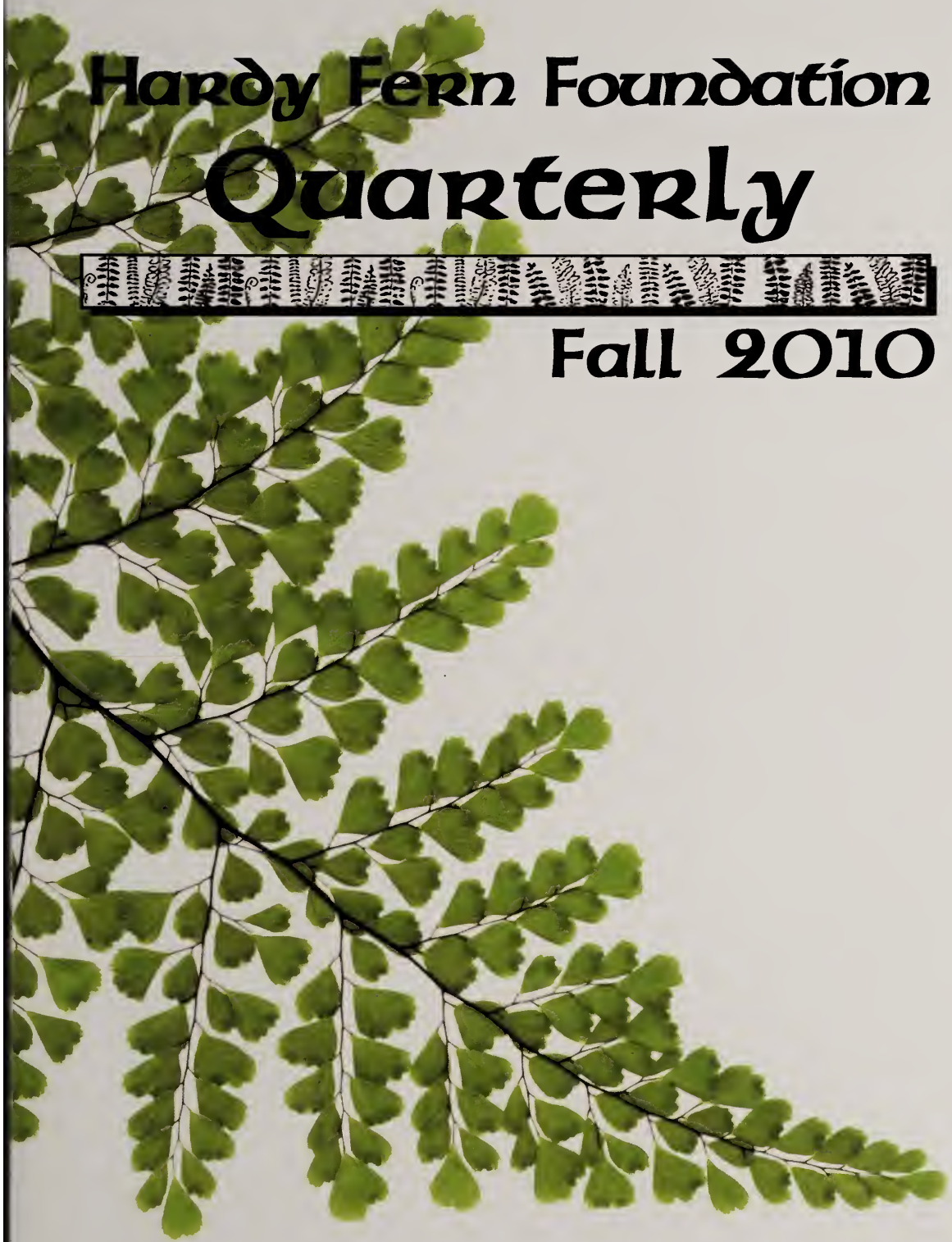
Hardy Fern Foundation Quarterly

Fall 2010



THE HARDY FERN FOUNDATION

P.O. Box 3797

Federal Way, WA 98063-3797

Web site: www.hardyferns.org

The Hardy Fern Foundation was founded in 1989 to establish a comprehensive collection of the world's hardy ferns for display, testing, evaluation, public education and introduction to the gardening and horticultural community. Many rare and unusual species, hybrids and varieties are being propagated from spores and tested in selected environments for their different degrees of hardiness and ornamental garden value.

The primary fern display and test garden is located at, and in conjunction with, The Rhododendron Species Botanical Garden at the Weyerhaeuser Corporate Headquarters, in Federal Way, Washington.

Satellite fern gardens are at the Birmingham Botanical Gardens, Birmingham, Alabama, California State University at Sacramento, California, Coastal Maine Botanical Garden, Boothbay , Maine. Dallas Arboretum, Dallas, Texas, Denver Botanic Gardens, Denver, Colorado, Georgeson Botanical Garden, University of Alaska, Fairbanks, Alaska, Harry P. Leu Garden, Orlando, Florida, Inniswood Metro Gardens, Columbus, Ohio, New York Botanical Garden, Bronx, New York, and Strybing Arboretum, San Francisco, California.

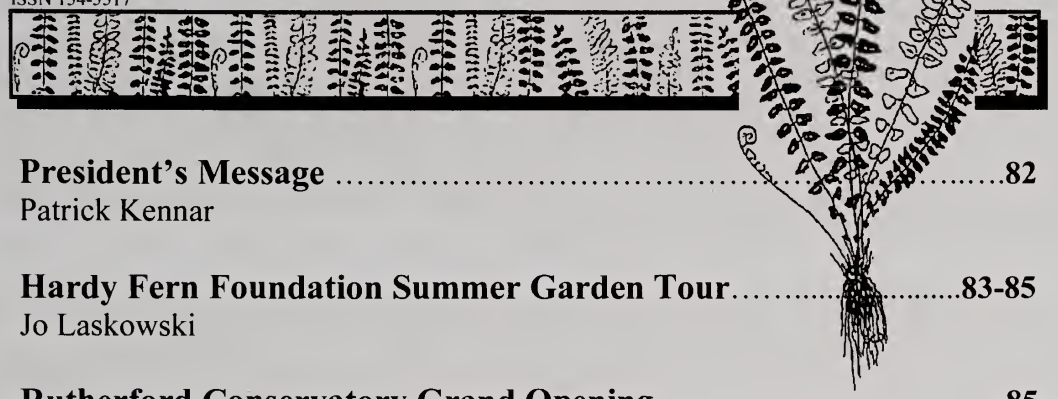
The fern display gardens are at Bainbridge Island Library. Bainbridge Island, WA, Bellevue Botanical Garden, Bellevue, WA, Lakewold, Tacoma, Washington, Lotusland, Santa Barbara, California, Les Jardins de Metis, Quebec, Canada, Rotary Gardens, Janesville, WI, and Whitehall Historic Home and Garden, Louisville, KY.

Hardy Fern Foundation members participate in a spore exchange, receive a quarterly newsletter and have first access to ferns as they are ready for distribution.

Cover design by Willanna Bradner

HARDY FERN FOUNDATION QUARTERLY

THE HARDY FERN FOUNDATION
QUARTERLY
Volume 20 No. 4 Editor- Sue Olsen
ISSN 154-5517



President's Message

Fall President's Message 2010

It has been an exciting spring and summer for The Hardy Fern Foundation. Regardless of the lagging economy, the Fern Festival sale June 4-5 was once again an affirmation of intensified interest in ferns by local gardeners. Cooperation and involvement have always been the secret to our success and we are extremely fortunate to have gifted and skillful vendors who provide the beautiful, well nourished plants for our sale. Keeping It Green Nursery of Stanwood, Washington was a welcome new addition providing an interesting mix of woodland perennials which were a special attraction for those looking to complement their fern plantings. Thank you to HFF members Carolyn and Jerry Doherty, our most consistent volunteers in all areas of our main garden and who have been especially helpful with fern propagating.

Many thanks to Michelle Bundy and Richie Steffen for organizing and conducting an August tour of four outstanding regional gardens. It was a rare opportunity to see well established and diverse landscapes and enjoyed by all who participated. (For highlights see the article on page 3)

On September 22nd, Hardy Fern Foundation board members and guests gathered at the Parkshore Retirement Center on Lake Washington for our first end of summer party. Hosted by Lyman and Liz Black, we celebrated our past accomplishments and gave special recognition and appreciation to our Honorary Board Members, Sylvia Duryee and Jocelyn Horder. We gave them our sincere thanks for their many years of partnership and dedication to the HFF. They have been a source of intuition, insight and perceptive thinking since our organizational beginnings and we are profoundly grateful and feel extremely fortunate to have them as a part of our endeavors. We look forward to their continued participation. We thank them too for our many immensely enjoyable visits to their beautiful gardens.

