because the plant is programmed, as it were, to go dormant after setting seed, but is forced to stay awake during the long summer and fall months. During that time it can do nothing but age prematurely. (I will never forget my first sight of *G. verna*. Soon after arriving from New York on a Friday evening in spring, I walked out to the rock garden. There, where there had been a three-inch-wide cushion of green, was a five-inch-wide display of unbelievably blue flowers, like nothing I had ever seen before. The next year the display was diminished and somewhat lopsided, but still beautiful. The third year the plant was no more.)

A plant that must be constantly repropagated by seeds or cuttings tends to get lost in my garden unless it be some choice androsace or the like that is always under one's eye in the alpine house. But I have quite fortuitously stumbled on a method that keeps both the subjects of this note growing vigorously and showily year after year. This is what happened:

Sedum pilosum — Eight or nine years ago I planted six of the "softly hairy, tubby rosettes very suggestive of a closely-packed sempervivum of the

ciliosum group" (Mrs. G.) in a circle in a small bulb pan. They bloomed and died but left hundreds of seedlings. Those seedlings grew apace and some bloomed the following year. Instead of the original formal circle I have now a vigorously competitive jumble of rosettes in every stage of development. The effect is attractive and the pot has won me many points over the years at our flower shows. The only care needed besides the occasional tweaking out of a weed is top-dressing the pot with good soil to make up for the shrinkage due to the disappearance of the humus in the original compost.

Gentiana verna — About five years ago I planted up a new trough thirteen by nineteen by six inches deep. In one rear corner went a seedling of *Daphne alpinum* (Messrs. Brickell and Mathew in their monograph on the genus report that *D. alpinum* will remain dwarf in a trough. My own experience bears this out, for the plant is still only five inches high.) In a front corner went *Lewisia nevadensis*, an indestructible and underrated plant. Also in the foreground went a red-flowered form of creeping thyme. I completed the planting by carefully transferring the contents of two small plastic pots in which very young seedlings of *G. verna* were growing, into holes in the trough's medium by using the pots themselves as male molds. (The color scheme envisaged was perhaps not very subtle, but nobody can deny that it was patriotic.)

In the second year several of the gentian seedlings produced one flower apiece. In the third, there was a great show of bloom from each of the clumps and, even more exciting, seedlings of *G. verna* appeared all over the trough. To this day I don't know whether those seedlings were self-sown or whether I, perhaps, absent-mindedly, rolled an inverted seed-pod between thumb and forefinger and so peppered the planter with seed. I certainly now every year spread a bit of seed. By the fourth year the gentians had quite taken over the trough. The lewisia does still make its brilliant white splash and the modest little daphne is still there. The thyme was too vigorous and had to be removed. But what one sees is the gentians and only the gentians.

I do not think that the trough method of growing extends the life of individual plants, but as in the case of the pot of *Sedum pilosum*, at any time the trough contains aged plants in their decline, new seedlings, and every stage in between. Thus continuity is effectively achieved by a balance of degeneration with regeneration. Process is all.

The planting medium in the trough is the usual one for high alpine plants, namely three parts grit and one part leaf-mold, to which has been added, to meet the most special requirements of gentians, a handful or two of dried manure and a lacing of bone meal. The humus element in this compost is short lived, so I attempt to replace it from time to time by punching holes with a sharpened stick or a fat pencil as deep as I can and filling them up with leaf-mold. I also like to top-dress with a leaf-mold-sand mixture, but this is difficult to do without smothering most of the new seedlings. I usually end up by depositing little cones of the dressing where infanticide will be minimal.

Apart from weeding, the trough needs no other attention besides, of course, water in droughts. I put the trough on the floor of my cold alpine house in winter, but that is probably not necessary. Better might be to put it against the north wall of your garage but protect it from excessive wet by leaning a window sash or the like against the wall over it. §

A Few Plants of North Carolina

Dr. Ernest H. Yelton
Rutherfordton, N.C.
Photographs by the author

The Carolinas have been a Mecca for botanists over the last three centuries, so it is not surprising that the American Rock Garden Society should turn to this area for the Society's Fiftieth Anniversary meeting in 1984. One hundred and eighty plant families, nine hundred and fifty-one genera, three thousand three hundred and sixty species and other varieties and subspecies make their home in the Carolinas. Professor B. W. Wells in his book, *The Natural Gardens of North Carolina*, lists ten main plant associations in our state: seaside dunes and live oak and salt marshes; inland marshes; swamp forests; aquatic vegetation; evergreen shrub-bogs; savannahs or grass-sedge bogs; wire grass sandhills; old fields in transition and regrowth; the great forest; the Christmas tree lands of the boreal forest of the mountains.

One can find in each of these areas fine members for the rock garden adaptable to a wide array of habitats. Also, North and South Carolina are the *only* habitat for several fine rock garden subjects; in some instances, one must go to the Japanese highlands or Chinese woodlands to find similar species, an intriguing plant association of disjunct species never fully explained to this day.

That "unsinkable Molly Brown" of plantdom, Miss Lester Rowntree, the author of *Hardy Californians*, visited Chimney Rock, N.C. in 1940 and stated "it reminds me of the Sierras, the flora reminds me of the redwoods." Other observers have commented on the pear shaped sandhill lakes and their similarity to the lakes seen from the air flying over the Alaskan tundra of the Yukon delta. The Pine Barrens dwarf forests of New Jersey share the same plants as the turkey oak forests of the sand dunes country near Pinehurst. The deep, dark spruce woods of the Smokies are quite similar to those of the Gaspé peninsula or the Acadia National Park in Maine. Forty Acre Rock and other granitic outcrops are very similar to Mt. Monadnock with huge blocks of exfoliated stone and xerophytes growing in the one inch deep soil along the rock seams. One can pick one's favorite plant habitat in the Carolinas. The seasons offer a magnificent range of spectacles: the pogonias in full bloom in Green Swamp; the rhododendrons atop Roan Mountain in late June; the sandmyrtle cliffs of Linville Gorge in early May; the magnolias and wild azaleas of the Smokies and Wayah Bald; the magnificent fall foliage from the Blue Ridge Parkway toward Looking Glass Mountain all have indelibly etched a spot in my memory.

Of the plethora of possible rock garden plants available in this diversified state, I can only mention a very few of my favorites. It is difficult to choose. In the sandy swamplands of the southeastern corner of the state grows the internationally renowned Venus Fly-trap, *Dionaea muscipula*, the insectivorous plant capable of quite fast leaf move-

ment to catch flies and bugs. The process of digestion of the imprisoned insects and means by which the closure of the steel-trap shaped leaflets is triggered was studied intensively by Charles Darwin. One wonders how much we owe to the Venus Fly-trap in the formulation of his theory of speciation? The Fly-trap is fairly low growing (two to three inches high) and does best in a bog or moraine. In its native setting, the plant responds to frequent burning of the surrounding grasslands by blooming more profusely and spreading into the burned areas. It blooms in May with a white, five-petaled, half inch diameter flower on a stalk about one foot high; this plant's chief attraction, however, is the foliage. You will find it difficult to establish Fly-traps purchased in the gift shops and nurseries where they are grown on damp sphagnum. These plants have a long taproot, which, in their native setting, goes down at least eighteen inches to find subterranean water during the dry hot summers, and this root is necessary for their outdoor survival without constant petting.

