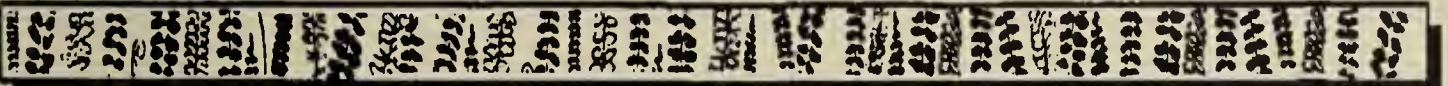


Hardy Fern Foundation Quarterly



THE HARDY FERN FOUNDATION

P.O. Box 166

Medina, WA 98039-0166

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 Stephen Austin Arboretum, Nacogdoches, Texas, Birmingham Botanical Gardens, Birmingham, Alabama, California State University at Sacramento, 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, Lewis Ginter Botanical Garden, Richmond, Virginia, 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, Lakewold, Tacoma, Washington, Les Jardins de Metis, Quebec, Canada, University of Northern Colorado, Greeley, Colorado, 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

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President's Message	98-99
<i>John van den Meerendonk</i>	
New Members	99
Drought Tolerant Evergreen Ferns	100-103
<i>Joyce Descloux</i>	
<i>Dryopteris erythrosora</i>	104-105
<i>James R. Horrocks</i>	
This Just In... ..	106-111
<i>Jeanie Taylor</i>	
American Fern Society Fern Foray 2003	112-114
<i>Sue Hollis</i>	
Hardy Fern Foundation Spore Exchange List 2003	115-118
Ferns & Fern Allies of Southeast Alaska	119-124
<i>Mary Stensvold</i>	

The Spore Exchange Needs You!

Please send your spores to our Spore Exchange Director:

Katie Burki
501 S. 54th St.
Tacoma, WA 98408

President's Message

Fall 2003

This summer here in the Pacific Northwest has been one of the warmest and driest on record with daily high temperatures of 80 degrees plus with only ¼ inch of precipitation recorded in the months of June –August. Newly planted ferns and fern plantings in general have required an added diligence in the watering regime. The native trees, shrubs, perennials and ferns have fared remarkably well, a tribute to their adapted hardy and enduring qualities for which they are so highly valued. September has brought some cooler weather, overcast skies, and a bit of rainfall. Autumn is in the air. We start the day with an added layer of fleece, check our rain gear, and make planting plans for this fall season.

The British Pteridological Society's Tour of the PNW hosted by Sue Olsen and the HFF was a wonderful experience for all. It was a pleasure to accompany our guests on forays into the region's most beautiful natural areas of the Cascade and Olympic Mountain Ranges, the Pacific Coast and numerous gardens, both public and private in the Puget Sound Region. All of our guests displayed an insatiable appetite in seeking out and observing ferns in the wild, and those grown in local gardens. Their knowledge and acute observations only encourages us here to become more knowledgeable and increases our interest in the observation and growing of ferns. Their comparisons of ferns growing here, with their experiences of growing them in their own areas, were a part of daily discussions. A Sincere Thank You to Sue Olsen for the time and dedicated effort in putting together this most remarkable tour, along with the indomitable task of arranging lodging, transportation, guides, meals, banquets etc. Also a Thank You to the HFF Board and HFF Members and Friends who so kindly gave of their time, assistance and participation.

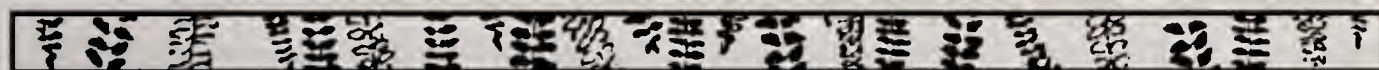
On September 15, the HFF Board presented a landscape design/planting plan to the Washington Park Arboretum Staff for a Fern Display Garden. The plan was warmly received and accepted. The Washington Park Arboretum, located within the City of Seattle, is administered by both the University of Washington and the City of Seattle, and is one of the premier woody plant collections in the world. The Fern Display Garden will be located in the front of the Visitors' Center, in an area called the Signature Garden. The Garden is approximately 60 feet by 6 ½ ft. and runs parallel with the Visitors' Center, separated by a trellis covered courtyard. The plan calls for construction of a trellis to cover the entire display garden to provide shade for the plantings. A narrow meandering natural

dry stream traverses one-half the length of the bed. More than fifty species and varieties of ferns are called for in the planting which also includes a limited number of selected small trees, shrubs, ornamental grasses, perennials and ground covers. The ferns selected were given careful consideration, and represent the best of the hardy ferns that do well in this area. Eighteen fern genera will be represented, so as to show the great diversity of form and beauty that ferns represent and give an indication of the garden possibilities that ferns can provide. The installation of the Fern Display Garden will be done the week of October 13-20. We members of the HFF Board are quite excited about the installation of this Fern Display Garden within the Washington Park Arboretum. For HFF founding, long term board members and HFF members this has been a long sought after affiliation with this venerable institution. Hopefully this may lead to permanent fern plantings with the arboretum itself.

May this message find you in good spirits, musing about fern forays both past and future, and contemplating a new fern acquisition to the garden. Happy fern gardening to all.

Best Regards,

John van den Meerendonk



New Members

Pat Acock

Dorothy Bewick

Curt Black


Anthony J. Blackwood

Maurine Crisp

Mary V. O'connor

Mark C. Outcalt

Jeanne Raines



THE HARDY FERN FOUNDATION
QUARTERLY

The Hardy Fern Foundation Quarterly is published quarterly by the Hardy Fern Foundation, P.O. Box 166, Medina, WA 98039-0166.