As an added bonus we were given a tour of some of Lyman Black's garden projects. He is not only our dedicated treasurer, but also a gifted gardener. In addition to a woodland fern garden that he designed and built for the center, he has created an amazing 4 by 8 foot fern table displaying a nice selection of ferns and related plants. (photo pg. 92) He is also developing a Healing Garden on an upper patio. We look forward to a description and detailed account in a future Quarterly.

Best regards,

Patrick Kennar

Board members Sylvia Duryee and John van den Meerendonk. Photo courtesy of Caroline Chase

Hardy Fern Foundation Garden Tour August 2010

Jo Laskowski
Des Moines, WA

I am a resolute, unapologetic Pacific Northwesterner. I know that the region is nationally suspected of being a continuously rainy, dismal, depressing area. It's an image we promote because we are, after all, insanely jealous of the beauty and lushness of this area. It has an incredible ability to support plants from a variety of climates, including those of Asian and South American origin. And it's always fun to see how others are arranging their coveted plant possessions, encouraging them on, and watching them knit into communities and cohesiveness far beyond the eye of most garden designers.

The Hardy Fern Foundation's garden tour was set for Saturday, 7 August. A supremely manageable, four garden tour, was set to the expectation that the weather would be clear, beautiful, and warm. Eleven of us started off in a light, misty drizzle which turned into a steadier and wetter DRIZZLE. The attendant low clouds would obscure Mount Rainier from the two gardens that possess a view of it. The ability to see this symmetric, snow-capped, volcanic mountain by looking out over a stretch of water, or over a wide valley, lends depth and a sense of infinity to a gardenscape—"borrowed landscape" as they say, on a grand scale.

The Rick Peterson/Richie Steffen garden was first on our list. It's on an otherwise flat and small suburban lot, but for a phenomenally steep bank that plunges to a narrow, flat area at its bottom, and that consumes approximately a quarter of the lot's square footage. Judicious and clever use was made of two to three foot sections of tree trunks that were imbedded vertically against the hillside, creating a giant's set of steps. Corralled back into usability, full advantage was taken of the myriad planting holes between the trunk sections. Ferns, perennials, small garden trees, dwarf conifers, out-of-the-ordinary shrubs—all are stuffed into the hillside and upper beds. (photo pg. 92)

Plantable ground space was captured in another way, too. At the edges of the parking pad, terra cotta chimney flue liners are stacked on end and filled with soil to provide planting holes, mostly for ferns. Large slabs of broken concrete with soil between them were laid on their side—like Oreo cookies—and in these spaces sedums and other xerics are flourishing including a lush colony of *Adiantum aleuticum* 'Subpumilum'. I noticed that the height gained by the flue liners gave me the opportunity to look at the particular details of ferns that are seldom apparent at ground level, a nice touch. (photo pg. 93) Donuts, coffee, and orange juice finished our visit to the Peterson/Steffen garden before we piled into our cars and headed off for the next destination.

In contrast to the suburban lot of our first stop, the Ilga Jansons and Michael Dryfoos Edgewood Garden is a boggling 32 acres. It was a 2003 purchase by these locally well-known philanthropists, when there was little in the way of a garden. Aside from the 16,000 sq foot home and selected established trees, there would be nothing there today that someone familiar with the earlier property would recognize.

With the extraordinary amount of space available, and their amazing personal

energies, Ilga and Michael have created garden rooms and garden structures on a large scale. A white trellis with rose garden, a potager, several deep perennial borders, a pond, an Asian garden, a labyrinth, immense pieces of garden art and more were shown to us. I normally don't care for the ubiquitous birch tree, but when I saw a cluster of mature ones across a huge expanse of lawn and could see their elegance and grace, well, I decided I just might have to change my mind. Perspective, perspective, perspective! As we wandered, Ilga explained that the stuffed-to-bursting beds would be culled of some plants over time, as trees and shrubs approached maturity. Given all I saw, I do believe that they will be two of the few people who ever go back and follow through on intentional overplanting with subsequent plant removal.

We removed our shoes and got a brief tour of the equally interesting interior. From a sunken room in front of the stone fireplace we did however lament our loss of the view of Mount Rainier, usually visible across the valley. On to stop three, for boxed lunches and uh, oh—a retail nursery.

The Old Goat Farm came into the possession of Greg Graves and Gary Waller in 2005.

The well-kept one hundred-year-old house has outbuildings and a barn, currently used for their retail business. While we dined *al fresco*, Gary regaled us with tales of the various and sundry fowl kept on site, which includes turkeys, ducks, geese, and the periodic visit and extended stays by wild waterfowl. Up close and personal, I discovered that turkeys can be rather intimidating. But the afternoon was waning, and a closure time at our last garden forced us to move on. We agreed we'd return to Old Goat, because we hadn't had time to sufficiently inspect the grounds or especially a chance to purchase plants…

Chase Garden is located on four and a half acres overlooking the Puyallup (pew AL up, for you not familiar with our local pronunciations!) River valley. Because of the insistent overcast and drizzle the spectacular view of Mount Rainier for which this garden is well known was lost to us here also. Chase Garden is an example of a naturalistic Northwest woodland. Covered by second-growth Douglas fir trees, its pea gravel paths meander through the property, displaying an understorey of native shrubs and carpets of trillium, erythronium, vanilla leaf, and other wildflowers. These are part of the stunning seasonal color for which the garden's also known. The occasional oddball tree, like *Cunninghamia lanceolata*, popped into view.

With the death of its owners and garden creators, Emmott and Ione Chase, the garden has come under the management of the Garden Conservancy. Adoption by this organization enables it to retain a garden that shows in its creation the influence of Japanese tradition, the modernist ideals of the 1950's and '60's, and our regional landscape. It also establishes its presence in preserving, organizing, and funding gardens of significance in this area. After the intensity of the first gardens, the Chase was a serene contrast. Its simplicity and Zen-like feeling noticeably dampened our former and collective manic behavior at seeing so many plants and varieties in the other gardens, returning us to a somewhat more rational level for our return to: Old Goat Farm!

Nobody left Old Goat without plant purchases, including myself. Most of their inventory featured unusual perennials, shrubs, and small trees. Many of the plants they offer for sale are also established in their garden for viewing. (photo page 93) This is a real benefit to the many people who fall for small plants in tiny pots, not realizing what height and width they can truly attain, and what form they will ultimately take. While I left with only two plants—real restraint for me—I fell prey to a Royal Copley vase.

These ceramics were originally sold in five-and-ten-cent stores during the 1940's and '50s, and are on offer, in my opinion, to guarantee that no-one could possibly finish off this fabulous tour empty-handed.

After eight hours of intense viewing, o-o-hing, and scribbling down plant names and ideas, a spent group of participants returned to our cars, goodnighted, and went our separate ways. Bet I'm not the only one who dreamt plants all night!

Rhododendron Species Botanical Garden Rutherford Conservatory Grand Opening

Michelle Bundy
Tukwila, WA

On Saturday, September 25th, 2010, the Rhododendron Species Botanical Garden unveiled the new Rutherford Conservatory, the latest edition to its world renowned research and education garden. In addition to the gorgeous weather that day, visitors were welcomed with a string quartet, bright balloons and an appetizing array of snacks. The Rutherford Conservatory, named in honor of the late Francis C. Rutherford – long time RSBG member and vireya enthusiast – is the first public conservatory built on the West coast in recent history. This five-thousand square-foot facility features an exquisite collection of tropical vireya rhododendrons from Borneo and New Guinea as well as tree ferns, orchids and the largest collection of agapetes in North America. (photo pg. 92) These rare and unusual specimens are nestled in this peaceful setting beside a naturalistic mountain stream which is surrounded by rugged basalt columns, giving you the feeling of being in a tropical paradise.

The event was very well attended by various city leaders, RSBG and community members.