Within the same general zone as the Venus Fly-trap may be found the Rose Pogonia, *Pogonia ophioglossoides.* Green Swamp, a Nature Conservancy reserve, is the best place to see masses of these lovely fragrant rose orchids blooming in May. The half size cattleya type blooms are displayed on one foot scapes with up to three blossoms per stem and look quite out of place in the acidic black muck surrounding open ponds. They may be found even in the mountain areas in sphagnum bogs, but are much more rare; some feel that this may be a different species, *P. divaricata.* This orchid is difficult to transplant and grow in the garden. I would recommend you view it in its natural setting and enjoy that opportunity to believe God can do it better than you. North Carolina has fifty-nine species of orchids, several of which are to be found in Green Swamp preserve.

Another lovely of the inland marshes is *Orontium aquaticum,* Golden Club. This plant is more ubiquitous and may be found sparingly up the East Coast. It reminds me of a Calla lily without the white scape or hood. The white spadix is about four inches long with a bright golden yellow tip. The leaves are beautifully veined and make a nice rosette; the whole plant looks rather startling, shining so neat and clean, rising out of the black muck around Easter time. It is fairly easy to grow in proper bog conditions. It is a member of the Arum Family.

Another plant of the coastal plain, this one from the Amaryllidaceae, is the Atamasco Lily, *Zephyranthes atamasco,* which is found more commonly in South Carolina. Exceptional use of this small, pale pink, bulbous plant is made at Cypress Gardens, an old converted rice plantation lake near Monck's Corner, S.C. The kurume and indica azaleas blooming on islands surrounded by the deep black water of the pond and fringed along the shore with Atamasco Lilies at Easter time is quite a sight. But don't go on Easter Sunday if you like a little peace and quiet with your flowers. This plant is easily raised in any slightly moist location.

One of the oddities of the plant world found in the coastal ponds and roadside ditches filled with water is *Utricularia purpurea,* the Bladderwort. It is a small raft of rootlets kept afloat by small airfilled bladders from which arise in midsummer tiny, soft purple, spurred flowers on threadlike stems. Green Swamp is an ideal site to see this insectivorous plant, also a subject of Darwin's book. The little bladders trap small plankton swimming in the water. This plant is of the same family as the Butterwort or Pinguicula which catches insects on the sticky surfaces of its leaves. For the lazy rock gar-

dener, all that is needed for its culture is a pool of water.

Continuing to the pine barrens and acidic sandy loams of the lower piedmont, we find Pyxie Moss, *Pyxidanthera barbulata* var. *brevifolia*, with foliage much more mossy than the regular *P. barbulata*, which grows in the Pine Barrens of New Jersey. This is one of the most beautiful members of that famous rock garden family of Diapensiaceae, two other representatives in the southern Appalachians being *Shortia galacifolia* and *Galax aphylla*. Pyxie Moss is quite a spectacle in late March when the solid mat of soft green foliage is sprinkled with white five-petalled stars. Rotten pine needles and just a tad of moisture in semishade are required for this rather stubborn plant. It is best to use the acidic sandy soil so common to the xerophytic woods of the sandhills rather than make up an artificial soil, since there seems to be some sort of mycorrhizal symbiosis necessary for absorption of essential nitrogen and other nutrients as in most of the members of the Ericaceae.

Pyxidanthera barbulata var. *brevifolia*

Another plant found in close proximity to the Pyxie Moss is the Box Sand Myrtle, *Leiophyllum buxifolium*. The eastern forms are much taller than those found on the high rock outcrops of Linville Gorge and Grandfather Mountain at 6000 feet altitude; this latter is the var. *prostratum*, much more desirable for its compactness and density of bloom heads. Many state that the *prostratum* forms when grown from seed revert to the regular form, but I have found that seedlings do retain much of their dwarfness. Seeds are the best way to propagate this shrub since rooting is quite difficult. The *prostratum* variety makes a shrublet of shiny dark green elliptic leaves about one fourth of an inch long (some forms have a soft pink cast to the flowers), which are borne in tiny corymbs of fifteen to twenty florets, each about five mm. wide in April and May. This plant is seen at its best on Grandfather Mountain at the overlook and swinging bridge. Interestingly, this plant has been considered for placement in the Diapensiaceae rather than Ericaceae, and probably needs mychorrhizal association in culture. The eastern forms are much easier to grow than the *prostratum* forms, but not as desirable due to legginess.

Another member of the Ericaceae from the sandhills near Southern Pines is *Vaccinium crassifolium*, the Creeping Blueberry. This has much the same foliage as the leiophyllum, but is a creeper and sends out fairly long runners up to one foot in length. The bloom is bell shaped and reminds one of Lily-of-the-Valley in shape. An extra bonus is the nice blueberries in the late summer. It can be grown easily in moist sandy acid loam.

The Pine Barrens Gentian, *Gentiana*

autumnalis, or *Gentiana porphyrio*, also grows in our sandhills. I honestly believe that our form has larger blooms and deeper color than in the New Jersey forms. For you gentian lovers, it would be worth the trip to Green Swamp in early October to see this one; it is better than many of the European or Asiatic species. Unfortunately, it is rather difficult to grow and seeds are not easy to come by in most years. It seems to prefer a pocosin or savannah acidic soil with some semishade and moisture. The trumpets are deep blue with white or soft greenish throats and often occur up to three on one stem. This is one of my favorite wildflowers.

The Grassy-leaved Spiderwort, *Tradescantia rosea* var. *graminea* is also a native of the sandhill country. The foliage is less than 3 mm. wide and slender, up to 20 cm. in length and grow in a dense clump, usually in sandy loam in open woods. This form is much preferred to the regular *T. rosea*, which is coarser in foliage and flower. The flower cymes of var. *graminea* bear up to fifteen soft rose blossoms on drooping stems atop a slender stalk extending just above the grassy foliage. Best blooming time is in May although they continue to bloom well into July. For some reason, ants dote on these clumps for their nests so I would recommend treatment with chlordane if they are noted since they do much damage.

In the upper coastal plain near the fall line is found *Hypericum lloydii*, one of the finest members of this large genus. Dr. Wurdack of the Smithsonian Institution has sung the praises of this plant before in our Bulletin. It is found chiefly in xerophytic areas and on rock outcrops, notably at Forty Acre Rock, where it grows in the acid humus accumulated in the crevices of the weathered granite. This plant is easy and grows well in full sun, bearing a great summer-long profu-

Gentiana autumnalis (porphyrio)

sion of soft feathery golden flowers on a compact bush dressed heavily with fine linear needles of light green. It propagates readily from cuttings or seeds. Another plant also highly praised by Dr. Wurdack and generally from the same locale as *Hypericum lloydii* is *Talinum teretifolium* of the Portulaca Family. This resembles the Okanagon Talinum in plant habit and foliage which is succulent and admirably equipped to withstand the hottest spot on the hottest rock in the garden. The blooms begin in early June and continue throughout the summer to frost. They arise from the foliage clumps on long eighteen inch stalks on which float beautiful lavender-pink stars, which fully open only in the afternoons and close at night. This plant freely seeds over the whole garden, but is so shallow rooted that the small, fleshy, awl shaped rhizomes are easily removed and replanted in inoffensive patches. A good place to find this plant in the wild is on Rocky Face Mountain in Alexander County, N.C. where it grows on rocky

Phlox stolonifera 'Shinn's White'

outcrops and in granite pockets.

My favorite member of the phlox tribe is *Phlox stolonifera*, one of the parents of *Phlox procumbens*. Mr. and Mrs. Tom Shinn, a couple of learned amateur plantsmen and pillars of the North Carolina Wildflower Preservation Society, have found and cultivated a beautiful pure white form named 'Shinn's White,' which has proved to be a most exemplary garden plant, growing in sun or semishade equally well. A slightly moist location seems to be the ideal spot, especially along a creek bank or in woods mold. This plant blends well with the April rush of bloom when it is good to have a plant that goes with every color. It does not exceed ten inches in height so will not overpower any neighbor, and can be easily propagated from cuttings or divisions.

