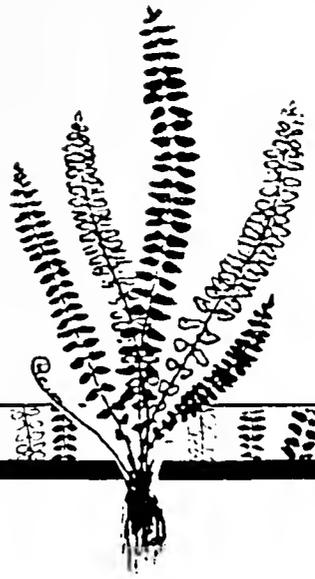


Hardy Fern Foundation

NEWSLETTER

Editor Sue Olsen ■ VOLUME 3 NUMBER 3 ■ SUMMER 1993



President's Message

GUY HUNTLEY

It is necessary, I think, to pause now and then from the frantic pace in to which so many of us get swept and take a look at where we're going. Once the destination is clear, we need to ask whether or not that is where we still want to go, and if so, whether we are taking the best path to get us there.

Such has been my thinking as I begin a second term as president of the Hardy Fern Foundation. This seemed like a prudent time to take a close look at the past accomplishments and future direction of our organization. A basic tenet of the organization is education. Creating opportunities for people to become more aware of and more understanding of ferns. As I reflected, I highlighted some of the paths we have chosen to reach that aim.

At the core of the HFF's initial vision was the establishment of Satellite gardens in different sections of the country. This goal is still a main emphasis today, and should, I feel, continue to be. Such gardens afford an opportunity for greater public awareness of, and increased education about, ferns, and education is at the heart of our ideal. The more interest there is in ferns - the more interested people there are growing ferns - the more knowledge and information will be available to the rest of us.

Such knowledge can and will be shared in a variety of ways. Another thrust of this organization is this newsletter, which under the editorship of Sue Olsen has been very instrumental in the collection and redistribution of information pertinent to its members. I am continually pleased to see the high quality of each issue, and comments from our members have been very positive. This newsletter is a strong step in the right direction. (Thank you! - Ed)

Another project of the HFF, started with the same goal of education, is the creation of a Directory of United States Fern Gardens and Nurseries. This monumental task is being taken on by Joan Gottlieb, a member in Pittsburgh. Modeled after a similar directory in Great Britain, this guide will be a great boon to those interested in ferns at any level. It will hopefully provide a variety of locations where anyone interested in becoming familiar with ferns can stop and learn. I received a copy of Dr. Gottlieb's questionnaire recently, and was impressed with her efforts. Thank you, Joan, for the fine work you are doing on this project. If any member has suggestions of fern gardens and/or nurseries in their area which might be included in this directory, the name and address can be sent to:

Joan Gottlieb / Directory Project / 2310 Marbury Road / Pittsburgh, PA 15221-3670. Watch for periodic progress reports in this newsletter.

The HFF also hosts an open house and member's day in early June each year at the primary garden. This affair provides attendees with lectures and classes about various aspects of ferns and fern gardening, followed by a tour of the garden. There is talk about sponsoring similar events in other gardens throughout the country - we'll keep you updated as this progresses.

Education is the goal. Looking back, and looking ahead, I think the Foundation is on the right track. But any comments or questions any member has regarding our goals would be welcome. If you have something to add, please drop me a note. If you'd like to discuss any issue with me send along your telephone number and I will give you a call.

This is your organization - lets make sure it is working for you.

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Reprinted from "The Fern World", April, 1992, with permission from The San Diego Fern Society.

The Great Fernists

This is the second of a series of articles being produced by Bob Halley and edited by Robin Halley on those Pteridologists that the other Fern Experts turn to for help. A list has been compiled that includes many of the great names throughout the world.

Neill D. Hall

Neill D. Hall was born in Woodburn, Oregon, on May 9, 1899. Little did anyone realize then what an eventful life he would be leading. Now, as he still keeps active in his home, his church and his garden, it is fascinating to survey some of his interests and achievements.

He received a degree in Mechanical Engineering in 1922 from what was then Oregon State College in Corvallis, Oregon. Western Electric Company was an early employer but then followed a period of miscellaneous jobs after which he affiliated with the American Telephone and Telegraph Company where he worked until his retirement. Even then he contributed time to the related, worthwhile activity of creating "Talking Books" for the blind, a task sponsored by a group of retired A.T.& T. employees.

Meanwhile, on September 1, 1922, he married another Corvallis graduate, Amy Ruth Thompson, who was a strong influence in his life and a great joy to him until her death in 1987, a span of 65 years. They shared delight in each others' hobbies as well as in a wonderful family.

One of Neill's interests was fly fishing which he often pursued alone.

He began this hobby using a discarded fly rod which he found and repaired. Testimony to his careful and successful job of mending it is the fact that his son, himself a grandfather, has the rod to this day.

Another interest was photography in which he had been indoctrinated by his father who followed it professionally. Neill pursued this avocation diligently in many far-flung places as he and Amy travelled far and wide.

Still another hobby was wood-working which resulted in such useful objects as salt-and-pepper shakers



Neill Hall & great granddaughter Samantha

and even furniture like a music cabinet and an elaborate bedstead. He allied his interest to his devoted service to the Boy Scouts of America. As each boy in his troop achieved a certain rank Neill presented him with a wooden neckerchief slide which Neill had turned on his lathe to some

unique design, each one different from the others.

He was involved in other facets of Boy Scouting such as hiking and teaching various hobby subjects. His service was so valued that he was honored with their Silver Beaver award in 1951.

Plants and gardening were always important to Neill. When the American Rock Garden Society was formed in 1934, he soon became a stalwart supporter of the local chapter's activities and a dependable participant

in meetings, shows and other functions of that group. The difficulty of presenting a slide or other informational program never daunted him. He was ever on call, as I can personally testify since my husband and I were privileged to enjoy a close association with him.

Each year the Rock Garden Society held a "Book Night" when members brought for 'Show and Tell' precious publications relating to botany or horticulture. One memorable such meeting was held at the home of Dr. and Mrs. T.C. Frye. Dr. Frye, then head of the Botany Department at the University of Washington, had in 1934 published a small text on "Ferns of the Northwest". Else Frye, his wife, was a botanist in her own right and was chief mentor to our group. That evening, her "Show

and Tell" included an 8-volume set of English books on "A Century of Ferns" which so intrigued Neill that he wrote to England and succeeded in locating another such set. And so began his love affair with the world of ferns.

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His specialization in this field became so deep and engrossing that it is little wonder that he was tapped to be National Curator of the Spore Exchange of the American Fern Society. There followed international correspondence tied in with extensive travel which created ever broader horizons and multiplied acquaintanceships with people of similar interests all around the world.