Rutherford Conservatory - Photo courtesy of Michelle Bundy

Dryopteris neorosthornii

James R Horrocks
Salt Lake City, Utah

Dryopteris neorosthornii
Photo courtesy of James Horrocks

This interesting Sino-Himalayan species is rather widespread, though uncommon, even rare, ranging from India to Nepal, Tibet, and China. It is a terrestrial fern of the upper level forest zone growing mainly in scrub. The species epithet "neorosthornii" means "new rosthornii", named after A. von Rosthorn, a plant collector who spent time in China in the late 1890's. It is named in reference to a separate species, *D. rosthornii*, which represents a distinct species mostly confined to the western part of China. The name "rosthornii" was also misapplied to *D. pulcherrima*, another Sino-Himalayan species. *D. neorosthornii* may be confused with *D. wallichiana* as both display the same somewhat drooping shuttlecock habit and the truncated pinnules. The most obvious difference is the initial glossy-black scales on the stipe and rachis of *D. neorosthornii*, which are mostly retained at maturity. In *D. wallichiana*, the scales are mostly brown in varying shades although some are blackish-brown, and the stipe and scales at maturity can be green to reddish-brown. *D. neorosthornii* is smaller in size compared to *D. wallichiana*, but the most significant difference between the two is their cytology. *D. wallichiana* is a diploid while *D. neorosthornii* is triploid. To throw in the proverbial monkey wrench, Christopher Fraser-Jenkins maintains that *D. neorosthornii* is actually a subspecies of *D. wallichiana*, classified as subsp. *nepalensis*, and that plants in the trade are misnamed and should be *D. xanthomelas*.

Description: The rhizome is erect. The stipe is rather short, about one-fifth the length of the frond and densely clothed at the base with wide ovate-lanceolate scales that are thick and glossy-black. The scales above are somewhat smaller and not as dense but with scattered narrowly lanceolate to hair-like scales between. The rachis is clothed with rather scattered short glossy-black scales and again scattered hair-like pale brown scales. The two to three foot fronds are bipinnate below but pinnate-pinnatifid above, lanceolate in outline, and bearing up to three dozen or so more or less paired pinnae. The fronds tend to droop slightly. The upper surface of the fronds is mid to dark green. The pinnae are linear, somewhat leathery, and bear numerous more or less rectangular pinnules. The pinnules are about the same size as those in *D. wallichiana* and the sides of the pinnules are straight or parallel to each other, and truncated, more so nearer the rachis. They sometimes bear a few short acute teeth but are otherwise almost toothless. The sori are in two rows, medial on the pinnules. They are covered with a thick kidney-shaped indusium. The spores are mostly fully formed but some are abortive. This species is apogamous.

Culture: A most striking plant with its "wonderfully mysterious" uncurling black-scaled

crosiers, as Martin Rickard describes it. This species is hardy in Zone 6. Sue Olsen tells us that "it is a dynamite of a plant and certain to evoke a wow from even the least fern enlightened of your garden guests." It is at its best in humid climates and languishes in areas of low humidity. Its requirements are the same as for *D. wallichiana*, enjoying an evenly moist humusy soil in filtered shade. It is rather slow to establish, but well worth having. Like *D. wallichiana*, its rectangular truncated pinnules give it a unique charm.

References:

A Monograph of Dryopteris in the Indian Subcontinent, 1989, Christopher R. Fraser-Jenkins, The Botany Series, British Museum of Natural History, London

Encyclopedia of Garden Ferns, 2007, Sue Olsen, Timber Press, Portland

The Plantfinder's Guide to Garden Ferns, 2000, Martin Rickard, Timber Press, Portland

Hardy Fern Foundation Spore Exchange

The Hardy Fern Foundation would like to thank Board Member Katie Burki, for her many years of service as our dedicated Spore Exchange Director! We look forward to Katie's future involvement in other aspects of the organization.

Our new director, Carolyn Doherty lives in Puyallup, Washington and has been an HFF member for a number of years. She and her husband Jerry volunteer on a regular basis, helping in the garden, nursery and with propagation. Carolyn has set-up a website - **fernspores@hotmail.com**. Here members can order spore, correspond, or just ask questions. The 2010-2011 Spore List, along with ordering instructions will be available in January through our quarterly, on our website or if requested, via e-mail. (Current ordering instruction can also be found on our website).

Fall is the time for collecting...your fresh spore is always appreciated!!!

(Please write collector's last name, location, and year collected on package - individually packaged spore is helpful).

Mail requests to:
Carolyn Doherty
HFF Spore Exchange Director
1905 43rd St SE
Puyallup, WA 98372

Fern Murder Last Winter

Alastair C. Wardlaw
Glasgow, Scotland

a.wardlaw@tiscali.co.uk

Coming from Glasgow, the operative word in the title should be pronounced with rolling 'r's as 'Murrr-Durrr'. However rendered, it well describes what happened to some of my ferns during the winter of 2009/10. It wasn't so much a problem of record-low temperatures, since the lowest I recorded in garden shade was -6°C (21°F); it was more a matter of the long duration of the freezing – about 3 weeks of continuously icy conditions. In the news media, the winter was described variously as 'the worst winter since 1963' and 'the coldest since 1978/9'. The Glasgow city minimum was cited as -10°C (14°F); we live in suburbia about 4 miles from the city center, whatever effect that may have had.

The winter in our garden seemed to be particularly murderous for Southern Hemisphere ferns, notably tree ferns. So although I had their trunks wrapped with the usual amount of insulation (See HFF Vol. 10 #4, page 71, Fall 2000), the long-lasting freeze eventually penetrated into the crowns and the plants succumbed to the frost. The tree ferns were devastated, and so was I in losing 6-foot trunked specimens of *Dicksonia antarctica*, *D. fibrosa* and *D. squarrosa*, and also *Cyathea australis* and *C. smithii*. Some had been planted outside in the ground since 1996 and had survived a decade or more of normal winters. I had become relaxed about what they could take. With hind-sight, I see myself as having been careless, or at least insufficiently vigilant.

Nowadays in Britain, only the *D. antarctica* are easily replaceable as mature plants. Our local garden center was recently offering end-of season specimens, with about 5-foot trunks, at the half-price of £49, or about $76. The several other tree-fern species, which 10 years ago from specialist suppliers were easily obtainable (although expensive!) with tall trunks, tend nowadays to be available only as small, untrunked plants.

Among all the gloom there were several – actually a majority - of cheerful occurrences. Unexpectedly, the prostrate-trunked *Dicksonia lanata* from New Zealand survived the winter with its fronds unwithered, in a rhododendron-understory area. It had not been wrapped, or covered with dead leaves, or in any way deliberately insulated, yet it survived unscathed. This makes me wonder if the wrapped tree ferns may have died through lack of water during the 4 months of being wrapped, rather than the low temperatures.

An unwrapped *Dicksonia squarrosa*, whose 18-inch trunk had been killed, started to produce about a dozen new fronds – what I call 'pups' – from around the base (Fig. 1). This species is well-known as one of the few tree-ferns that regularly do this. Each of the 'pups' has the potential to give rise to a new plant, eventually forming a grove. So all is not lost with my tree ferns, although several murders had taken place!

I also have about half-a-dozen small potted tree ferns of various species that were over-wintered in a frost-free glasshouse. This is what I plan to do with any new

Fig. 1. An 18-inch trunk (right arrow), and a much shorter trunk (left arrow) of Dicksonia squarrosa , killed during the winter of 2009/10. By the following summer, the two trunk bases were surrounded by the numerous fronds shown and which had sprouted from near them.
Photo courtesy of Alastair Wardlaw

acquisitions of tree ferns in the future – keep them outside in pots or tubs for most of the year and overwinter them in the glasshouse where the trunk-watering can be done as needed.

I didn't lose any British or North American fern species, but that is only to be expected. British natives should, by definition, survive and the ferns from North America tend routinely to experience harder winters than ours. Nevertheless it was comforting to see alive and in good condition my 3 species of British filmy fern: *Hymenophyllum tunbrigense, H. wilsonii*, and the Killarney fern, *Trichomanes speciosum*. All were in unheated and uninsulated, but partly-buried and polycarbonate-covered enclosures, with a seepage-water arrangement to maintain 100% humidity. It was also gratifying when the two adder's tongues appeared – *Ophioglossum azoricum* and *O. vulgare*.

Fig. 3. Winter-killed crown of Blechnum magellanicum (arrow), with two sources of new fronds sprouted from near the base. Photo courtesy of Alastair Wardlaw

Especially hard-hit by the long period of freezing were long-cherished Southern-Hemisphere blechnums. I had previously thought of *Blechnum chilense* as a really tough customer, coming as it does from the far south of South America and the Falkland Islands. Last winter's freeze, however, killed many mature crowns (Fig. 2) that previously had just starting to have short trunks and fertile fronds. Vigorous new plants subsequently sprouted abundantly from the underground rhizomes.