In the mountain counties of North Carolina may be found several members of the genus *Phacelia*, the best of which is *P. fimbriata*. This is an annual plant and resows itself once established, but not obtrusively so. The twelve inch tall plants of pinnate lobed leaves and crowning inflorescence of up to fifteen florets of finely fimbriated cups create a soft fluffy mound of white in May, which is most effective as a ground cover under shrubs, including rhododendrons, or along stream banks. This should be sown where it is to grow since the plant resents moving. Another equally effective member of this family is *P. bipinnatifida*, with larger soft blue flowers, but coarser in plant habit and foliage.

The queen of the mountain coves is *Shortia galacifolia*, Oconee Bells, which we mentioned earlier. The foliage resembles almost exactly that of its cousin *Galax aphylla*, being bright and shiny due to the layer of cutin on the surface. It is not so large as galax, however. Most rock gardeners are familiar with the history of this plant and its rediscovery in the Horse Pasture Creek drainage basin

Phacelia fimbriata

Polygala paucifolia

long after the original description by Asa Gray. Shortia makes an excellent groundcover in semishade and moist conditions. Height does not exceed eight inches, and the white, fringed bells in early spring are a bonus added to the beautiful foliage. This plant slowly spreads on short runners, which will root easily, or the fresh seeds may be sown promptly with some success on sphagnum. Ants love the seeds and will beat you to them unless a close watch is kept; they ripen quite early in midsummer.

Another woodland cove plant from our mountain counties is *Polygala paucifolia,* Gay Wings. These resemble pink, fringed dragonflies in bloom on a five inch tall creeper in April and are the equal of the European *P. calcarea* or *P. chamaebuxus* in plant habit and bloom. It is not as easy in cultivation, however, and seems to need a mycorrhizal companion for good results.

Mountain bogs offer *Sarracenia rubra,* the Sweet Pitcher Plant, a diminutive form of the insectivorous pitcher plant family, growing to 40 cm. tall, nicely scented, and having rose colored hoods. This is to be preferred over *S. purpurea* because of the bonus of the fragrance. *S. flava* is too tall for the average rock garden. Sarracenias may be found in abundance in the Green Swamp area, although the Sweet Pitcher Plant is confined mostly to our mountain counties. The Shinns have made a special effort to raise sarracenias and have beautiful examples of them in their bog garden. The blossoms of *Sarracenia rubra* are maroon on the outer surface and greenish within and droop on the scape above the leaves in April and May. They are quite easily cultivated and thrive in any boggy seep.

Another plant of the mountain bogs and seeps is *Helonias bullata,* Marsh Pink, of the Liliaceae. This forms a low rosette of evergreen leaves from which rise a foot high spike carrying a thick swarm of tiny pink flowers, each with six petals. A quite rare plant, this is grown to perfection by the Shinns. Seeds are of very low fertility, unfortunately, and one must use division of the rhizomes

Helonius bullata

for certain reproduction.

From the highest peaks comes the Roan Lily, *Lilium grayi.* This plant is more diminutive than *L. superbum,* a handsomer plant but growing too large for most rock gardens. The Roan Lily has a hanging bell-shaped flower, with up to nine florets per inflorescence, of a lovely orange-red heavily dotted with black. Its average height is around two or three feet, but it may reach six feet in the wild. This blooms in midsummer and loves a fair amount of cool moisture, which precludes its cultivation in our hotter piedmont. Seeds are borne prolifically and one must break dormancy by stratification to germinate them well.

The rich mountain woodlands are the home of *Delphinium tricorne,* which may be found sparingly as far north as West Virginia and Kentucky, so it is not an endemic of the Carolinas. Plants may reach one and a half feet tall atop which are borne the deep purple, spurred florets in April. The foliage is deeply cut and unobtrusive for the semishaded rockery. Seeds are the best means of propagation.

Along the Blue Ridge Parkway rock-cliffs where water seeps out of the rock may be found *Hypericum buckleyi,* another of the thirty species of hypericum found in our state. This forms a dense shrublet up to eighteen inches tall, which covers itself with golden stars in July, not easily overlooked by the gardener. This plant must have a moraine to give its best, but the foliage has a distressing habit of shedding soon after flower if the soil gets too moist and dieback becomes a major problem, so very sharp drainage seems to be necessary. Seedlings grow well and acid leaf mold with plenty of sand makes a good potting mix for them.

From a few of our western counties, along high rocky ridges above four thousand feet elevation and at bases of cliffs with a northeasterly exposure comes *Rhododendron vaseyi,* the Pink-shell Azalea. Why should I include a shrub that can reach fifteen feet in the wild in a rock plant list? Usually, the Pink-shell Azalea does not exceed about three or four feet and it bears the loveliest soft pink flowers imaginable; some forms are white, but just as lovely. The plant is well-behaved, and the foliage has a glaucous sheen during the summer. In the fall, the leaves turn a lovely scarlet. This plant is interesting botanically because it represents an intergrade between rhododendrons, which have ten stamens, and the azaleas, which have only five; the Pink-shell has five to seven stamens. This azalea is becoming quite rare in the wild, but fortunately is easily cultivated and widely grown over the whole world.

One could make an interesting rock garden from the above list alone, but these are only my favorites. Why not come to Carolina in 1984 and select yours out of our many hundreds of garden worthy plants? §

Perennial — Any plant which had it lived, would have bloomed year after year.

— *A Dictionary for Weedpullers, Slugcrushers & Backyard Botanists* by Henry Beard and Roy Mc Kie

Don't Discount Arizona

Sonia Lowzow*
Lakeside, Arizona
Drawings by Janet Fell, Lakeside, Arizona*

Much of Arizona is *not* a desert. Indeed, it is a state of enormous topographical and altitudinal contrasts, with equally great climatic differences. Elevations range from about 100 feet above sea level in the desert southwest to almost 12,600 feet on the San Francisco Peaks. The mountains in northern and central Arizona are considered a southern extension of the Rockies and the flora of Arizona (about 3,000 species of flowering plants) includes approximately twenty-five percent of plants endemic either to the bulk of the Rocky Mountain region or endemic only in the mountains of New Mexico and Arizona. In addition to this large percentage of mountain plants, add about thirteen percent of other North American plants that are found only at high elevations here and about three percent of circumpolar plants, and a whopping total of approximately 1,200 species of alpine and subalpine plants is reached. These include three or four dozen arctic-alpine chamaephytic plants found at elevations of from 11,000 to 12,500 feet, thereby confining the truly alpine vegetation to the summits of Mts. Humphrey, Agassiz and Baldy essentially, although there are many aggregations of sub-alpine flora on other mountain ranges, particularly in the southeastern portion of the state (from whence comes *Primula rusbyi* – see Sally Walker's article in the ARGS Bulletin, Vol. 39, No. 3).

The recorded lowest temperature in Arizona is −33°F., at one of our mountain weather stations, and the precipitation total has reached almost 60 inches in one year at another. And, withal, we have an essentially low relative humidity, even in our wettest areas.

Fjellgarden, my "mountain garden" is in the White Mountains, just north of the Mogollon Escarpment (the so-called "Tonto Rim"), at an elevation of 7,200 feet. In my backyard, literally, grow species of phlox, lupine, calochortus, townsendia and many other genera. Within a 30 to 40 mile radius can be found such moisture-loving plants as *Calypso bulbosa* and other terrestrial orchids, *Saxifraga rhomboidea, Dodecatheon alpinum, Sisyrinchium demissum, Viola nephrophylla* and many gentians. Certainly not the flora of the hot and arid Arizona desert.