Neill treasures his friendships and enjoys sharing with local visitors a card or a letter as well as the listing of spore from some noted individual or faraway place. He takes pride in publications and achievements of those whose lives have touched his life. The overwhelming demands of the Spore Exchange never elicited complaints, only pride in a job well done. Time made it necessary for

him to relinquish this post but he still maintains a keen interest in its development. As he closed the chapter on this job, he was made an Honorary Member of the American Fern Society, a distinction reserved for only seven other fern specialists around the world.

We have omitted many of Neill's varied interests such as the interval when he was a veritable rock hound. Nor have we been able to even mention many of the special plants which captured his attention. For instance, he acquired a large collection of hostas, many of which came to him from Japan. Nor have we stressed his consummate skill as a grower. A friend recently mentioned that Neill had done so well in growing *Oxalis adenophylla*, a plant which stymies most gardeners, even very good ones.

Neill's library has grown simultaneously in quality and quantity through the years. His collection of rare books on ferns is notable. Some are a hundred years old and of inestimable value. They have shared the bookshelves with other unusual and rare books. Some of his horticultural and botanical books he has already given to the library of his Alma Mater or to the Betty Miller Library at the Center for Urban Horticulture at the University of Washington.

Life continues to hold challenges for Neill and he continues to seek knowledge which he shares generously with anyone who is interested in our plant world, which he has enriched by his contributions to it.

Frances K. Roberson, Seattle, WA
19 April 1991.

Collections

The Hardy Fern Foundation Collections Committee would like to enlist your help in expanding our assortment of North American ferns. (We'll be after material from other parts of the world at a future date.) If you have properly identified plants or spore that you would be willing to share with us of any of the following ferns, please notify Suzanne Hattery, 25519 140th Lane SW, Vashon Island, WA 98070. DO NOT SEND ANY MATERIAL AT THIS TIME. We will sort our responses and get back to you. Thank you. This is your opportunity to help your organization.

Desirata

Asplenium bradleyi

Asplenium montanum

Athyrium pycnocarpon

Athyrium thelypteroides

Botrychium dissectum

Botrychium virginianum

Cheilanthes alabamensis

Cheilanthes covillei

Cheilanthes (Notholaena) dealbata

Cheilanthes feei

Cheilanthes (Notholaena) standleyi

Cheilanthes wootonii

Cystopteris laurentiana

Cystopteris montana

Cystopteris protrusa

Cystopteris tennesseensis

Dryopteris campyloptera

Dryopteris clintoniana

Dryopteris cristata

Dryopteris fragrans

Dryopteris goldiana

Dryopteris intermedia

Dryopteris ludoviciana

Phegopteris connectilis

Phegopteris hexagonoptera

Polypodium californicum

Polypodium polypodioides

Polypodium virginianum

Polystichum microchlamys

Thelypteris nevadensis

Thelypteris noveboracensis

Thelypteris palustris

Thelypteris simulata

Woodsia alpina

Woodsia glabella

Woodsia ilvensis

Woodsia obtusa

Woodsia oregana

Woodsia scopulina

Woodwardia virginica

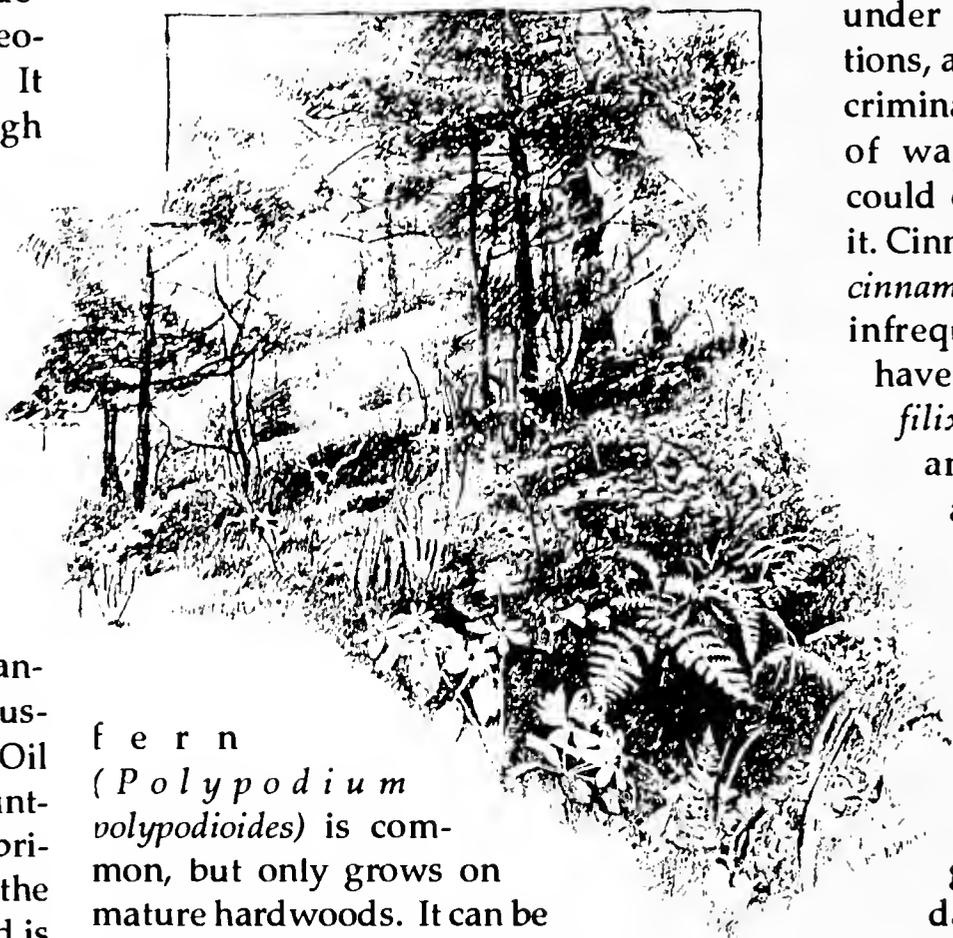
Growing Ferns in Southwest Mississippi

SAMUEL TUMEY, LIBERTY, MS.

The southwest corner of Mississippi, bordered on two sides by Louisiana, with a colonial history that long predates the founding of the present nation forms part of a region denominated by the Mississippi Geologic Survey as the Piney Woods. It consists of an endless series of high ridges of red sandy clay, with an underlying layer of gravel, interspersed with swampy valleys drained by small slow-running rivers. Once it was covered with long-leaf pine and within living memory, this land was intensely cultivated, then, when milk price support was in vogue, devoted to pasture. It is now largely reforested, partially by managed forestry practice and partially by abandonment. The forest products industry is by far the major industry. Oil and gas production and lease of hunting rights to outsiders are also primary sources of revenue. Unlike the Pacific Northwest, the timberland is largely privately owned and divided into small tracts, and as a result, there is little tension between the conservationists and timber interests. Because of the mild climate and the rapid growth of both timber and indigenous flora, such clear cutting as is done is rapidly regrown. The ferns native to this area, though few in number of species, are generally well adapted to present timber management practices and are so widespread as to be generally ignored by the local population.