Fig. 3. Winter-killed crown of Blechnum magellanicum (arrow), with two sources of new fronds sprouted from near the base.
Photo courtesy of Alastair Wardlaw

I am always conscious that one should be very cautious when generalizing from experiences with just one or a few plants,

which is often all there is space for in a suburban garden such as ours (0.4 acre). *Blechnum magellanicum* occurs further south in South America than *B. chilense*, but last winter seemed to be less hardy. My two specimens, a few yards apart, were both killed, but one has since produced 'pups' (Fig. 3), the other not. With the New Zealand *Blechnum fluviatile*, one plant was killed, while another close-by and with seemingly-similar exposure, kept its fronds green and looks totally undamaged. The same, one-dead one-alive, also occurred with *Todea barbara* (New Zealand). I lost both specimens of the South African *Blechnum tabulare*, which is generally considered fairly tender but survived previous winters unprotected. *Lophosoria quadripinnata*, from Central and South America, gave one plant surviving and another killed – why the difference was not at all obvious from their locations.

Gratifying survivals of less commonly-seen foreign ferns (foreign to the UK!) were: *Ariostegia parvipinnata* (Taiwan), *Cystopteris moupinensis* (China), *Diplazium sibiricum* (Siberia), *Drynaria sinica* (China), *Gymnocarpium fedtschenkoanum* (Central Asia), *G. oyamense* (Japan), *Polystichum vestitum* (New Zealand), *Pseudophegopteris aurita* (Taiwan) and *Pyrrosia sheareri* (China).

My three polypodiums from the Pacific Northwest, and growing close together, came through the winter unscathed – *Polypodium amorphum*, *P. glycyrrhiza* and *P. scouleri.* From the other side of the USA, *Woodwardia areolata* has survived fine, growing in a sphagnum bog beside two species of pitcher plant from Eastern and Western USA: *Sarracenia purpurea* and *Darlingtonia californica.* It always gives me pleasure to grow side-by-side in Scotland plants that in the wild inhabit the opposite sides of the North American continent and would otherwise never share a habitat.

Just clinging to life as single fronds, in what for many years had been good-sized clumps with many fronds, were two Australian species - *Pyrrosia rupestris* and *Sticherus lobatus*.

Do I need to crave editorial indulgence or apologise to readers for making brief mention of plants other than ferns, and how they responded to last winter? Surely a fern garden needs the counterpoint of flowering plants, just as music usually benefits from being played on more than one type of instrument?

In the garden I share with my wife Jackie the ferns are confined mainly to shady areas. She has the sunny side for roses, lilies, campanulas, monardas, and other flowering plants. Fortunately we both like 'architectural' foreign exotics, such as palms, tree ferns and conifers. As with ferns, it was the Southern hemisphere species that were worst hit by last winter. Among the losses were the New Zealand Celery pine (*Phyllocladus trichomanoides*), Kauri tree (*Agathis australis*), Rimu tree (*Dacrydium cupressinum*) and Parrot's claw vine (*Clianthus puniceus*). Also lost were all of our numerous and variegated Cabbage palms (*Cordyline australis*) from New Zealand.

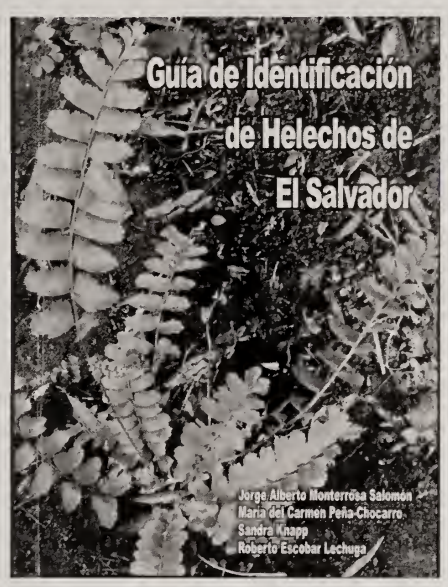
On the other hand it was gratifying to see survival, without any winter precautions, of all the bamboos (5), camellias (6) and rhododendrons (numerous); also a Paraná pine (*Araucaria angustifolia*) from Brazil, the common Monkey-puzzle (*Araucaria araucana*) and Flame tree (*Embothrium coccineum*) from Chile, Chusan palm (*Trachycarpus fortunei*) from China, Mountain toatoa (*Phyllocladus alpina*) and Kowhai (*Sophora microphylla*) from New Zealand, the European fig (*Ficus carica*) and, particularly, the Wollemi pine (*Wollemia nobilis*). This is the recently-discovered 'living fossil' from an inaccessible canyon in the Blue Mountains near Sydney, Austra-

lia, now being widely distributed into horticulture as a useful method of ex-situ conservation. And so the story goes: one wins some and one loses some, while the passion for trying out new ferns and other plants is difficult to control.

Before signing off, can I say what a pleasure it was this past summer to welcome the visit to our garden by a party of very distinguished members of HFF: Sue Olsen, Pat Riehl, and Naud and Wim Burnett, accompanied by Martin Rickard from Britain. I know Glasgow in Scotland is way off the beaten track from an American perspective, but we do welcome fern enthusiasts visiting from across the Atlantic. Do come here when you can!

Book Review

Sue Olsen
Bellevue, WA



Guía de Identificación de Helechos de El Salvador

Jorge Alberto Monterrosa Salomon, et. al.
2009, Jardin Botanico La Laguna y
The Natural History Museum
Antiguo Cuscatlan, La Libertad, El Salvador
558 pages, paperback
ISBN 978 0 565 09255 9

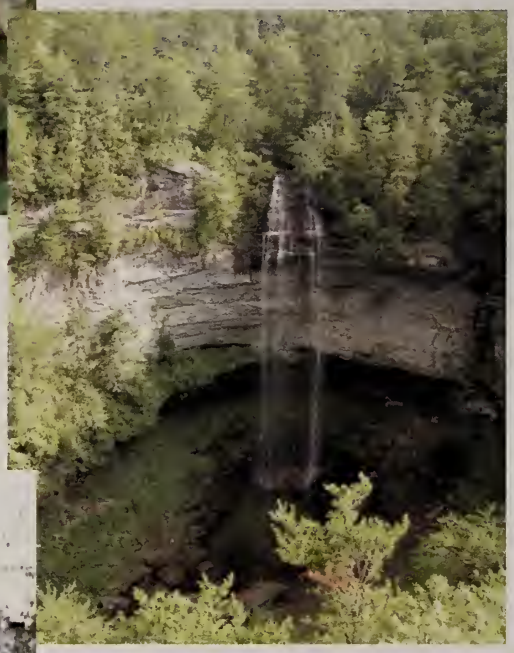
Planning a fern excursion to El Salvador? I didn't think so (but if you are this book is for you)! I don't expect to be exploring the fern flora there either, but like a number of our readers I have had the pleasure of ferning in Costa Rica. Since much of the native material overlaps from one country to the other, I was only too happy to have an excuse to treat myself to this rather expensive illustrated flora (110 Euros plus shipping from Koeltz Scientific in Germany). And illustrated it is! From the very first pages colored photos dominate the work. All the material and even more than is generally included in an introduction from habitats to fern structure to detailed close ups of rhizome types, scales, venation, sori and indusia are presented in color for ease of learning and understanding.

I might add that not surprisingly the book is in Spanish with Latin botanical names. While it has been close to 50 years since I was somewhat conversant in Spanish, I can manage an elementary understanding. And it should be no challenge to anyone to translate such descriptives as *estipite* (stipe), *rizoma* (rhizome) *segmentos* etc Other less obvious terms such as *escamas* (scales) and *venas* (veins) and oh yes, *helecho* (fern) quickly become familiar as well. (That said, I have not tried to work my way through the five page key!)