Let us explore a few of the alpine and sub-alpine plants of Arizona.

Lewisia pygmaea grows at elevations of from 8,000 to 9,000 feet. At one of its heaviest concentrations in the White Mountains, it is found on a sloping peninsula jutting out from a lake shore and grows in company with *Commelina*

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* Sonia Lowzow had been gardening in Phoenix, Arizona for 30 years, but did not start rock gardening until about 5 years ago when she moved to Lakeside. She has recently started a small mail-order nursery, which she calls Fjellgarden, an anglicized version of the Swedish word for mountain or alpine garden.

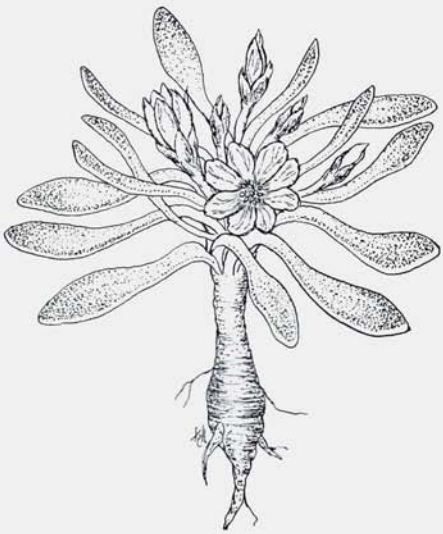
Janet Fell is a wildlife artist and Mrs. Lowzow's neighbor. The charming drawings she has done for this article are her first attempt at plants.

Lewisia pygmaea

dianthifolia and *Sedum stelliforme.* The Arizona form of *L. pygmaea* is a very attractive small plant one inch high by three inches wide. The color of its flowers ranges from pale to a very deep pink. In habitat, it is found on very rocky shallow scree overlying a heavy clay and, during its blooming period (June to August), is subjected to frequent summer monsoon rains. In cultivation at Fjellgarden, it pops out of the ground in May and is in full bloom by June 1st, flowering intermittently until mid-Autumn and deciduous only after having been subjected to frosts at night. I grow it in moist scree – about one-third each of loam, sand and one-fourth inch to one-half inch cinders – in a south exposure.

Lewisia brachycalyx, in contrast, is found at a much greater elevational range, blooming as early as March at 5,000 feet and in late May and early June at 8,000 feet. Its range is primarily in areas of sandy soil stretching east from the White Mountains. Many of the plants are found growing in pure sand, moist from snow melt. The range of color and shape of the flowers in any one population is considerable, from almost pure white to white lined with pink to practically solid pink and with from narrow to almost over-lapping petals. In full sun, the leaves are near-red, shading to white at their bases. The plants are approximately two inches high by five inches wide. In the wild they bloom and set seed in a period of a few weeks and are quickly deciduous – as though they had never existed. In cultivation *L. brachycalyx* retains its foliage for a considerably longer period, unless allowed to go dry. The plants at Fjellgarden are in sandy scree, kept somewhat drier than *L. pygmaea,* and in full sun.

Let us now wander up to the moist mountain meadows at 9,000 feet, where we can find *Dodecatheon alpinum.* This little shooting star has thickish, almost waxy, leaves in a basal rosette and a deep magenta-pink corolla. It grows in full sun in moist heavy acid soil; its companions are *Sisyrynchium demissum, Iris missouriensis, Linanthastrum nuttallii, Potentilla thurberi* and *P. fruticosa* and occasional patches of *Mimulus primuloides* and *Oxalis grayi.* In bloom it is about eight to ten inches high. *D. alpinum*'s range includes the lower eleva-



Lewisia brachycalyx 1:2

Dodecatheon alpinum 1:3

tions in the White Mountains, as low as 6,500 feet at Lakeside. At such altitudes, it seems to be confined to lake shores and creek banks and flowers as early as June. Here it is being grown in a semi-shaded woodland bed in a moist compost of woods soil, sand and peat. It starts to bloom in early June and continues until August. It spreads into a moderate-sized clump and is deciduous in early autumn.

And now let's go down again to the more habitable elevation of 7,200 feet and my own "backyard." On the hillsides, along the roadsides, along the edge of the forest and in the meadow south of the house, *Phlox woodhousei* explodes into a color symphony of pinks each May and June. Superficially, this little phlox is reminiscent of *P. nana,* although it is woodier, with notched corolla lobes (usually). Within a population of wild plants there is, again, considerable variation. Colors range from pure white to deep pink. Corolla lobes are deeply notched, or not at all. The distinctive phlox "eye" is sharply defined or almost absent. The range of the species is considerable, from 3,500 to 8,000 feet and from pure sand to thick heavy clay that bakes to a concrete-like consistency in June (but, in clay, the plants are always found on a slope). It is equally unfussy in cultivation, accepting ordinary soil and sun to almost full shade. Unfortunately, it is not easy to propagate, reminding one again of *P. nana.* Cuttings have been impossible so far and it is regrettable that so many phloxes set so little seed. *P. woodhousei* has a long easily-damaged tap root. (That does suggest the possibility of root cut-

Phlox woodhousei 1:3

Penstemon linarioides 1:3

tings, which I have not yet attempted). The plant grows about three to four inches high in lean scree in full sun, although it is quite a bit leggier in partial shade. It is altogether an attractive plant and so much less demanding than some of its brethren. It is almost evergreen at this elevation. If kept moist in summer, it will frequently bloom again in early autumn.

After the phlox season is over here, *Penstemon linarioides* begins to take center stage, blooming in June to August. This is not a showy penstemon. Its blooms are a sort of medium blue-lavender, but borne in profusion over a long period. The plant is almost shrubby, although some stems in young plants die down in winter. From a woody base, arching upright stems rise to six to eight inches, clothed in small, fresh-green linear leaves. The greatest attraction of *P. linarioides,* however, is its tolerance of well-nigh impossible conditions. The *Arizona Flora* (Kearney & Peebles) indicates that it frequently grows on calcareous soils. Here it flourishes on heavy acid clay and accepts heavy scree in sun or partial shade with equal equanimity. It will accept considerable dryness, but also tolerates our daily monsoon through July and August and our freeze-and-thaw winters, which would be the undoing of so many of the other small penstemons, certainly unless perfect drainage was provided.

In future articles, I will discuss the charming *Linanthastrum nuttallii;* our dryland houstonia, *H. wrightii* (which takes full sun); our little *Sedum stelliforme* and even some of our terrestrial orchids and ericaceae, which are such a prominent feature of the moist spruce-fir forests of our mountain slopes.

Perhaps you would also like to know how the exotics, the non-Arizonans, grow here at Fjellgarden. It is not a long-established garden, but there are saxifrages and androsaces and silenes and even a couple of eritrichiums in residence, all thriving in Arizona, which is not really so "hot and arid," after all. §

The Secretary wants to know if you've hugged a new member lately.

Little Known Miniature Conifers

Part I

Robert Fincham*
Lehighton, Pennsylvania
Photographs by the author

A well balanced rock garden should include a selection of dwarf conifers as well as alpine plants. These special conifers are not the large trees that one normally sees. Some are miniature upright trees while others range in size from tight buns to large mounds.