Our ferns must be able to withstand a combination of mild wet winters punctuated by occasional severe

freezes, early springs followed by frosts in mid-March, random assortments of moist or drought-stricken summers and warm, dry fall weather lasting until December, often accompanied by brushfires. The list of native ferns is brief, reflecting the difficulties of accommodating to the transition zone between temperate and subtropical. The resurrection



fern (*Polypodium volypodioides*) is common, but only grows on mature hardwoods. It can be admired in the woods but is not subject to cultivation. Christmas ferns (*Polystichum acrostichoides*) are common on dry hillsides. What we call the marsh fern (*Thelypteris kunthii*) appears in several varieties along streambeds, around old houses, and in flower gardens. The common variety will reach 50 centimeters under ideal conditions. There are other strains which are less common, including one which displays a waxy "bloom" when pressed and one with characteristic reflexed "ears" at the base of the frond. Chainfern (*Woodwardia areolata*) is common in marshy areas, as are royal fern (*Osmunda regalis*) and sensitive fern

(*Onoclea sensibilis*). Ebony spleenwort (*Asplenium platyneuron*) is ubiquitous. There is one species of grapefern (*Botrychium dissectum*) found in undisturbed woods. Bracken (*Pteridium aquilinum*) is largely limited to unmolested roadsides, and oddly enough, may be our only native fern which is in danger of disappearing. Since bracken doesn't ordinarily produce spores under our climatic conditions, an outbreak of indiscriminate spraying of rights of way with herbicides could effectively eliminate it. Cinnamon fern (*Osmunda cinnamomea*) is present but infrequently found. We have lady fern (*Athyrium filix-femina*), both red and green stemmed, and *Thelypteris torresiana*, which apparently has no common name. There is also the Japanese climbing fern (*Lygodium japonicum*) which grows in such abundance as to approach the level of a nuisance.

These thirteen constitute our entire fern inventory.

My Fern Preserve consists of approximately an acre of mixed pine and hardwood on what was once my grandfather's farm. It was pasture during my father's childhood and was planted in cotton as recently as the early nineteen fifties. The mature pines and younger hardwoods provide protection from the summer sun, but younger ferns must be watered during unusually dry summers. Beds are prepared by piling up compost piles of raked leaves and rotted tree trunks. (Unfortunately, these latter

are available in abundance due to an infestation of southern pine beetles in 1986. We have thousands of dollars worth of dead pines which are now being recycled into mulch piles). After about two years of rotting in place, the mulch pile is mixed with a modest amount of sand and gravel and commercial top soil. Soil preparation is necessary even in the woods. The roots of the young ferns have difficulty establishing themselves in the bare soil. The baby ferns are covered with plastic soft drink bottles for several months and watered as necessary during their first summer. (About those plastic bottles — No, I am not trashing the forest. The bottles don't go anywhere and are used over and over again. Also they are cut in such a manner that no sensible animal or bird could possibly get caught in one.) The beds have to be surrounded by chicken wire "fences" to keep out armadillos. They will dig up any freshly disturbed earth and can spot a prepared bed for up to a year, presumably by smell. Any fern planting left unprotected will invariably be dug up. But the armadillo's weakness is that he leads with his snout. He never goes over anything, only under. If you surround your beds with a foot high fence of chicken wire with another foot of horizontal skirt folded to the outside and anchored with bricks or logs the armadillo is stymied. If he can't pry the wire up, he will give up. Deer and rabbits are a problem only with cinnamon ferns, but they will devour almost any wildflower.

Our original objectives in establishing a "Fern Preserve" were somewhat murky. We simply wanted something interesting to look at while walking in the woods. Because they are easy to propagate in quantity from spores and, once established,

require no maintenance, ferns were an obvious choice. The availability of unusual species from the Spore Exchange was another factor. In time, our philosophy evolved with our experience in fern cultivation. There are those whose aim is to acquire a large variety of different species, even at the expense of considerable expenditure of time and effort in providing the necessary conditions. Ordinarily such a collection will serve its purpose if only a few specimens of each species are available.

Being limited to weekend work without hired or volunteer help, we have taken a different approach: The habitat is fixed. Suppose we take a few species of temperate ferns which are not native to our region, but which, being widely distributed, do not appear to be too highly specialized. To what extent can we persuade the progeny of these plants to naturalize and adapt to our local conditions? "Success" can be measured in three stages. First a fern has to be able to live in its new home without assistance. Second it should show signs of prosperity. It should grow large healthy fronds, form spores, reproduce vegetatively if that is its ordinary habit. The third and final test, the standard for becoming native, so to speak, would be for the species to begin to propagate itself by spores, seeking out new habitats, confounding the botanists of the next millennium.

It is necessary to digress here for a moment. The author is not a geneticist — this is philosophy, not science. But consider the world of ferns, featuring very few widely distributed cosmopolitan species. The USDA weed book for the southeast lists only one fern, bracken. The rest are fragile, delicate, limited in some inscru-

table manner to the most carefully selected habitats, at evolutionary dead ends, most of them. And yet we know their lineage is incredibly ancient. Every species must still carry the genes of some ancestor which adapted and thrived, weathering adversity without complaint. Examine the (haploid) chromosome numbers of ferns and you find numbers in forties, fifties, sixties, eighties. By contrast, look at flowering plants and you find predominantly low numbers. The family *Compositae*, with some exceptions, has nine, give or take a few. Is it unreasonable to assume that our ferns got to where they are from where they have been by adding rather than shedding chromosomes? If so, is it unreasonable to speculate that within the complex genetic systems that make up highly specialized ferns lurks the blueprint for the original hard-living tough as nails progenitors. If so why have not generations of nurserymen coaxed those genes out into the open, sliced off the overlay of promoters and inhibitors that form the baggage of eons of specialization? Because it would not enhance the appearance of the plant. Unless there is a public clamoring for ferns which will grow in sunbaked concrete sidewalks, there is no money in it.