Agapetes pyroliodes

Rutherford Conservatory

Photo courtesy of
Dennis Bottemiller



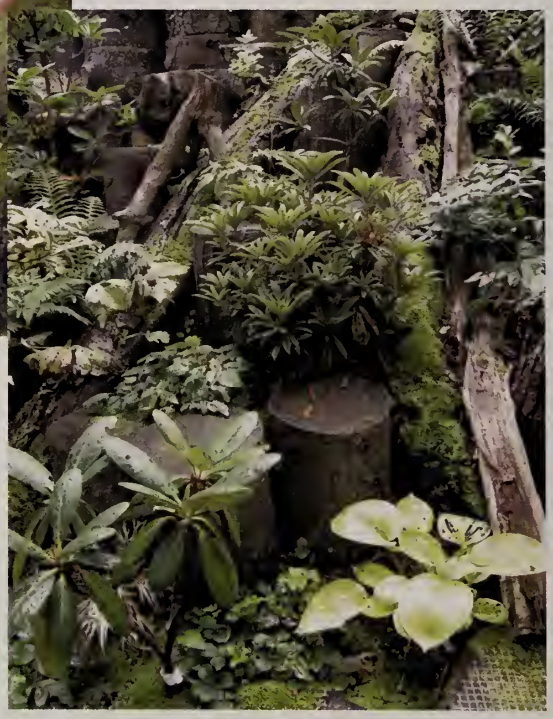
Falls Creek State Park

Tennessee, USA

Photo courtesy of
Naud Burnett

Steffen/Peterson Garden

Photo courtesy of Sue Olsen



Fern Table

Lyman Black's Garden

Left to right, Sue Olsen, Lyman
Black and Pat Kennar

Photo courtesy of Willanna Bradner

Steffen/Peterson Garden

Photo courtesy of Sue Olsen

Plant Delight's Nursery (below)

Photo courtesy of Naud Burnett

Hardy Fern Foundation 2011 Calendar

See details on page 94

Phyllitis scolopendrium

Old Goat Farm

Photo courtesy of Sue Olsen

The layout of the book is refreshingly direct. Each species is given two facing pages. Clear illustrations, all in color, on the left side include a photo of the fern in its habitat and then up to four more pictures are added focusing on distinctive characteristics of the particular species - perhaps of the rhizome, or an overview of the full frond, but always a close up of the fertile portion of the fern. The right hand page presents the descriptive information which is divided into six sections: Diagnosis, Description, Similar species, Habitat, General distribution and References. In addition there is a map showing the counties where the fern can be found in nature. The diagnosis and descriptions overlap somewhat in detail, but both include helpful information. Finally endangered species are identified with a symbol of a padlock!

There are 508 of these pages which reduces to an impressive 254 illustrated and described species. They are arranged by families (in color coded sections) and include Lycophytes and Selaginellas. The book finishes with a very comprehensive glossary (en Español), as well as a bibliography and handy list of recommended web sites. I was initially dismayed to find no index at the back, but lo immediately following the introductory botanical key is a list, "*FAMILIAS, GENEROS Y ESPECIES DE HELECHOS PARA EL SALVADOR*" and here we find all of the included ferns. They are classified by family but easily perused and with each listing there's a page reference number - the sought after index so to speak!

The book just arrived today, and obviously I'm impressed and enthusiastic. Can I give you any determinations about the accuracy of the information? Of course not, but based on the professional presentation I would have to recommend the work strongly and as I said earlier the data is very helpful with identification of material from adjacent countries.

Now who would like to organize an "helecho" foray to El Salvador?

Hardy Fern Foundation 2011 Calendar

The HFF is pleased to be offering our first ever fern calendar! We have compiled a variety of gorgeous fern photos for you to enjoy all year long. Calendars are $15 each and orders can be sent to Michelle Bundy at hff@rhodygarden.org. We will also have them available, after Nov. 1st, on our new "SHOP" page on our website. www.hardyferns.org

(see photo on pg. 93)

Temporal and spatial variation in growth of Rockcap fern (*Polypodium virginianum*) in Blue Hill, Maine, USA

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The following manuscript (and .jpg images) report on a study done over a five-year period to gain insight into environmental factors that affect growth of *Polypodium virginianum* in a natural site in Blue Hill, Maine.

INTRODUCTION

How long has a particular granite boulder been keeping watch on a property in Blue Hill, Maine? This boulder faces Blue Hill Bay, about 10 yards from the shore (Fig. 1). Some 10,000 years ago, the retreating continental glacier left a barren landscape strewn with such erratics, some the size of a house. This one is about the size of a Volkswagen. There are others, smaller and larger, scattered in the woods and fields, and along the shore.

How long has *Polypodium virginianum* (rockcap fern) been growing on the northeast side of this boulder? Impossible to say. The colony was there when the first author's parents bought the land in 1941, and it seems likely that it was there when part of the property's forest, though not the location of the boulder, was first cut and the land farmed back in the 1800's. Curiously, there is another granite boulder of approximately the same size some 20 yards inland from the main subject of our study, but it does not have a colony of *Polypodium virginianum*. Why? This other boulder is almost perfectly smooth; only in small cracks has any vegetation taken hold. The boulder under study, however, has a rough quartz-like surface on its northeast face, and this texture permitted leaf litter to build up, providing a substrate for moss, which provides the home for the ferns.

In addition to the underlying rough texture, the boulder has another feature of interest. At some point, likely owing to the cycle of freezing and thawing, a part of it on the lower left side facing the bay split off and slid to the ground, leaving a long fissure about 15 cm in width in the center front that, predictably, also filled with humus, making it a particularly desirable location for the ferns. One year, it was also home for nesting hermit thrushes.

In the summer of 2002 it was noted that the fern colony, so uniformly lush in past years, looked very poorly. There were fewer leaves than in the past, and its general appearance was very brown and dry. The property's owners had always seen this rock as something special on the land, yet they had changed the environment in which it was located. Whereas once it was in a forested corner of the property, over the years, they had cut trees and built, first, one house slightly to the southwest of the boulder, then another one to the north, and finally a large shed directly to the west. To address concerns about the health of this possibly ancient fern colony, it seemed that it might

provide valuable insights into its growth requirements to study it over a period of years. Longitudinal studies of temperate-zone ferns (e.g. Sharpe, 2005, Archer, 2003, Greer and McCarthy, 2000) have followed different aspects of fern growth for more than a year and have found differences from year to year. Hence in 2002 a collaboration began in which we would investigate the possibility that climate conditions might affect the vitality of the *Polypodium virginianum* population after it had endured each winter.

Figure 1. The boulder in Blue Hill, Maine, USA with its healthy population of *Polypodium virginianum* in 2010 showing the vertical crevice where growth is particularly lush (Photo by C. W. Guiles).

METHODS

The design of the field study, annual monitoring and climate analysis were accomplished by the first author, while the second author analyzed the growth data and developed the graphs presented in this jointly written report.

Polypodium virginianum is a creeping fern that is common in Maine and inhabits rocks, ledges and occasionally stumps from Greenland to Georgia and west to Wisconsin. It is a species often characteristic of woods with acid soils. Beginning in the late summer of 2002, six transects (five vertical and the sixth, horizontal across the top) were marked with wire on fern-covered areas of the boulder (Fig. 1) and maintained in approximately the same positions for a total of five annual surveys. The wire was affixed to the moss substrate with U-shaped fasteners and red tree tape was used to mark the ends of each line. In two cases, a wire went missing during the winter, and was replaced the next summer. These transects were approximately 45 to 68 cm long, depending on each one's position. Each year from 2002 through 2006, leaves along these transects were measured and their length and whether they were fertile or not was noted (Table 1). The number of leaves sampled along each transect each year ranged from 11 to 24, reflecting the density of

Figure 2. A clump of *Polypodium virginianum* on the ledge in the forest, Blue Hill, Maine, USA. (Photo by C. W. Guiles 2009)

each year's growth. For comparison, a transect approximately 1.5 m long (132 cm) was also marked on a damp, mossy ledge in the forest (Fig. 2) about 200 m inland from the boulder. There, the number of leaves sampled annually ranged from 12 to 21.

In addition to measuring the leaves, which was done in the late summer, for the first four of the five years, short white cords were tied on five leaves on each transect in order to determine leaf life span. Then, the next summer, these marked leaves were relocated (if present) and their condition recorded: alive, dead (brown) or desiccated (dried but still green). In most cases, one or more of the five leaves and their cords were not found in the following year. Is it possible that some were appropriated by birds for their nests? In a few other cases a corded leaf would somehow be overlooked and be found two years later.

Climate statistics (www.weatherunderground.com) were consulted to determine the varying factors which the ferns on the boulder and in the forest had grown, and to record other conditions which might have affected them. Climate records for locations near Blue Hill, Maine, are, unfortunately, irregular. For the years 1999, 2000, 2005, and 2006, we used statistics for Portland, ME (approximately 110 miles south of Blue Hill). For the years 2001, 2002, 2003, and 2004, we used records for Bar Harbor, ME (approximately 30 miles north of Blue Hill).

Data analysis

Means and standard error of the means (SE) are noted throughout. The non-parametric Wilcoxon rank sum test was used to test for significant ($P < 0.05$) differences between habitats and the Kruskal-Wallis ANOVA was used to analyze differences among years. Data were analyzed using Statistix 9 (Analytical Software, 2008).