A collector of conifers for eight years, many of which are dwarf forms, I would like to share my knowledge of some of the less well known cultivars with other plant lovers. The textbook source for this article is Welch's *Manual of Dwarf Conifers*. I have also used information I have secured from conifer collectors from Canada to Long Island and I am especially indebted to my friend Layne Ziegenfuss for sharing his life-time love and knowledge of conifers with me. The forms I have selected for this article are all in my own collection.

True dwarf conifers are extremely rare. Many forms sold as dwarfs are actually semi-dwarf. A true dwarf will not attain a height greater than two to three meters in seventy-five to one hundred years. Since all plants grow continuously, only a form with very limited annual growth will fit this definition. Of course, some semi-dwarf forms will remain dwarf if planted in poor soils, but should such a soil be enriched for any reason the plant will resume its normal growth pattern. Therefore, unless a gardener has unlimited space he will want to work mostly with true dwarfs. My discussion of conifer cultivars will include information about their annual growth rate in centimeters so that the reader may estimate a plant's dimensions for any age. A centimeter, for those not yet accustomed to metric measurements, is about three-eighths of an inch.

A dwarf conifer may originate in one of several possible ways: as a witch's broom, as a branch mutation, or as a seedling mutation.

A witch's broom occurs when a normal bud undergoes a literal "explosion" into many branches with diminished growth rate. These branchlets will form a tight knot on a tree. When they are grafted, they may produce a dwarf or slow growing plant. Most often, the graft will die within two years due to a factor called "virus." If the graft lives through this trial period, a true mutation has been found.

A branch mutation, other than a witch's broom, most often leads to the production of a variegated plant. Because a difference in the coloration of a branch is more noticeable than is growth rate, it is most likely to be collected for its unusual color and therefore a variegated rather than a dwarf mutation is usually the result of such a find.

* Robert Fincham is the owner of Coenosium Gardens, a nursery of dwarf and standard conifers and deciduous trees.

A seedling mutation is a result of a genetic deformity within the chromosome structure of the seed embryo. This type of mutation has produced many interesting forms found in seed beds, in Christmas tree plantations and in the wild.

When a mutation is found and grafted or propagated by cuttings, it is evaluated for several years and if it is considered a distinct form, the discoverer may assign it a cultivar name, usually, though not always, non-Latinized. This name is placed after the scientific name. It is not written in italics and is enclosed by single quotes. The following listing is done in this manner.

The Firs and Spruces

Abies concolor 'Conica' — This praiseworthy fir is indispensible in any size rock garden. 'Conica' is very columnar with a growth rate of 4 to 6 cm. per year. Alpines can be grown up to its base since it does not produce much shade.

Abies koreana 'Starker's Dwarf'

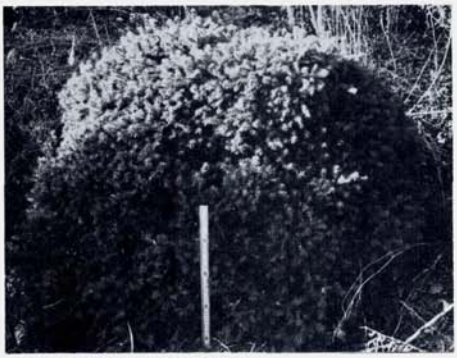
Abies koreana 'Starker's Dwarf' — This Korean Fir forms a charming, medium sized plant and is flat topped, rounded and slow growing at about 4 cm. a year. It is a fine choice for the medium sized rock garden in colder climates.

Abies concolor 'Conica'

Abies lasiocarpa 'Compacta' — For a bluish, conical, slow growing fir this likeable plant is a fine choice. The growth rate of about 3 cm. a year gives 'Compacta' a long life span in any rock garden.

Abies lasiocarpa 'Compacta'

Picea abies 'Clanbrassiliana Stricta' — I hold this plant in high regard and consider it a real gem for the rock garden. It is slow growing, with a vertical growth of about 5 cm. each year and takes on a conical shape due to its ascending branches.



Picea abies 'Gregoryana'

Picea abies 'Gregoryana' — This most laudable plant is a real eye-catcher. Its habit is very low and flat-topped with congested growth. Most of the branches grow 1 to 2 cm. a year with some stronger shoots. *Picea abies* 'Echiniformis' differs from 'Gregoryana' in that it has sharply pointed needles; otherwise the two plants are identical.

Picea abies 'Kluis'

Picea abies 'Clanbrassiliana Stricta'

Picea abies 'Kluis' — Of all my spruces, I find this one to be the most fascinating. It is very dwarf with an irregular growth habit. The needles are extremely tiny and the branchlets are short and thin. The growth rate is about 1 cm. a year. This plant is very rare and would be a fine addition to any rock garden.

Picea abies 'Witch's Brood' — This captivating plant has such a fine texture

Picea abies 'Witch's Brood'

that it doesn't even look like a Norway Spruce. It is a dwarf form that is globose to conical and light green in color. The growth rate is about 2 to 3 cm. a year. This plant was grown by Linc Foster in his garden at Millstream from seed taken out of a cone found on witch's broom.

Picea abies 'St. James'

Picea abies 'St. James' — This tempting little beauty was discovered as a witch's broom by Joe Cessarini and is a bun shaped dwarf with a growth rate of about 2 cm. a year.

Picea abies 'Wagneri'

Picea abies 'Wagneri' — Any rock gardener would cherish this cultivar. Layne Ziegenfuss ran across this seedling mutation in the Poconos. It is bun shaped, globose, and extremely light, growing less than 1 cm. per year.

Picea abies 'Little Gem'

Picea abies 'Little Gem' — As this mophead, dwarf plant becomes better known, the supply may not be able to keep up with the demand. The branchlets are upturned with a growth rate of 2 to 3 cm. a year. It originated as a witch's broom on a *Picea abies* 'Nidiformis.' This enthralling, dark green spruce is suitable for any size rock garden.

Picea abies 'Pygmaea'

Picea abies 'Pygmaea' — I am very fond of this plant since it is extremely dwarf and very distinctive. It is conical, com-

pact, and very slow growing. The branchlets are crowded and grow at the rate of only 5 to 30 mm. per year. *Picea abies* 'Humilis' differs from this plant only in the color of its winter buds. Both these cultivar names have been attached to several other forms in the trade so the collector must be careful to obtain the true form.

Picea pungens 'St. Mary's Broom' — This Blue Spruce is the most alluring of all its forms. It is a dwarf, broad, slightly conical plant with an outstanding blue color. Its growth rate is much slower than that of 'R.H. Montgomery' averaging 3 to 4 cm. per year. Layne Ziegenfuss and Greg Williams found this plant as a witch's broom. §

Picea pungens 'St. Mary's Broom'

(To be continued)

The Show Bench

Annual Meeting — 1983
Plant Show

Class 1 — Three pans of rock garden plants of distinct genera in flower. 1st – Doroyth Clark, N.Y.: *Aquilegia discolor, Dianthus microlepis, Gentiana verna;* 2nd – Robert Way, Pa.: *Gypsophila franzii, Campanula sartori, Aquilegia saximontana;* 3rd – Esther Bailey, Conn.: *Chrysogonum virginianum, Hypoxis hirsuta, Solidago* sp.