But back to earth. We need not search long to find problems with any project designed to put such a theory into practice. Is it not likely that the genes we seek, even if still present, are irrevocably altered or masked beyond any effort at retrieval? Probably. Our first effort at selection must be limited to rearrangement of chromosomes. We can select the most vigorous plants from a collection of spores in the hope that the optimum combination of chromosomes, or at least most of the opti-

mum combinations, will be retained. In print it sounds a vain prospect, but it is the way farmers have improved their herds for thousands of years. Unfortunately, ferns have a tendency to clone themselves, putting an end to chromosome manipulation after a couple of generations. We would have to maintain a parallel series of selections, randomly crossing them back and forth every generation (taking into account all the difficulties involved in artificially inseminating ferns) to avoid cloning, and even this would quickly lead to stagnation. Obviously we are going to have to depend on mutations somewhere down the line. Nursery growers have

to work with thousands of specimens, but they are attempting to develop unnatural and useless traits out of whole cloth. All we need is a little improved root growth, improved metabolism, more heat tolerance—turn a gene off here, turn one on there. In other words, the mutations we seek are survival related rather than consumer related. They should be easier to obtain and to spot.

What is the ordinary rate of mutation, and how many thousand years would it take to see any discernible change in our ferns? Who knows? But consider: An agricultural school in Mexico grew a minicow in ten generations or so simply by selecting the runt of the herd each season. According to the *Merck Manual*, there

are numerous mutation-driven birth defects in humans which occur once in each thousand births. It seems reasonable that mutations should occur frequently enough in a plant with thirty or more chromosomes that every sporeling would be a little different from the others. With a million dollar grant and a stable of graduate students we could find out. Some of the readers of this article could probably provide a ballpark figure off the top of the head. Even then, all the empirical data about mutation rates would not answer the practical question whether or not some species might be able to make sufficient genetic adjustments to

adapt to small changes in habitat. The answer must ultimately be remanded to a gardener for arbitration.

Then, again, with another grant and a little genetic engineering technology, we could just create the characteristics we want and not worry about cloning or back-crossing or anything. But we would miss all the exercise and fresh air.

It would be gratifying to report that we have grown the primeval superfern in our woods, but mostly we just got a lot of exercise and fresh air. There have probably been more

cusswords uttered in these woods than when my grandfather was plowing his mule. But there have been some interesting and illuminating surprises:

Athyrium pycnocarpon. This was one of our first subjects. Our first plants came from a nursery up North. They have survived for ten years but refused to produce spores. Then we obtained another set from a nursery in Tennessee erroneously labeled "Cinnamon Fern." These have thrived and produced spores almost every year. We now have a second generation consisting of forty or fifty plants. These do not appear to require any further tweaking of their genes in order to feel at home here.



Broad beech fern



Ebony Spleenwort. *Asplenium platyneuron*

Athyrium thelypteroides. The silvery spleenwort is the only introduction which has taken off like a weed without any selection at all. It is not listed in the Mississippi flora but has been reported in Tangipahoa Parish Louisiana just to the south of us. We found our specimen in a twelve foot ravine during the drought summer of 1985 when the water normally flowing across the bedrock had dried up, allowing us to climb down and examine the unusual ferns we had observed at the bottom. We took several specimens indoors and pampered them to produce spores, then grew a new generation. We now have silvery spleenworts coming up from spores everywhere, so much so that they already have to be occasionally removed as a nuisance. *A. thelypteroides* appears to have been effectively added to the flora of Amite County.

Asplenium platyneuron. Not much you can do with ebony spleenwort except just watch it grow. We have a project to see if we can grow a record size specimen that we can call *giganteum*. The selected plants are in the third generation but no results are available because the plants take a number of years to reach full size in the woods. We just take the best looking plant every two or three years and grow up another batch from spores.

Asplenosorus x ebenoides. Spores of this hybrid are now available from the Spore Exchange. However, the original specimen which gave rise to our population was purely serendipitous. It appeared spontaneously among failed cultures of other species. Unfortunately, no record was kept as to what culture the specimen appeared in, so it was not possible to

Asplenium ruta-muraria. The wall-rue is never going to become a native of Southwest Mississippi, and we have only three specimens, but we are quite proud of those three troopers. We grew them from spores obtained from the Spore Exchange. The young ferns were transplanted to a specially prepared bed with lime added and small chunks of concrete driven into the soil. Down here you can't just place rocks on top of the soil. Slugs will hide under the rocks and will come out and eat the ferns. The rocks or chunks of concrete have to be buried tightly to avoid leaving hiding places for hungry critters.

contact the donor and obtain the full story. These plants are quite vigorous and require no special soil preparation or care. The original survived being uprooted and partially devoured by the Family Cat and has given rise to forty or fifty young *asplenosoruses*. They continue to produce fertile spores from one generation to the next. And, yes, we have checked the identification quite carefully. If it isn't Scott's spleenwort, it's something that looks just like it.

Adiantum spp. The maidenhairs are native to the far northeastern corner of Mississippi in the area known as the Tishomingo Hills, which are limestone foothills of the Appalachians. Down in our part of the state, they will grow quite nicely in a bed laced with garden lime, but no amount of natural selection will ever induce them to grow in our native soil. We just keep them as pets.

Blechnum penna-marina. This genus is not represented in our area, being native to New Zealand. It proved to be a poor choice and died off during one of those sudden hard freezes to which we are prone in the early spring.

Botrychium virginianum. We have been unable to grow specimens of rattlesnake fern purchased from various nurseries. These sprout feebly for one or two years and disappear. This species is indigenous to the southeastern part of the state, and a related species, the grape fern, *Botrychium dissectum* is native here. We do not have a good explanation for our inability to grow rattlesnake ferns. Inability to grow rattlesnake ferns from spores would make this an unsuitable subject for adaptation in any case.

Cheilanthes alabamensis. The Alabama lipfern is the only *Cheilanthes*

which we have been able to grow. The difference is that this species is glabrous rather than hairy, an adaptation which it has already made to the humid climate of the Southeast. Our ferns have been developed from one specimen out of a population of thirty or forty grown from spores. It appears to have possessed an adaptive trait which the others lacked and which it passed on to its spore-grown descendants. All the remaining plants died during the first year after transplanting while this particular specimen grew luxuriantly and produced large quantities of spores, thus providing at least some support for our theory. We now have a third generation in the ground and growing this spring.

Dryopteris goldiana. We obtained spores of Goldie's fern in 1984 as something of a lark. It was presumed that this species would prove delicate and difficult or impossible to cultivate. In fact it can be grown here with very little trouble, although it does not flourish in the manner of the mountains of Tennessee. At present we are beginning to cultivate a second generation grown from spores of one plant which survived the drought years of 1985 and 1986 without assistance and was still hanging onto a dry hillside (admittedly the north side) in 1990. Goldie's fern is reluctant to produce spores in the dry summer weather. Therefore, after the parent fern is selected, it is brought inside and pampered with humidity and frequent watering whereupon viable spores are almost immediately forthcoming.