RESULTS

The mean length of the leaves measured on the boulder (12 ± 0.31 cm) was significantly shorter ($P < 0.01$) than for the leaves on the ledge (14 ± 0.50 cm) located inland in the woods. The maximum leaf measured on the boulder was 29 cm (2005) while on the ledge it was 25 (2003) with almost 50% of the length of leaves measured on the ledge in the 12-18 cm range (Fig. 3). Although sori could be present on leaves in any size class in this sample, spore production is clearly positively related to the size of the leaf (Fig. 4).

Microhabitat variation

While habitat on the ledge was uniform, the boulder had several different microhabitats that were reflected in the leaf-length results for different transects (Fig. 5). For each of the annual monitoring dates, the longest leaves (mean 17 ± 0.62 cm) were found on the transect parallel to and closest to the central vertical crevice on the face of the rock (T4), while the shortest leaves (mean 4 ± 0.66 cm) were found along the transect (T1) in the section of the population that was closest to the base of the boulder.

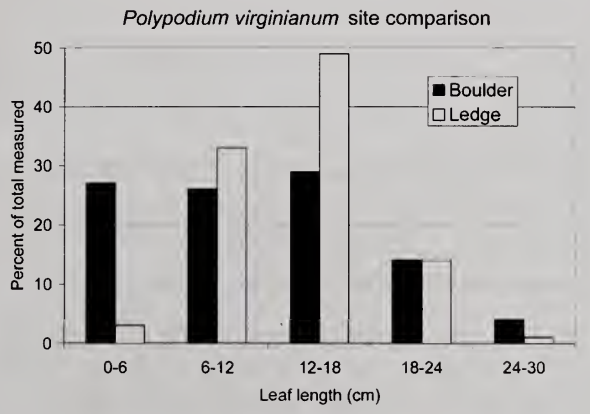

Figure 3 Size classes of all leaves of *Polypodium virginianum* measured in late summer of 2002 through 2006 on the boulder and ledge at a site in Blue Hill, Maine, USA

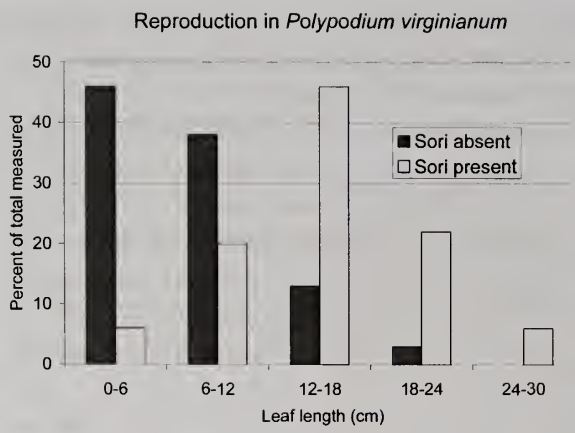

Figure 4. Size classes of all leaves of *Polypodium virginianum* for which presence or absence of sori was recorded in late summer of 2002 through 2006 at a site in Blue Hill, Maine, USA.

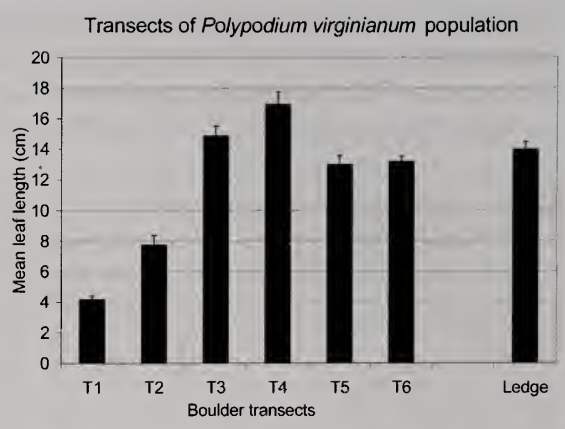

Figure 5. Mean leaf lengths for all leaves in six transects of a *Polypodium virginianum* population measured in late summer of 2002 through 2006 at a site in Blue Hill, Maine, USA.

Annual variation

There was a notable increase in mean leaf length from 2002 through 2006 in he boulder population, while there was no obvious temporal pattern to the changes in leaf length on the ledge from year to year (Fig. 6). Linear regression showed no relationship between leaf length and time for the ledge population ($P = 0.4969$), while there was a significant increase in leaf length from year to year for the boulder population ($P < 0.0000$). At the start of the study in 2002, the population on the boulder was dominated by leaves in the two smallest-size classes
(< 12 cm) in a pattern not only characteristic of a stressed population, but also of a young population (Fig. 7). By 2006 the majority of the leaves were in the larger three classes (Fig. 7) in a pattern that was similar to the overall distribution of leaf sizes for

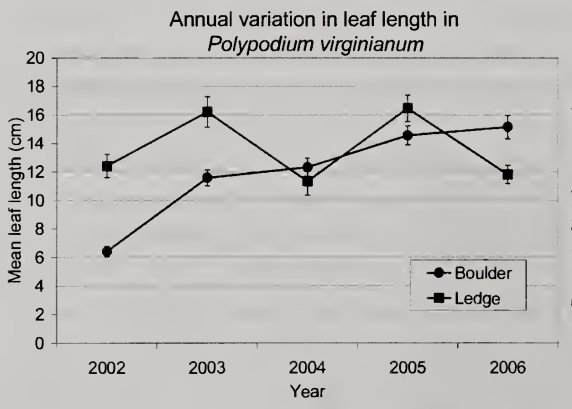

Figure 6. Annual variation in mean leaf lengths for boulder and ledge populations of *Polypodium virginianum* at a site in Blue Hill, Maine, USA.

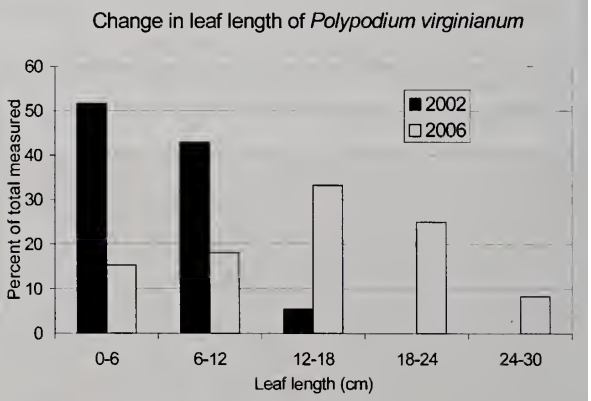

Figure 7. Comparison of leaf length size classes for leaves of *Polypodium virginianum* measured

the ledge (Fig. 3) and characteristic of a mature population. Spore production on the boulder population, as evidenced by the presence of sori on a leaf, increased three-fold between 2002 and 2003, and increased again in 2005. For the first three years, the ledge had a higher percent of leaves with spores than the boulder. For the first three years, however there was less annual variation in the ledge population (Fig. 7).

Leaf life spans

Polypodium virginianum is considered an evergreen species. Therefore, when a leaf marked with cord at the end of one season was missing at the end of the following season, it was assumed to have had a life span of approximately one year. On the boulder, the majority (66%) of leaves remained attached and green, but often desiccated, for two summers while on the ledge almost half (48%) lasted for only one summer. Very few leaves were still there for a third summer.

DISCUSSION

The main goal of this study was to document the small size and thin population of leaves in the summer of 2002 in a previously lush population of *Polypodium virginianum* on the boulder and to explore the progress of the population as it either declined or recovered. Recovery was remarkably swift. In the first year, the mean leaf sizes nearly doubled (Fig. 6), and continued to increase in size through the end of the study in 2006, documenting a full recovery of the population. However, the maximum leaf size of 29 cm is considerably less than the maximum of 40 cm reported for this species (Haufler *et al.*, 1993), thus suggesting the upward trajectory of the recovery graph may have continued beyond the end of the study, or that this coastal Maine location is less than optimal for the species. The increase in spore production (Fig. 8) was proportionally even greater than in leaf length, perhaps in response to the previous year's stress. The ledge population, with a much smaller sample size, started out with much longer and more fertile leaves in 2002, and mean leaf lengths as well as spore production varied from year to year, though the maximum leaf length was only 25 cm. Thus the decline and recovery of the population on the boulder was clearly a response to environmental factors that had not impacted the ledge.