Class 2 — One pan rock garden plant in flower. 1st – Doroyth Clark: *Gentiana clusii;* 2nd – Lincoln Foster, Conn.: *Ramonda myconii;* 3rd – Robert Way: *Campanula fragilis.*

Class 3 — One pan rock garden plant, new, rare, or difficult in cultivation. 1st – Doroyth Clark: *Douglasia laevigata;* 2nd – Robert Way: *Aruncus aethusifolius;* 3rd – Paul Halladin, N.J.: *Carmichaelia ensyi.*

Class 4 — One pan Primula, species or hybrid. 1st – Lincoln Foster: *Primula algida;* 2nd – Janice Anthony, Maine: *Primula sieboldii.*

Class 5 — One pan Primulaceae other than Primula. 1st – Doroyth Clark: *Androsace sempervivoides;* 2nd – Kathy Lippit, N.Y.: *Cyclamen persicum;* 3rd – Lincoln Foster: *Dodecatheon ellisiae.*

Class 6 — One pan Saxifrage. 1st – Paul Halladin: *Sax. cotyledon* 'Pyramidalis'; 2nd – Roxie Gevjan, Pa.: *Sax. cochlearis;* 3rd – Doroyth Clark: *Sax. decipiens.*

Class 7 — One pan bulbous or rhizomatous plant suitable for the rock garden. 1st – Geoffrey Charlesworth, Mass.: *Rhodohypoxis baurii* var. *platypetala;* 2nd – Paul Halladin: *Orchis latifolia;* 3rd – Paul and Sandra Olafsen, Conn.: *Liparis lilifolia.*

Class 8 — One pan rock garden plant grown from seed by the exhibitor. 1st – Doroyth Clark: *Phlox diffusa;* 2nd – Paul and Sandra Olafsen: *Rhododendron brachycarpum* "creeping form"; 3rd – Esther Bailey: *Aquilegia* 'Blueberry'.

Class 9 — One pan silver or gray foliage plant. 1st – Paul Halladin: *Raoulia australis;* 2nd – Kathie Lippitt: *Draba rosularis;* 3rd – Robert Way: *Leucogenes grandiceps.*

Class 10 — One pan dwarf shrub (not bonsai) other than Ericaceae. 1st – Wally Alberts, N.H.: *Salix serpyllum;* 2nd – Lincoln Foster: *Ilex crenata* 'Green Dragon'; 3rd – Kathie Lippitt: *Teucrium subspinosum.*

Class 11 — One pan Ericaceae suitable for the rock garden. 1st – Esther Bailey: *Rhododendron balsaminaeflorum;* 2nd – Lincoln Foster: *Rhododendron* x *multiflorum;* 3rd – Paul and Sandra Olafsen: *Rhododendron brachycarpum* "creeping form".

Class 12 — One pan dwarf conifer (not bonsai). 1st – Lincoln Foster: *Chamaecyparis obtusifolia;* 2nd – Doroyth Clark: *Chamaecyparis pisifera;* 3rd – Paul and Sandra Olafsen: *Chamaecyparis pisifera* 'Tsukoma'.

Class 13 — One pan bun or cushion; flowers of no importance. 1st (tied) – Taite Darlington, N.Y.: *Asperula pontica;* Doroyth Clark: *Asperula nitida;* 2nd – Kathie Lippitt: *Silene acaulis;* 3rd – Lincoln Foster: *Androsace cylindrica.*

Class 14 — One pan hardy fern suitable for the rock garden. 1st – Paul Halladin: *Asplenium trichomanes;* 2nd – Doroyth Clark: *Asplenium platyneuron;* 3rd – Lincoln Foster: *Pellaea fendleri.*

Class 15 — Three pans of plants of distant genera native to the U.S. 1st – Robert Way: *Penstemon hirsutus, Silene hookeri, Sedum spathulifolium.* 2nd – Doroyth Clark: *Lewisia nevadensis, Dodecatheon poeticum, Tiarella wherryi;* 3rd – Lincoln Foster: *Lewisia cotyledon, Silene wherryi, Chrysogonum virginianum.*

Class 16 — One pan Lewisia, species or hybrid. 1st – Lincoln Foster: *Lewisia cotyledon* x *rupicola;* 2nd – Robert Way: *Lewisia rediviva;* 3rd – Doroyth Clark: *Lewisia nevadensis.*

Class 17 — Three pans of Crassulaceae of distinct genera. 1st – Doroyth Clark: *Rhodiola rosea integrifolia, Jovibarba sobolifera, Sempervivum* sp.; 2nd – Esther Bailey: *Sempervivoides arachnoideum tomentosum* 'Stansfieldii', *Sedum pilosum, Orostachys* sp.; 3rd – George Clark, N.Y.: *Sempervivum arachnoideum, Sedum middendorffianum, Orostachys* sp.

Class 18 — Container of three or more plants of distinct genera arranged for effect. 1st – Edith Young, N.Y.; 2nd – Doroyth Clark; 3rd – Lincoln Foster.

Highest aggregate points: 1st – Doroyth Clark; 2nd – Lincoln Foster; 3rd – Robert Way.

Best in Show: Edith Young, Class 18.

H. Lincoln Foster Award given by the Connecticut Chapter for three pans of distinct genera native to the U.S.: Robert Way, Class 15.

Delaware Chapter Award for three pans of rock garden plants of distinct genera in flower: Doroyth Clark, Class 1.

Primrose Society Award for best pan

of Primula species or hybrid: Lincoln Foster, Class 4.

Pennsylvania Horticultural Society Silver Certificate for one pan of rock garden plant grown from seed by the exhibitor: Doroyth Clark, Class 8.

Connecticut Horticultural Society Award for one pan dwarf shrub (not bonsai) other than Ericaceae: Wally Albents, Class 10.

— Joan A. Keefe and Robert M. Cole

In Praise of

Hymenoxys scaposa

Dr. Alexej B. Borkovec
Silver Spring, Maryland
Photograph by Joseph J. Higgins

Formerly known as *Actinea, Actinella,* or *Rydbergia angustifolia*, this native of south-central United States is a low, evergreen perennial with imbricate, narrow, linear leaves, 4-8 cm long. The solitary golden composite flowers, up to 6 cm in diameter, appear in April to May on sturdy, leafless stems, 15-25 cm long. Flowers last a week or two but are not very numerous. Although *Hymenoxys scaposa* has been referred to as short-lived, my experience does not confirm this. In fact, specimens older than three years acquire a special charm by losing leaves on the lower part of the stem and exposing thick, woody, red-brown branched trunks that give the plant an ancient appearance. My oldest plant lived ten years.

A sunny location and perfect drainage seem to be the only requirements for growing this plant. A 10-cm layer of pure crushed stone around the neck of the plant is important to keep the stems dry in wet winters, but low temperatures are tolerated even without snow cover. Because rotting of the trunk is the main potential damage, dead leaves that gradually accumulate at the base should be removed early each winter. Summer drought, humidity, and pests are no problem.

Hymenoxys scaposa

Seed is set plentifully, but germination is poor. After winter or early spring sowing in sharp sand, some seedlings will appear and can be easely transplanted to small pots with gritty regular soil when the first two to three true leaves appear. The pots can be exposed to full sun, but should not dry out; transplanting to a permanent location can be carried out in about a month. Occasionally, older plants will develop offshoots on the stems; these can be detached or cut off with a razor blade and stuck 1-2 cm deep into moist sharp sand in a closed coldframe or propagation box. Treating the cuttings with a growth hormone seems beneficial. I prefer taking the cuttings in late fall and keeping them in styrofoam drinking cups filled with sharp sand in a coldframe until March. Then they can be taken out to harden for a few days and transplanted directly into the garden. By this method, success is almost assured and the plants may even bloom in May. §

Deer? Oh, Dear!

Dee and Dorothea Devault
Easton, Connecticut

The State of Connecticut among other places needs to come to terms with the exploding deer population. In the meantime, here are a few suggestions for beleagered gardeners:

Human Hair: Not worth the bother, though often recommended. It takes about a baseball sized bag of human hair every foot or so to do any good and in a short time they lose their efficacy. Blood works until the first good rain. Moth balls are useless, as are rags or binder twine soaked in creosote.