Dryopteris marginalis. Marginal woodfern has proved easy to grow and forms spores almost every year. We are growing a second generation from a select individual, but, because this is not a particularly challenging

or interesting species, it has received a low priority in the allocation of time and space. *D. marginalis* does have one odd trait. The, presumably, mature spores collected on a sheet of paper in the usual manner are invariably infertile, whether sterile or dormant is not clear. However, the spores clinging to the ruptured sporangia scraped off the bottom of the leaves germinate quite readily.

Matteucia struthiopteris. We have attempted several times to grow ostrich fern both from spores and from nursery plants but without success.

Osmunda claytonia. We have had little success with the interrupted fern. Specimens purchased from a nursery die after one year but produced spores which we were able to germinate. However, the young plants did not fare well either. Five years later we are down to one plant which we are attempting to protect, but its future does not appear promising.

Pellaea atropurpurea. Our purple cliff-brake came to us by way of Germany and a major seed company, which for liability purposes shall remain nameless. It is a fact that fern spore packets sold by all the major seed companies tend to be worthless. In this case, we had ordered Boston Fern spores just to have a little fun. Ordinarily we don't bother with ornamentals. The package which came back was labeled "Product of West Germany" and contained no Boston Fern spores at all but did produce several specimens of purple cliff-brake. This species has taken to our woods with relish and requires no lime. It prefers to grow on the side of a bank but will transplant anywhere. We have not observed a single planting which has faltered or died out. The plants are producing viable

spores, but we are not aware of any new ferns propagated to natural dispersal of spores outside the prepared beds. This is another example of the advantage of ignoring the advice of the published literature. From the descriptions of this plant's growing requirements, we would have assumed that it was impossible to grow and would have never attempted to cultivate it.

Rumohra adiantiformis. Leatherleaf ferns, ordinarily considered a non-hardy species, were grown from spores collected from floral arrangements. After ten years we have one or two specimens out of about twenty which have survived winter temperatures as low as zero degrees. No effort has been made yet to grow a second generation from these plants.

Thelypteris hexagonoptera (*Phegopteris hexagonoptera* - Ed.) This species does not appear in our area but was reported in the 1920's by the State Geologic Survey in neighboring Franklin County, forty miles to the north. We have since located colonies in Franklin County ourselves. These appear on steep ridges together with other native species such as the cowcumber, trillium, and jack-in-the-pulpit, which indicates the ridges were impossible to cultivate by mule in earlier times and retained some of the native plantlife. By contrast, every inch of our land was once cultivated. The broad beechfern was grown from spores in 1984 and has been easily transplanted to the woods. We now have several colonies which are well established. One of these colonies began with one plant and now covers several square feet. This species is quite vigorous and invasive. It should be segregated when any group planting is laid out.

Thelypteris noveboracensis. The New York Fern was obtained from a nursery, mislabeled as hayseed fern, *Dennstaedia punctiloba*. It was easily cultivated and reproduced by rhizomes. In mild summers, plentiful spores are produced. However, these spores are always sterile. We have been unable to grow New York Fern from spores, but it is well adapted and has formed a thriving colony without further selection. This is another traveler and will choke out your more valuable ferns if you don't watch those rhizomes.

Thelypteris palustris. This fern was obtained from the Spore Exchange and its identification has been accepted as correct, but since it has never produced spores, we can not state with certainty whether it is correctly identified. While the Marsh Fern is apparently common to other areas, it does not occur here. This fern has regularly reappeared every spring for ten years, producing healthy, although smallish fronds (about 15 cm in height), but showing little tendency to spread. All fronds are sterile. This colony appears able to hold its own but shows no indication that it will propagate.

Thelypteris phegopteris. (*Phegopteris connectilis* - Ed.) We have been unable to grow the narrow beechfern. For several years after transplanting, it produced fiddleheads in early spring but withered in summer and eventually failed to return the next year.

Woodsia obtusa. This is the only *woodsia* which we have been able to grow with any success. We are in the third generation of attempts to select among specimens which seem more able to accommodate our conditions. So far there is little reason for encouragement, although we hope the

sporelings transplanted this spring may show a little more vigor. All the original plants from which we began selecting have now died. This species appears to give us our best test as to whether ferns can be acclimated to their habitat over a time scale measurable in terms of a human lifetime. With this fern we can actually record some qualitative results in the form of the average number of years of survival and see whether viability has gone up.

Woodwardia virginica. The Virginia chain fern was obtained as nursery stock and spreads by rhizomes but does not produce spores. While the colony is enlarging, the plants themselves are not particularly impressive. They seem to be constantly under some form of stress. It might be possible to obtain spores to begin genetic selection by bringing a plant indoors, but this species has a low priority for the present time.

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Samuel Tumey amongst his ferns

Biographical Sketch of Sam Tumey

BY SAM TUMEY

I was born in Mississippi in 1948 and obtained a pharmacy degree from the University of Mississippi in 1971. After graduation I served almost four years in the United States Air Force repairing B-52's and F-4 Phantoms and had an opportunity to see the end of the Vietnam War up close. In 1976 I returned to Ole Miss to obtain a Master's in Pharmacognosy (natural products chemistry). When it became obvious that I was not born to be a chemist I moved across the Grove to Law School, and now have a small town general law practice ranging from land disputes to criminal trial work. I am married to the county 4-H Agent, and we have no children other than a big furry cat named Ralph. I am writing a novel dealing with the dark side of family history and the confluence of fantasy and reality.

Bartholomew's Cobble and the Norcross Wildlife Sanctuary, Massachusetts

CATHARINE W. GUILLES

"A cobble is a rocky hillock, or stone island, rising from the alluvial bottom lands. Actually hereabouts it is a peak of the underlying limestone which has survived the wearing down and burying process. Almost invariably it has many steep, or even precipitous rock faces, and is a natural rock garden, especially rich in ferns."

Walter Pritchard Eaton, *Wild Gardens of New England*, 1936

The topic of this article was suggested by Editor Sue Olsen, who greatly regretted the cancellation of the Fall 1992 Fern Foray in New England. Bartholomew's Cobble in Ashley Falls, Massachusetts, was to have been one of the stops. The above quotation perfectly describes a naturally formed cobble and in my researches, I learned of another nature preserve in Massachusetts, The Norcross Wildlife Sanctuary, which contains two man-made cobbles that create the conditions needed by the limestone-loving plants at Bartholomew's Cobble.



Bartholomew's Cobble. Photo by Catharine W. Guiles

Bartholomew's Cobble

Bartholomew's Cobble—named for a farmer who once owned the property—is located in southwestern Massachusetts less than a mile from the Connecticut line. It is bordered by the winding Housatonic River and by fields that once were pastures. Eaton, in his quotation above, refers to the limestone which is characteristic of New England's cobbles, but actually, the cobble is composed of marble and quartzite. The marble is the source of the alkaline soil which creates an appropriate habitat for some of the Cobble's most unusual plants; the quartzite acidifies other locations on the reservation and thus contributes to the location's great botanic variety. The highest of the cobble's two knolls rises 100 ft. above the river.