The prediction that environmental conditions might explain the poor appearance of the rock-cap fern colony in 2002 is born out by climate statistics. The two growing seasons before that of 2002 (Apr. 1-Oct. 31, 2000, and Apr. 1-Oct. 21, 2001) both had rainfall below that of the years 2002-2006. Calendar years 2001 and 2002 had higher average temperatures than the following three years. Calendar years 2001 and 2002 also had higher minimum temperatures than the next three years, suggesting the possibility of a winter thaw, which could interfere with the dormancy of the colony. The fern colony on the forest ledge is in a naturally damp and sheltered area of the woods, which would explain the lack of variation in its growth statistics while the colony on the boulder at the edge of the bay is entirely exposed to the elements and thus sensitive to drought as well as extreme temperatures and winter icing.

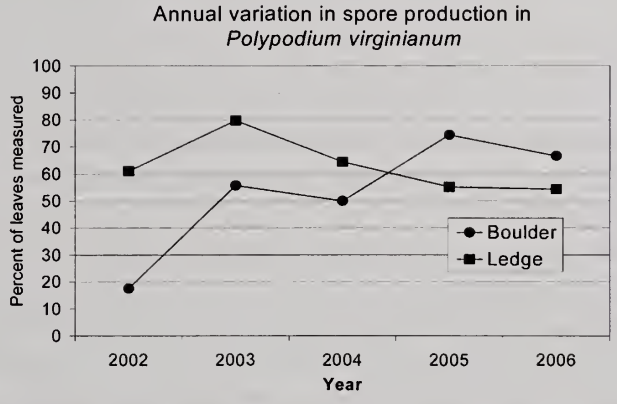

Figure 8 Annual variation in spore production (presence of sori on leaves) for boulder and ledge populations of *Polypodium virginianum* at a site in Blue Hill, Maine, USA.

In the process of addressing the population recovery question, we were also able to demonstrate variation in growth (leaf length) in response to microhabitat variability on

the boulder. We have also documented important elements of the natural history of *Polypodium virginianum* including leaf-size constraints on spore production, and leaf life spans.

CONCLUSIONS

We took on this project with the hope that the report would be of interest to the readers of the *Hardy Fern Foundation Quarterly*. For years, the foundation has collected and published information on the health and fertility of plants in its test and satellite gardens. In that longitudinal data set there may be an opportunity for finding insights into annual variation in fern growth within a garden setting. A comparison of such results for garden-grown plants and their native counterparts could also be interesting. Also, fern enthusiasts who have a colony of *Polypodium virginianum* on a boulder or ledge in their area might find it worthwhile to closely follow the health of the colony, and compare results with ours. Likewise, there are other fern species that grow in seemingly precarious conditions such as *Polypodium appalachianum.* Might a longitudinal research effort, particularly one commenced after a poor growing season, bring interesting findings to light?

There is another direction for possible study. In 2002, at the beginning of this project, we thought that acid rain might be a factor causing the poor condition of the rockcap fern colony. In its effort to lure summer visitors to Maine, the state's tourist industry omits in its publicity the fact that, on some days, the views from the mountains of the state's jewel, Acadia National Park, can be dimmed by smog. This smog, we hasten to add, is not generated in state. Rather it is caused by emissions of power plants in the midwest, and it has been the subject of litigation between the New England states and the home states of the power plants. This smog causes acid rain, which has affected the state's lakes and forests. Since the fern colony recovered through the years of this study, it seems unlikely that acid rain, which would further acidify already naturally acid growing conditions, played a prominent role in the health of the plants. Nevertheless, a study that examines this question might be of interest.

We are not the first to have reported detailed observations of fern growth to the Hardy Fern Foundation. Ralph Archer recruited several people from different parts of the country for a phenological study to investigate annual variation in the date of fern emergence in the spring in two different years (Archer, 2003). There was not only year-to-year variation, but also site-to-site variation. It is always fascinating to collect detailed facts to support general observations, as Tom Stuart found with his later notes on early emergence ferns in his own gardens in Zone 6 (Stuart, 2008). As a result of our own close observations, we now know that a population of *P. virginianum* can bounce back extremely quickly from adversity. A stressed population that might have even been considered young in 2002 (had it not been observed casually for many years before) was in fact capable of producing leaves double in length and three times as fertile within a year when conditions were more favorable.

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BPS/HFF Southeast USA Fern Tour June 13-27, 2011

Naud Burnett, tour organizer

This is the proposed schedule based on a scouting tour just completed through the states of Georgia, Alabama, Tennessee, Kentucky, North Carolina, and South Carolina. The tour will take place from June 13-27, 2011. While the complete details have not been finalized, I can assume that the cost will be comparable to the California trip in 2009, which was $2,850 (single) and $2,050 (double) with a sizeable refund due to less than expected costs. The scenery will be terrific with excellent sights and expert guides at each of the locations. We would like for you to join us for the tour and we will have a website that will cover much of the information on the sights as well as information on the ferns we can expect to see. It will not be a trip for the physically impaired as many of the sites will be in natural areas with sloping land, steps, and probable temperatures in the 80's F. In the Smoky Mountains, it could be in the 60's at night.

Monday, June 13, 2011 (Day 1)- Participants will arrive in Atlanta, Georgia (Hartsfield Airport), which is the busiest airport, in the USA. Get together at the hotel during the day if you would like and have dinner to meet new participants. We will pass out tour packets for you to study. Night in Atlanta. Hotel to be determined.

Tuesday, June 14, 2011 (Day 2)- Our first stop is a very special fern garden at Georgia Perimeter College. Our host and guide, George Sanko, is responsible for its conception and he has grown the fern collection to 450 taxa and 7,500-10,000 fern plants- who counts? The collection covers 1 ½ - 2 acres, contains temperate and xeric ferns. It is a fine fern garden and you will never find a more enthusiastic fern lover than George. Lunch at the garden will be furnished by one of the owners of ChicK-fil-A, who is also a fern person. The next stop is a natural fern and other herbaceous garden with 'Eco' named plants which are sold via mail order. Its owner is Dr. Don Jacobs, who is a retired professor.

Wednesday, June 15, 2011 (Day 3)- We will meet our hosts, Dan and Karen Jones of the Birmingham Fern Society who are responsible for the wonderful design and collection of 185 species in the 'Fern Glade' at the Birmingham Botanical Gardens, an HFF affiliate. It is a fine botanical garden and you are urged to see the other gardens before

meeting for lunch at their café near the entry. Good gift shop. We will leave promptly for Huntsville.

Upon arrival in Huntsville, we will be met by Stu Clifton, President of the Huntsville Fern Society and many of their members to discuss and see their excellent fern collection at the Huntsville Botanical Garden that is maintained by their members. Stu suggests visiting the nearby Butterfly House. Huntsville was the center of development of the USA NASA space program. There is a tram that takes you next door to the NASA Museum Complex and its last tram out is at 6:00pm, so don't get locked in. Stu says you'll really enjoy it.

Thursday, June 16, 2011 (Day 4)- A new site, near Tuscumbia, Alabama, Cane Creek Nature Preserve, was recommended by Dan Jones. My scouting trip proved it to be a great site. Waterfalls, streams, bluffs with overhangs, and 3 species of filmy ferns and dozens of other species in just one section of the 400 acre site. We will spend 3 hours including a picnic lunch there. The owners' Jim and Faye Lacefield, as well as two trained guides, Paul Davison (Botanist) and Fuzzy Perritt, will take us to part of their 15 miles of trails. Drive to Monteagle, TN for the night.

Friday, June 17, 2011 (Day 5)- Check out of Monteagle Motel and drive and see filmy ferns at the Natural Bridge State Park outside Sewanee as well as a few other sites nearby. Drive on to Chattanooga, Tennessee where we will see Tennessee River Gardens and Rock City at Lookout Mountain. Dinner at our daughter, Kate Brock's, home on the mountain. Overnight at Lenoir City, TN.

Saturday, June 18, 2011 (Day 6)- Check out of the motel in Lenoir City and drive to Townsend, TN to meet our guide, Dr. Patricia Cox, the botanist for the Tennessee Valley Authority, who will be our guide for the next two days. Our first day will be exploring (observing) native ferns growing at 3 locations in Smoky Mountains National Park: Elkmont- 'The Little Trail'- 2 miles roundtrip, 'Big Creek Trail'- Dryopteris hybrids- 5 miles roundtrip and 'Cataloochee Valley'- ferns and allies in swampy area.

We will return to the Smokies next week. We will drive on to Knoxville, TN or Lexington, KY so we can get an early start to accommodate our stop in Louisville, KY on Monday. Motel at either city.