Snow fencing: Very good. Not to be used upright. Cut into needed lengths to curve in an arch over a plant or plants. Some support may be needed under large areas. Can be bought in fifty foot lengths by four feet wide and cut into suitable sizes. Cost per roll about $28.

Chicken Wire: Very good when used upright around shrubs. May need a few posts for support if used around a group of plants. Areas enclosed should not exceed fifteen feet in diameter. We use pea fencing raised a few inches off the ground to reach a sufficient height to prevent browsing over the top. Can also be used arched over shrubs or laid flat over low supports a few inches above ground hugging plants. Fasten down edges so deer cannot lift them. A nuisance to set up and take down and bulky to store.

Ross Gro-Netting: Excellent. A durable, lightweight, black plastic mesh with openings large enough to let snow go through but small enough to prevent browsing. Easily handled and stored and practically invisible in place. Can be used as an upright barrier around plantings if supported by posts and area is not too large. Excellent when placed over plantings if edges are firmly fastened down either by Twistems to lowest shrub branches, or, if plantings are low, by long wire "hairpins", bricks or rocks. Available from Agway and some garden centers in various lengths and widths, which can be cut with scissors to required size. A thirteen by forty-five foot length, packaged, costs about $20.

Sprays: Deer and Rabbit Repellant, a Thiram product, is available at most

garden centers. Add an equal amount of water. Too expensive unless only a small area is to be protected.

Thiram, (a fungicide) plus Rhoplex (a sticker) can be ordered from Agway. Expensive but a little goes a long, long way as it is used diluted with water. A good air pressure sprayer, one to two gallon size with a fine nozzle gives excellent coverage. No need to spray high.

For summer use three ounces of Thiram and one and a quarter ounces of sticker to one gallon of water. A stronger solution is needed in winter: twenty-one ounces Thiram and nine ounces of sticker to each gallon of water, though we found this mixture too strong as it burned some evergreens. We strain the mixture through a tea strainer so as not to clog the sprayer.

Thiram does leave a white residue on the leaves and as neither spray lasts more than three months a second application is necessary before winter is over. Unfortunately, in our climate, this second spraying should occur in mid-winter when the temperatures are below 40°F., the recommended minimum. Sometimes the weather does not cooperate.

Other sprays that have been recommended are based on eggs. Gordon Thayer, an orchardist in Lansing, N.Y. uses one lightly beaten egg mixed into each gallon of water (strained) along with a good dollop (about one quarter cup) of raw linseed oil and a tablespoon of cayenne pepper, Tobasco, or Hot Pepper Sauce. John J. Dommers, Director of the New England Regional Office of the Humane Society of the United States recommends a spray made of the lightly beaten whites of eighteen eggs for every two gallons of water. Nothing else, but this could run into quite a lot of money if you plan to spray a wide area unless you live near a chicken farm that sells cracked eggs at a discount. Also you'd have a lot of egg yolks to use up.

A second application of these egg based sprays is recommended after six weeks. After this second application spray every four to six months. Again the 40° F. minimum temperature for spraying is advised.

Fencing: A tall, ten to twelve foot fence is needed to keep out deer. It must be very sturdy (sheep fencing) with strong posts so as to prevent deer from knocking it down. The bottom should be no more than six inches from the ground or deer will wriggle under it. A gate, which is never left open, a style, or a cattle guard of pipes laid lengthwise over a short, but very wide ditch across the opening will be needed so you can get yourself in and out of the enclosure. The pipes should be loosely fastened to supports so they will rattle and roll slightly.

Some people succeed with an electrified fence of four to five strands only ten feet high. The lowest wire should be no more than a foot from the ground. Deer tend to get close to a fence to jump it and are likely to sniff at the wire beforehand to see what it is. Once shocked they theoretically learn their lesson and don't try again, but leave the electricity on so as to teach newly approaching deer that this barrier hurts. Don't forget to put warning signs on the posts. Deer can't read, but most humans can.

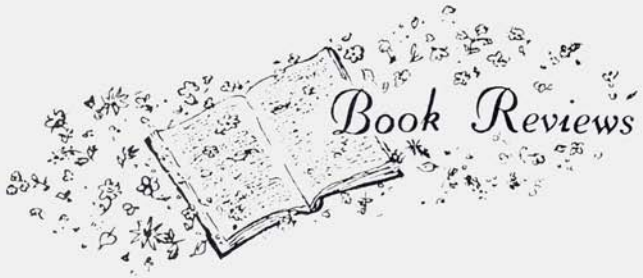
An electric fence must be kept clear of all vegetation that might touch it and short it out.

Lights: Deer become accustomed to a steady light, but success in keeping them off with flashing lights has been reported. String flashing Christmas tree lights around your plantings.

Other Measures: Of course, if you're a good shot and you live in an area where shooting is permissible, there's always the gun. You will need a deer permit as well as a hunting license.

Though new deer will move in to fill the vacuum, it's a good way of keeping the freezer full of venison.

Good Luck! §



The following list of books, maps, and information should help to make the visit to North Carolina for the 50th Anniversary Meeting extra special. When you write to each of the different departments, be sure and include in *each* letter a list of your particular interests, i.e., wild flowers, gardens, art, birds, wildlife refuges, museums, etc. Give the dates of the visit and areas of the state that you are interested in; the more thoughtful the letter, the more information you will receive. The other way to ensure that your trip will be exciting is to write to each of the states you will be traveling through, again giving dates and interests. I have found that the country inns and other accommodations listed by each state generally prove to be excellent.

North Carolina

North Carolina Dept. of Natural Resources and Community Development, P. O. Box 27687, Raleigh, NC 27611. – State travel packet contains map and listing of attractions, calendar of events and motel guide.

North Carolina Dept. of Natural Resources and Community Development, Division of Parks and Recreation, P. O. Box 27687, Raleigh, NC 27611. – Request park information in the specific areas, and also park maps.

State Extension Services, Dr. Chester D. Black, North Carolina State University, Raleigh, NC 27650. – "Endangered and Threatened Wildlife of Kentucky, North Carolina, South Carolina and Tennessee," a co-operative publication of US Fish and Wildlife Service and the respective Agriculture Extension Services, revised 1980.

Southeastern Forest Experiment Station, Asheville, NC. – "Some Useful Plants of the Blue Ridge" by Arnold and Connie Krochmal. Line drawings and a few photos of plants and trees from the USDA Forest Service.

North Carolina Wildlife Federation, Box 10626, Raleigh, NC 27605. – Information on plants, animals and natural resources.

North Carolina Botanical Garden, University of North Carolina-Chapel Hill, Totten Center, 457 A, Chapel Hill, NC 27514. – NCBG propagates southeastern and North Carolina plants as well as featuring the plants in their natural habitats of the Sandhills Region, the Coastal Plain Savannah, and the Mountains.

US Dept. of Agriculture Forest Service-Southern Region, Toecane Ranger District: US Forest Service, P. O. Box 128, Burnsville, NC 28714. – "Roan Mountain Gardens-Pisgah National Forest."

District Ranger-US Forest Service,

435 Thurman Rd., New Bern, NC 28560. – "Insect Eating Plants on the Croatan National Forest."

Great Smoky Mountains National Park, Great Smoky Mountains Natural History Association. – A guide-newspaper describing trails, news and map. Write to: *National Forests in North Carolina,* P. O. Box 2750, Asheville, NC 28802. Request "Bloom Calendar for the Parkway," describing when and where each of the wildflowers are blooming, giving mileposts on the Parkway. Also ask for "Blue Ridge Parkway Map."