Since 1946, The Bartholomew's Cobble, 254 acres in all, has been a property of Massachusetts' Trustees of Reservations, an organization founded in 1891 by Charles Eliot, whose father, Charles W. Eliot, was the president of Harvard University. Then only 31 years of age, the younger Eliot, who later worked with Frederick Law Olmstead, "proposed the establishment of an organization 'empowered to hold small and well distributed parcels of land...just as the Public Library holds books and the Art Museum pictures for the use and enjoyment of the public.'" Toward this end, the Trustees of Reservations was founded a year later. (Interestingly, this organization founded by Boston Brahmins antedates Britain's famous National Trust for Places of Historic Interest or Natural Beauty by four years!) The National Park Service recognized the uniqueness of Bartholomew's Cobble in 1971, when it was selected as a National Natural Landmark.

To get down to the business of ferns, the Cobble's literature lists 53 ferns and fern allies. The most unusual—those that fern enthusiasts like myself have travelled miles to see—grow on the cobble itself. These limestone lovers are the maidenhair spleenwort, the ebony spleenwort, the bulblet fern, the walking fern, wall rue, and the purple-stemmed cliffbrake. A great rarity is Scott's spleenwort, the hybrid of the ebony spleenwort and the walking ferns. According to Eaton, some years he would find it at the Cobble; others, it would be absent.

Other ferns found along the trails include the standard regional offerings: the ostrich fern, the interrupted fern, the

lady fern, the narrow-leaved spleenwort, Goldie's fern, the evergreen wood fern, and the maidenhair fern. A list of the ferns and fern-allies there appears at the end of this article.

For the visitor from the southern and western states who comes to New England, particularly in spring, Bartholomew's Cobble offers a great range of wildflowers. First to appear is probably bloodroot, and later several species of trillium and columbine. Each month offers something new until asters announce the fall. Not surprising, the Cobble is also a mecca for bird lovers.

The Norcross Wildlife Sanctuary

In searching for additional information on Bartholomew's Cobble, I found, in the Handbook on Ferns published by the Brooklyn Botanic Garden, reference to The Norcross Wildlife Sanctuary in Wales, Massachusetts. This site is also on the Massachusetts-Connecticut line but is further east and is convenient both to Springfield and Worcester. I have not visited it; however, judging from their attractive brochures, it must be a very interesting site for all plant lovers.

This sanctuary was founded in 1939 and covers 3,000 acres. As their guide states, "...varying terrains and moisture conditions permit the creation of naturalistic, informal 'gardens' for a wide variety of plants. An interesting project has been the introduction of plant life not native to the area and the simulation of conditions in which such plants thrive. Plants growing (there) are native to the Eastern Seaboard from the Carolinas to Canada." For example, the Norcross Sanctuary offers a cedar swamp, a pine barren garden, hickory and conifer groves and other features.

One interesting feature of the Norcross Sanctuary is a man-made lime cobble which serves as a home for many of the same ferns available at Bartholomew's Cobble. Again, I refer the reader to the list at the end of this article. For ambitious gardeners who would like to construct their own cobble, the Norcross Sanctuary staff kindly gave permission to reprint instructions for doing so. These are also found at the end of the article.

Thus, whether the visitor to Massachusetts is spending time in the western part of the state—in the lovely Berkshire mountains—or is perhaps traveling in the central part of the state, these two nature sanctuaries offer the opportunity to see unusual collections of ferns and other plants.

In closing, I would like to offer thanks for their valuable help to Don Reid, Warden/Naturalist of Bartholomew's Cobble, and Jane Plumley, Assistant Propagator, The Norcross Wildlife Sanctuary.

Mailing Addresses:

Bartholomew's Cobble, The Trustees of Reservation, Western Management Region, Box 792, Stockbridge, MA 01262.

The Norcross Wildlife Sanctuary, 30 Peck Rd., Monson, MA 01057.

Literature consulted in the preparation of this article:

Brochures and plant lists from Bartholomew's Cobble and The Norcross Wildlife Sanctuary.

Handbook on Ferns (Special Edition of Plants and Gardens, Vol. 25, No. 1), Helen S. Hull, Guest Editor. Brooklyn, NY: Brooklyn Botanic Garden, 1976.

Lellinger, David B., A Fern Manual of the Ferns and Fern-Allies of the United States and Canada. Washington, DC: Smithsonian Institution Press, 1985.

Payne, Rolce R., "Banking Land," House and Garden, September 1987 (Vol. 159, No. 9), pp. 56-57, 62.

Fern List

Ferns and fern-allies found at Bartholomew's Cobble (BC) and The Norcross Wildlife Sanctuary (NS). Note: The Bartholomew's Cobble list dates from 1981, and some of the identifying names have been revised to correspond with those of Lellinger (1985). The Norcross Sanctuary's list is based on Gray's Manual of Botany (1987) and Hortus III (1976). An asterisk indicates that the identification was unclear.