Sunday, June 19, 2011 (Day 7)- Check out of our hotel and leave for Natural Bridge State Park, KY. Dr. Cox will meet us and explore the park to see the aspleniums and their hybrids. If possible, we would like to spend the night in cabins in the park; otherwise we will stay in Lexington, KY.

Monday, June 20, 2011 (Day 8)- Check out of motel or cabin early for our departure for Louisville, KY and our visit to Whitehall which is the historic house and garden of inventor, Thomas A. Edison. Whitehall is also a hardiness test and display garden for the HFF. Lunch there, and a special program for our group will be offered by Dr. Dick Lighty, retired director of the Mt. Cuba Center in Delaware, and a nationally recognized plant and fern authority. We must leave by 3:30 in order to reach a destination close to our next days' experience.

Tuesday, June 21, 2011 (Day 9)- Check out of our motel, probably Nashville, TN area. Another long day. Check out of our motel so we can leave by 7am CST. All of the fern expert advisors said you must take them to Fall Creek Falls State Park, TN and it has

been in and out of drafts of sites to see and now it's back in. (photo pg. 92) When you see it, you'll know why. We will stop at the north entry visitor's center to see the topographic models which show the extent of the gorges. There is a small waterfall there. We will move on to the site for viewing the falls and hope you feel like walking down to the valley floor while observing the ferns on the way down. The water falls 256' to a pool and stream below. Remember it's 256' back up.

We will meet for lunch nearby at the Visitor's Conference Center/Hotel/Restaurant/ Cabins, which all overlook a beautiful lake. We will leave at 1pm CST for the Smokies again via interstate highways and gain an hour on our way via Knoxville to our motel at Waynesville, NC, which is on the southeast end of Smoky Mountain National Park. We should arrive around 7:15pm ET.

Wednesday, June 22, 2011 (Day 10)- From our Waynesville, NC motel, we will meet fern grower and nature guide, Tom Goforth, and drive along the Blue Ridge Parkway with selected stops where we will walk short distances to see native ferns. Either a picnic lunch or café lunch at Waynesville or Sylva. Spend the night in the same motel in Waynesville. (2 nights here)

Thursday, June 23, 2011 (Day 11)- We will check out of our Waynesville, NC motel for another day with Tom Goforth. The first stop will be at Poe Creek State Forest off Highway 11, then Jocassee Gorge Reserve, SC. Tom will take us to his Crow Dog Native Fern Nursery, where he will discuss his method of growing ferns from collected spore to finish plant. He grows about 30,000 ferns a year on a yearly cycle. Picnic lunch at his house. Leave for the Glassy Mountain Heritage Preserve, SC. Then off to Greenville, SC where we will spend the night.

Friday, June 24, 2011 (Day 12)- The rest of the trip will be Eastern Time Zone (ET) Check out of the motel. Some of you have asked why Asheville's Biltmore Mansion and gardens were eliminated. I went there 38 years ago and they now charge $40.00 admission- Thanks, but no thanks!

Check out of Greenville, SC. Our first stop will be Charlotte, NC to visit the campus of University of North Carolina- Charlotte sunken fernery and fern glade. Hopefully we will see Dr. Larry Mellichamp, who has also written a new book *'Bizarre Botanicals'*, Timber Press. Stop for lunch around Greensboro and drive on to UNC- Chapel Hill Botanical Garden, then on to Durham, NC- Duke University where the Sara P. Duke Botanical Garden is located. It has a nice planting of native ferns and overall is a fine botanical garden. We leave there around 5:00 to go to our motel, which is close to our next days' stop in Raleigh. We will stay in Garner, just off of I-40.

Saturday, June 25, 2011 (Day 13)- Check out of our motel in Garner, NC to visit the premier mail order nursery in the USA, Plant Delights, owned by Tony and Michelle Avent. They grow all of their products (which have previously gone through rigorous testing for hardiness) in their own Juniper Level Botanical Garden before being propagated and offered for sale. He takes frequent plant forays to other growers and collects plants from around the world. His website, www.plantdelights.com has wonderful descriptions of his trips and mail order listings, some of which are not in the catalog. I drool going through his catalogs.

His collection of ferns has been propagate by spore from his worldwide trips. The visit

the first day with George Sanko and this stop will surely be the most lasting experiences of exotic ferns on the trip if you are a true fern enthusiast. The other stops are great, but more of a "plants in nature experience". We will leave Plant Delights by 1pm and leave for Charleston with an arrival around 6pm.

Sunday, June 26, 2011 (Day 14)- Leisure breakfast at the hotel in Charleston and those who wish to can take a walking tour of downtown home and gardens in this historic and well maintained city.

We'll freshen up at the hotel after 11:30am and then proceed to Magnolia Plantation House Gardens for lunch. House tours, a nature boat trip, and nature train on the outskirts of the plantation are available for a fee. Gardens (60 acres) on your own. This 600 acre estate was purchased in 1676 and the gardens' owner was the first to import camellias (900 varieties) and azaleas (250 types). There are downtown carriage rides and bicycle buggies at night, which will require a fee. Excellent restaurants are nearby in town. Pack up. One more night in Charleston.

Monday, June 27, 2011 (Day 15)- Check out of Charleston hotel. Proceed to Atlanta, which is 6 ¾ hours driving time. We will have 2 rest stops and a lunch stop or picnic lunch. We will drive through Madison, GA, which was not destroyed by the Civil War, and see the Stone Mountain sculpture carved on a granite, rounded mountain similar to Enchanted Rock in Texas.

Farewell dinner.

Tuesday, June 28th - Relax, enjoy Atlanta until your plane is scheduled to leave.

Now doesn't that sound like a great trip?

Think about it, Wim and I would be pleased to lead the 2011 Fern Tour with the help of Kent Kratz. Please send all correspondence and reservations for this trip to the following email address: trip@casaflora.com. Heather will help me, so don't omit anything with her name and proposed Trip HFF-BPS 2011. We will set up a special email account: trip@casaflora.com.

The tour will be limited to 25-30 participants. Deposits of 50% are due by Jan.1 and will be refundable minus a portion of bus costs until May 15th. Final payment is due on May 15th and is refundable minus the bus portion plus an additional 10% up until departure time. There will be no refunds once the tour begins.

Overseas deposits of 50% should be sent to Pat Acock, 13 Star Lane, St. Mary Cray, Kent BR5 3LJ, England (pat.acock@btinternet.com)

North American deposits should be sent in care of Naud Burnett trip at Casa Flora, PO Box 41140, Dallas, TX 75241-0140.

In case you want to have other addresses and phone numbers:

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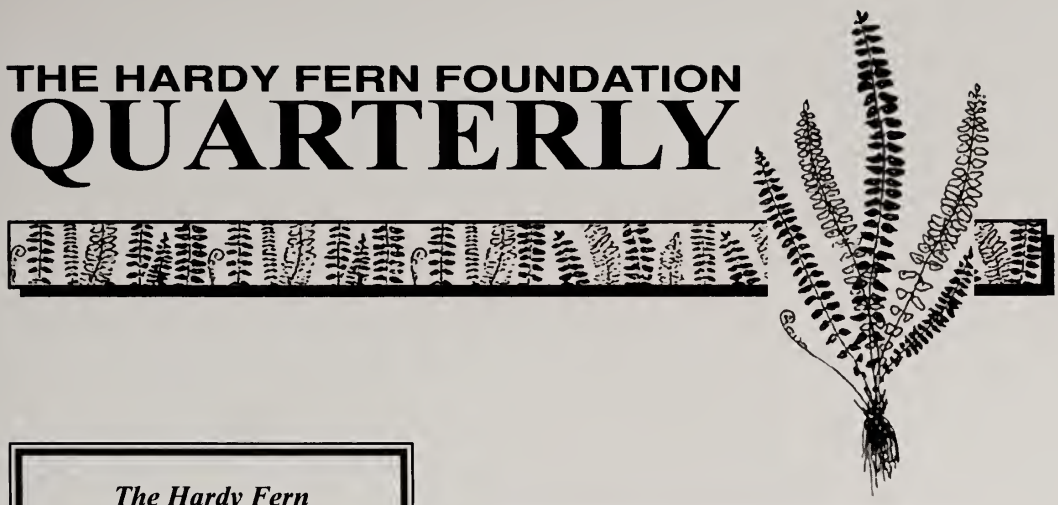
THE HARDY FERN FOUNDATION
QUARTERLY



The Hardy Fern Foundation Quarterly
is published quarterly
by the

Hardy Fern Foundation
P.O. Box 3797
Federal Way, WA
98063-3797

Articles, photos, fern and gardening questions, letters to the editor, and other contributions are welcomed!

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