North Carolina Wildlife Resources Commission, 512 N. Salisbury St., Raleigh, NC 27611. – Request specific information of interests and/or location, i.e., Great Dismal Swamp, etc.

Historic New Bern, P. O. Box 5223, New Bern, NC 28560. – Home of the restored Tryon Palace, first Capitol of NC, a very lovely restoration, complete with restored gardens. Get dates and times.

Biltmore House, the Biltmore Co., 1 Biltmore Plaza, Asheville, NC 28803.

Carolina Bird Club, Inc., P. O. Box 1220, Tryon, NC 28782. – Ask for specific information on locations and times to see local birds that have become quite rare in overpopulated communities. Use a bird record from Cornell's Laboratory of Ornithology, Ithaca, NY, or call your local Audubon Society to listen to a record of common bird songs. Bird song identification can enhance any walk in the wild as well as aid in locating all species. President of the Carolina Bird Club: Mrs. Harry Snavely, 115 Plymouth Ave., Winston-Salem, NC 27104. Publication: "The Chat" (quarterly).

Conservation Council of North Carolina, 307 Granville Rd., Chapel Hill, NC 27514. – Publication: "Carolina Conservationist."

The Nature Conservancy, 1800 North Kent Street, Arlington, Virginia 22209. – Some of the Conservancy's North Carolina projects: Beaverdam Creek, Davidson Co.; Bluff Mountain, Ashe Co.; Camassia Slopes, Northamton Co.; Goose Pond Bay, Robeson Co.; Nags Head Woods, Dare Co.; Pretty Pond, Robeson Co.; Rainbow Springs Easement, Macon Co. Consult Conservancy for specific information.

National Wildlife Refuges: Ask for plant, bird and seasonal lists.

Pea Island National Wildlife Refuge, P. O. Box 1026, Manteo, NC 27954.

Pee Dee National Wildlife Refuge, P. O. Box 780, Wadesboro, NC 28170.

Piedmont National Wildlife Refuge, Round Oak, Georgia 31080.

Pungo National Wildlife Refuge, P. O. Box 267, Plymouth, NC 27962.

Nantahala National Forest. – Additional book of native plants with line drawings by Arnold and Connie Krochmal. This guide can also be used for West Virginia, pocket size.

West Virginia

The state of West Virginia publishes an excellent packet for tourists. Their country inns are all fun to eat at with excellent food. The publications on native plant material is excellent. Be sure to list your interests and areas to visit. *Be specific.*

Office of Economic and Community Development, Travel Development Division, State Capital-SP, Charleston, WV 25305. – Request booklets on West Virginia Ferns; West Virginia Rare and Endangered Plant Species; Trees of West Virginia Farm Ponds; Mid-Summer Wild Flowers; Common Native Shrubs of West Virginia; Conifers of Farms and Woodlots 1; and West Virginia Plants in Autumn. Also request the book of West Virginia State Parks and Forests, which lists additional information and local

highlights.

Brooks Nature Center, Oglebay Institute, Oglebay Park, Wheeling, WV 26003 and the state forest and wildlife agencies are also very helpful.

South Carolina

South Carolina has some exceptional areas to visit. The beach in South Carolina is very different from the North Carolina beaches. The South Carolina shore is calmer and not quite as rugged. The plants and birds are in great abundance and are exceptional.

South Carolina Department of Parks, Recreation and Tourism, 1205 Pendleton St., Columbia, SC 29201. Request Charleston's Natural Areas; The Francis Beidler Forest in Four Holes Swamp; Brookgreen Gardens, a garden museum of American sculpture, with a tremendous use of plants to highlight sculpture; Middleton Place, a restored farm and gardens; The Forests and Flowers of Keowee-Toxaway (Nature's Garden); US Dept. of Agriculture Forest Service for Southern Region List of Parks, etc.; "Threatened and Endangered Plant Species of South Carolina" lists plants and areas where to see them; Magnolia Plantations and Garden.

A 1983 Touring Book of the Eastern United States or the US will give the current state address for information needed for the states that you will be driving through. I have found that the Wildlife and Audubon Societies are very helpful in helping to make sure you find their best spots in each state.

American Association of Botanical Gardens & Arboreta Inc., Secretary-Treasurer: Gurdon L. Tarbox, Jr., Brookgreen Garden, Murrells Inlet, SC 29576. – Request information on Brookgreen Gardens and other specific gardens in areas you are to visit.

Virginia

Virginia State Travel Service, 6 North Sixth St., Richmond, Virginia 23219. – Request the Virginia Bloom Calendar for the Blue Ridge Parkway because the bloom peaks earlier in this state than in North Carolina. If visiting Williamsburg or stopping over for the night, ask for a list of the restored homes that you can stay in. These places are very pretty, usually less commercial and expensive than the large inns. Virginia and North Carolina have the friendliest tourist offices just off the highway I have ever been in; they will go to great lengths to make sure you find their lovely treasures.

Books for Additional Reading

The Blue Ridge, text and photographs by William A. Blake, Viking Press, 1977. Library #917.55 Bak.

The American South, Four Seasons of the Land by William A. Blake and James J. Kilpatrick, Oxmoor House, Inc., 1980.

Southern Living Garden Guide by the Garden & Landscape Staff of Southern Living Magazine, Oxmoor House, 1981. Lib. #635.9 Sou

The Swamp by Bill Thomas, W. W. Norton & Co., 1976.

Reader's Digest North American Wildlife, ed. Susan J. Wernert, 1982. A good over-all guide for everything from plants to birds, animals, shellfish. Well illustrated in color.

A Beachcomber's Botany by Loren C. Petry, Chatham Conservation, 1963.

Wild Habitats by Aleta Karstad, Chas. Scribner, 1979. Aleta's drawings and water colors are lovely; the text is excellent.

Flowers of the South, Native and Exotic by Wilhelminia F. Green and Hugo L. Blomquist, University of North Carolina Press, 1953. Line drawings, black and white.

Trees and Shrubs of Virginia by Oscar W. Gupton and Fred C. Swope, Dept. of Biology, Virginia Military Institute, University Press of Virginia, 1981. Very

good color photos of leaves and flowers and/or berries.

Wildflowers of Eastern America by John E. Klimas and James A. Cunningham, Alfred A. Knopf, 1974. Reissued in the last two years. Very clear color photos.

Wildflowers and Weeds by Booth Courtnay and James H. Zimmerman, paper, Van Nostrand Reinhold, 1972. Color photos arranged by habitats.

America from the Road, Reader's Digest, 1982. Arranged by areas with highlights of the states. Lib #917.3 Rea.

Kentucky Birds by Roger W. Barbour, C. Peterson, D. Rust, H. Shadowen, and A. L. Whitt, Jr., University Press of Kentucky, 1973. Very good text and color photos.

The New Peterson Field Guide to Birds by Roger Tory Peterson.

Winter Birds of the Carolina's and Nearby States by Michael A. Godfrey, John F. Blair, 1977, LC #QL 684.N8G6.

Wild Flowers in South Carolina by Wade T. Batson, University of South Carolina Press, 1964.

— Margaret Wisner

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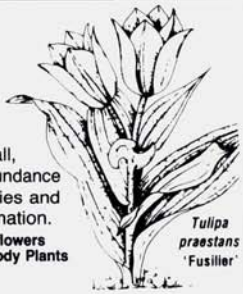

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– Bulletin of the American Rock Garden Society

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