Fern List

<i>Adiantum capillus-veneris</i>	Southern Maidenhair	NS
<i>Adiantum pedatum</i>	Maidenhair fern	BC, NS
<i>Asplenium pinnatifidum</i>	Lobed spleenwort	NS
<i>Asplenium platyneuron</i>	Ebony spleenwort	BC, NS
<i>Asplenium ruta-muraria</i>	Wall rue	BC, NS
<i>Asplenium trichomanes</i>	Maidenhair spleenwort	BC, NS
<i>Asplenosorus x ebenoides</i>	Scott's spleenwort	BC, NS
<i>Athyrium filix-femina</i>	Lady fern	BC, NS
<i>Athyrium pycnocarpon</i>	Narrow-leaf spleenwort	BC, NS
<i>Athyrium thelypteroides</i>	Silvery glade fern	BC
<i>Botrychium dissectum</i>	Lace-frond grape fern,	BC
<i>Botrychium matricariifolium</i>	Daisy-leaved moonwort	BC
<i>Botrychium multifidum</i>	Leathery grape fern	NS
<i>Botrychium oneidense</i>	Blunt-lobed grape fern	BC
<i>Botrychium virginianum</i>	Rattlesnake fern	BC, NS
<i>Camptosorus rhizophyllus</i>	Walking fern	BC, NS
<i>Cheilanthes lanosa</i>	Wooly lip fern	NS
<i>Cryptogramma stelleri</i>	Slender rock brake	NS
<i>Cystopteris bulbifera</i>	Bulblet fern	BC, NS
<i>Cystopteris fragilis</i>	Brittle fern, Fragile fern	BC
<i>Cystopteris protrusa</i>	Eastern brittle fern	NS
<i>Cystopteris tennesseensis</i>	Tennessee bulblet fern	NS
<i>Dennstaedtia punctilobula</i>	Hay-scented fern	BC, NS
<i>Dryopteris carthusiana</i>	Toothed wood fern, Spinulose wood fern	BC, NS
<i>Dryopteris cristata</i>	Crested wood fern	BC
<i>Dryopteris filix-mas</i>	Male fern	NS
<i>Dryopteris goldiana</i>	Goldie's fern	BC, NS
<i>Dryopteris intermedia</i>	Fancy fern, Evergreen wood fern	BC
<i>Dryopteris marginalis</i>	Marginal wood fern	BC, NS
<i>Dryopteris x boottii</i>	Boott's wood fern	BC
<i>Dryopteris x dowellii</i>	Dowell's wood fern	NS
<i>Dryopteris x triploidea</i>	Triploid wood fern	BC
<i>Gymnocarpium dryopteris</i>	Oak fern	BC, NS
<i>Lygodium palmatum</i>	Hartford fern, Climbing fern	NS
<i>Matteuccia struthiopteris</i>	Ostrich fern	BC, NS
<i>Onoclea sensibilis</i>	Sensitive fern	BC, NS
<i>Ophioglossum pusillum</i>	Northern adder's tongue fern	BC
<i>Osmunda cinnamomea</i>	Cinnamon fern	BC, NS
<i>Osmunda claytoniana</i>	Interrupted fern	BC, NS
<i>Osmunda regalis</i>	Royal fern	BC, NS
<i>Pellaea atropurpurea</i>	Purple cliffbrake	BC, NS
<i>Phyllitis scolopendrium</i>	Hart's tongue fern	NS
<i>Polypodium virginianum</i>	Rock polypody	BC, NS
<i>Polystichum acrostichoides</i>	Christmas fern	BC, NS
<i>Polystichum braunii</i>	Braun's holly fern	NS
<i>Pteridium aquilinum</i>	Bracken fern	BC, NS
<i>Thelypteris hexagonoptera</i> (<i>Phegopteris hexagonoptera</i>)	Broad beech fern	BC, NS
<i>Thelypteris hispidula</i>	Hairy maiden fern	NS
<i>Thelypteris noveboracensis</i>	New York fern	BC, NS
<i>Thelypteris palustris</i>	Marsh fern	BC, NS
<i>Thelypteris phegopteris</i> (<i>Phegopteris connectilis</i>)	Long beech fern	BC, NS
<i>Thelypteris simulata</i>	Massachusetts fern	BC, NS
<i>Trichomanes spp.*</i>		BC
<i>Woodsia ilvensis</i>	Rusty cliff fern, Rusty woodsia	BC
<i>Woodsia obtusa</i>	Blunt-lobed woodsia	BC
<i>Woodwardia areolata</i>	Netted chain fern	NS
<i>Woodwardia virginica</i>	Virginia chain fern	NS

Fern Allies

<i>Equisetum arvense</i>	Field horsetail	BC
<i>Equisetum fluviatile</i>	Swamp horsetail	BC
<i>Equisetum hyemale</i>	Scouring rush	BC, NS
<i>Equisetum variegatum</i>	Variiegated scouring rush	BC

Lycopodium clavatum
Lycopodium complanatum
Lycopodium digitatum
Lycopodium lucidulum
Selaginella apoda
Selaginella rupestris

Staghorn clubmoss
Northern running pine
Fan clubmoss
Shining clubmoss
Meadow spikemoss
Rock spikemoss

BC
BC
BC
BC
BC
BC

How to Build a Cobble for Lime-Loving Rock Ferns

COURTESY OF THE NORCROSS WILDLIFE SANCTUARY

Norcross Wildlife Sanctuary
Monson, Massachusetts

The lime-loving rock ferns are fascinating little plants and a cobble to accommodate them is an interesting addition to any wild garden. The newest one at Tupper Hill is 75 feet long and 16 feet deep, but a lime cobble can be made any size at all, even small enough to fit into the home garden.

LOCATION

The ideal location is at the toe of a slope so that moisture will seep down from the top. The best slope is a three-and-one-grade. That is, it rises one foot for every three feet in from the toe.

EXPOSURE

Exposure must be as due north as possible.

MATERIALS

The materials needed are lime soil and field lime stones or rocks. The stones should be as porous as you can obtain. The soil can be made by mixing two parts good garden loam, one part humus and one part lime talus.

PREPARATION

To prepare the slope take off most of the top-soil and any vegetation except for a few trees which can be left to provide shade. The trees can be thinned out later as the new plantings become established and more light is needed.

Spread the lime soil mixture to a depth of at least six inches and work hydrated lime into it very thoroughly. Use about one half pound of the hydrated lime to every two yards.

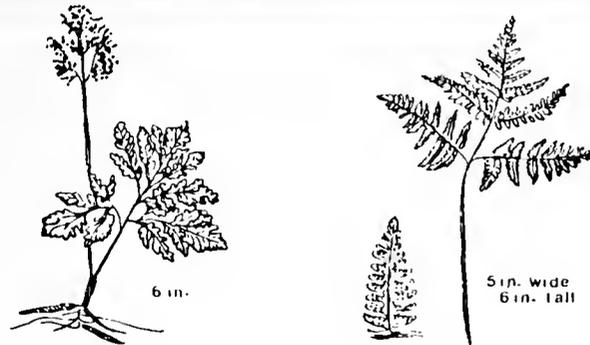
Set the lime stones firmly into the soil so that they will not heave in frost action.

With the new soil and stones in place, leave the cobble alone for a year so that the ground establishes its own moisture level.

PLANTING

Lime-loving ferns such as Ebony Spleenwort, Walking-leaf Fern, Maidenhair Spleenwort and the Cliff Brakes can be obtained from wildflower nurseries. Plant them around the stones and in the crevices. An important point to remember when transplanting small rock ferns is to give them twice as much soil to grow in as they seem to require in the wild.

Once the cobble is planted it should be watered twice a week until the plants are established and until you are sure that the water seeping down from the top of the slope is keeping the ground moist to a depth of four inches.



LEATHERY GRAPEFERN

OAK

Line drawings courtesy of The Norcross Wildlife Sanctuary.

Polystichum Deltodon Po-lis'-ti-kum delt-o-don

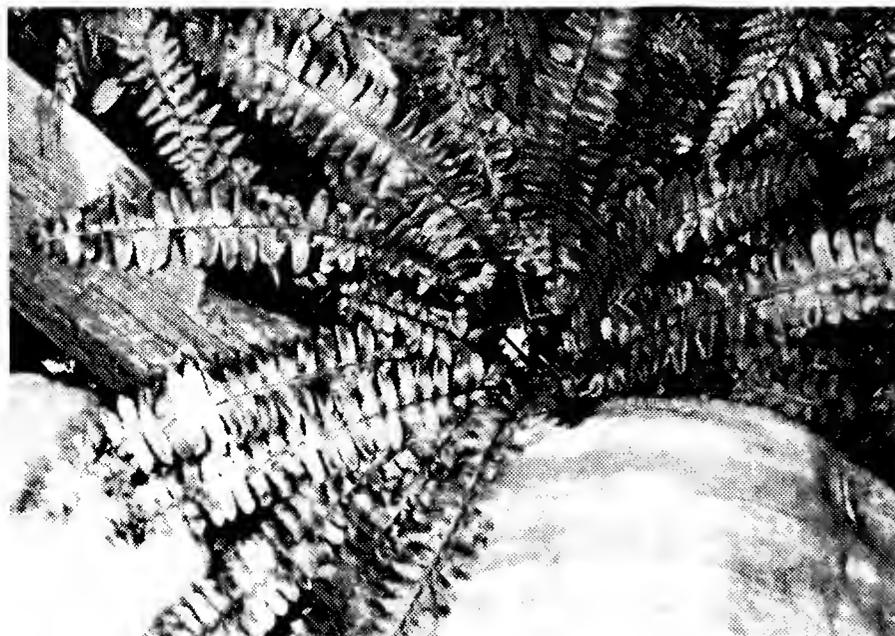
JAMES R. HORROCKS,
SALT LAKE CITY, UTAH

Polystichum is a Greek word meaning "many stitches" which describes the linear pattern of sori. The species name "deltodon" is translated "triangular tooth", no doubt referring to the auricles of each pinnae which are not as pronounced as in some other *Polystichums*. This fern is a rather rare little gem which enjoys being planted near large rocks as well as in open ground. The fronds, up to 15 inches long, are evergreen and rather narrow in width, up to 2 inches wide in favored specimens. The fronds remain the same width along most of the blade. A full grown specimen will produce from 10 to 14 fronds in the spring followed by 4 to 6 more about midsummer. *Polystichum deltodon* is native to China, Formosa, Japan, and the Phillipines. It is considered rare in Japan. It's habitat is stream banks and rocky hillsides, especially among calcareous rocks. It might possibly be confused with *Polystichum lonchitis* although the differences become apparent when compared. The distinctly narrow fronds of *Polystichum deltodon* and the pattern of the sori make it rather easy to distinguish.

Description: The rhizome is stout, erect to somewhat ascending, densely clothed with basal stubs of old stipes. The fronds are tufted; the stipes from 2 to 5 inches long, straw-colored, sparsely scaly, the scales membranous, pale brown and lanceolate, often tapering with a long tail-like tip. The blades are linear-lanceolate, from 6 to 15 inches long and from 1 to 2 inches wide, acuminate to elongate-

acuminate, once-pinnate with 15 to 30 pairs of pinnae. The texture is firmly chartaceous—that is, like parchment. Each pinna is from 1/2 to 3/8 inches wide. The pinnae are smooth and somewhat glossy above, thinly scaly beneath, sessile obtuse to abruptly acute, spine-toothed and bristly at the tip. The anterior side is nearly straight across, truncate at the base and auricled, narrowly cuneate or wedge-shaped on the posterior side at the base. The sori are found on the apical and anterior side of the pinnae, a distinction where they differ from most other once pinnate *Polystichums* such as *P. lonchitis* and *P. munitum* which have sori on both

ter with about 8 to 10 inches of snow cover. The fronds remain green through the winter if protected. Unfortunately, it is agonizingly slow from spore, as Sue Olsen and I can well attest. Two sporelings in my possession that are now 4 years old are but 2 inches high and still growing under glass. Being this difficult, it has obviously not been readily available from nurseries. My original specimen was "smuggled" into this country in a "baggie" by a friend all the way from Japan and still grows where it was planted 9 years ago. It is a unique addition to the fern garden, if you can find it, and is quite easy to grow.



Polystichum deltodon. Photo by Kim N. Durrant, S.L.C., Utah

the anterior and posterior parts of the pinnae. The sori are closer to the margin than the midvein. The indusia are thin, orbicular and jagged.

Culture: This well-behaved little garden gem has unfurled its quaintly narrow fronds in the author's garden since 1984 and is still thriving. The soil, which should be kept damp, may be circumneutral to alkaline. This fern is a limestone lover, but enjoys the large piece of slate it is adjacent to in my garden. It has survived extreme cold, 30° below zero here during the atrocious '91-'92 win-

References:

Flora of Japan (1965) Jisaburo Ohwi. Smithsonian Institution, Washington, D. C.

Ferns and Fern Allies of Japan (1992) Edited by Kunio Iwatsuki. Heibonsha Ltd., Publishers, Tokyo.

The Japanese Pteridophyta (1975) Motozi Tagawa, Heikusha Publishing Company LTD, Osaka

Special Thanks to Kim Durrant, who has photographed many of my ferns and whose work will appear in future articles.

Growing Ferns in Southwest Mississippi *continued from page 9*

And there you have it. It will soon be twenty years since we first gained access to our "Fern Preserve", ten years since we began growing ferns in the woods. In that time middle age has caught up with us. We no longer want to work as hard as we used to. We find that we want to sit by the fire in winter and in the air conditioning in summer. We find ourselves telling stories about how we used to go out to the woods in mid-winter and how we used to cut brush in the hot summertime. There are more and more reasons not to go to the woods at all. And there are worse things down the road, Lyme disease, African bees,

government confiscation of woodpecker habitat, sensitization to poison ivy. In the early spring when the dogwoods bloom and the first fiddleheads pop up among the trilliums, then we find ourselves going over in the mind's eye where the new fern bed will have to be and how next time, we will literally set out hundreds of baby ferns to cover the entire hillside, and how we need to get some new species from the spore exchange which we haven't tried yet. But by summer our enthusiasm will have waned again. There are a few more species which we want to try. One in particular is the Louisiana

Woodfern *Dryopteris ludoviciana*, which, in theory is supposed to be native to the Southeast, but which most of us have never seen. We might also try to get some of the less common species of *Asplenium*. We will continue to work with the ferns that show some inclination to survive and prosper. But the project is winding down. Someday soon, most of these ferns are going to be on their own, to either form subspecies in their own right and replenish the earth with their progeny or to go gently into the dark night. In truth it has been their project and the choice has always been theirs, not ours.

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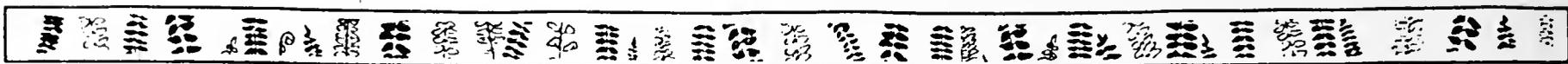
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