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

Please send your submissions to:
Sue Olsen
2003 128th Ave SE,
Bellevue, WA, 98005

Newsletter:

Editor: Sue Olsen
Assistants: Michelle Bundy
Graphics: Willanna Bradner (cover design)
Karie Hess (inside design)

Drought Tolerant Evergreen Ferns

Joyce Descloux
Randolph, NJ

The heat and drought of the summer 2002 severely tested many plants, yet none fared better in my garden than some evergreen ferns – an evergreen fern being one that keeps its fronds from spring to spring, and so provides a green presence in all seasons.

Here on a stony wooded ridge in northern New Jersey we have developed a garden landscape for year round color and interest, utilizing mainly four evergreen plant groups: conifers, rhododendrons, heaths and heather, and ferns.

Conifers provide wind and privacy screens, as well as gold and blue toned foliage. Rhododendrons offer contrast with lustrous broad leaves and a seasonal display of vibrant blossoms. Scotch heather (*Calluna vulgaris*) and heaths (*Erica* species) fill sunny banks and are especially valued for colorful foliage and bloom in winter, as well as in summer. The ferns fill in here and there, adding an airy grace that belies their sturdiness.

The native Christmas fern was already here, carpeting the oak woodlands. The marginal wood fern had colonized a sunny rock wall, and the intermediate or fancy fern nestled at the base of shaded rocks. The deciduous hay-scented fern had taken over sunny banks and clearings. I sensed other ferns might feel at home here, and since ferns had long beguiled me, I began to acquire and plant as many different kinds as I could.

Evergreen plants are by nature designed to be resilient in climatic extremes, whether of heat, cold, snow, ice, storm or drought. During the past hot summer deciduous ferns turned dry and brown without supplemental watering. Evergreen ferns, though slowing their growth, showed little other distress than drooping a bit. Their stalwart fronds, green islands in a distressed landscape, somehow made the garden seem cooler.

Ferns like a cool, stony root run. A moist but well drained woodland soil suits them perfectly. They need a site protected from strong winds and high summer sun, yet with good air movement and a moderate sun/shade aspect. Fortunately, this is what I had when we moved here twenty years ago. But we have lately endured unusual drought and heat, as well as stringent restrictions on water usage, which has stressed all plants.

Planting ferns

I used to be somewhat careless about how I planted – the ferns grew with abandon if just scratched into the ground and topped with a rock. Now I am careful to dig a hole to fit the fern root ball comfortably with room to grow. I line the bottom of the hole with a mix of peat or sphagnum moss, loam, compost and a few small stones, then set the fern so the base of its crown is level with the soil. I fill in with more of the stone-peat-soil mixture, tamp it down and water well, then loosely mulch around the base of the fern with forest litter and stones. Stones help stabilize the fern and protect it from foraging squirrels, chipmunks and birds. More importantly, stones trap moisture and hold it in the soil.

My two best planting times for ferns are mid May to mid June, and early September to mid October. I never plant ferns until the oaks have leafed out, mid May here, as they provide the cool leafy ceiling and shade for the garden. I like to have the planting site prepared beforehand, but if weather conditions are not right I often put new ferns into larger pots and grow them on for awhile, sometimes not planting them until late summer when the sun is lower and nights are cooler.

Whether planted in spring or fall, success with ferns depends on getting the plants established quickly. This is easier with potted ferns that can be set in without disturbing the root ball. During the first year after planting a fern should never be allowed to dry out. It may recover, but will be severely set back. Fall-planted ferns also need consistent watering, and once the ground is frozen, additional mulch to protect their crowns. Here it is the natural fall of oak leaves.

Although it may be tempting to dig wild ferns, I do not think it feasible. Uprooted ferns require more care and take more time to establish than nursery grown ferns. And in any case, it should never be done unless it is from your own property or with the permission of the owner. State conservation laws prohibit digging many plants from the wild, including most ferns.

Once established, I have found most evergreen ferns are quite self-sufficient. I do not fertilize my ferns, as I find it forces lush growth the root system can't support and also makes them appealing to slugs and insect pests. Ferns have tough rangy roots that gather and hold a reservoir of moisture and nutrients, like those of other evergreen plants. Atmospheric moisture comes from dew and fog, as well as rain and snow.

USDA hardiness zones are based on average temperature lows that can vary here from -10F to 10F. More meaningful to a gardener is how long the ground stays frozen and to what depth. When the soil is frozen evergreen ferns conserve moisture by lying flat or curling their fronds. Here the ground is frozen usually from December first until the end of March, four months. Snow cover provides insulation, but cannot be counted on, so only ferns adapted to harsh and unpredictable conditions are totally reliable here.

I now grow a hundred or so different ferns and am constantly adding more. But as with any large collection of plants, a few always stand out for their beauty, interest and performance. Below are listed some of my favorite evergreen ferns. Some are familiar natives, some exotics from distant continents. All are hardy to Zone 5 or colder. All are easy to grow in a wide range of conditions and most are readily available.

Native ferns

Our native Christmas fern (*Polystichum acrostichoides*) makes a great natural ground cover in winter when it lies flat, its outspread fronds forming a protective cover for bulbs and other plants. It is slow to mature, but increases in size by making multiple crowns and would probably live forever. In June or later, sometimes, the top portion of its fertile fronds turn gold and curl back gracefully to release the spores. It is then both colorful and fascinating. For the simple beauty of its polished leathery fronds, its versatility in almost

continued on page 102

Drought Tolerant Evergreen Ferns *continued from page 101*

any garden use, and for its robust constitution in sun or shade, this fern is tops. It is most happy with its roots embedded under rocks. (1 to 2 feet tall. Zone 3)

Braun's holly fern (*Polystichum braunii*) is a less common evergreen fern, native not only to northeast and northwest America, but also Europe, China and Japan. It has lustrous, dark green fronds with bristly tips. The spring crosiers (fiddleheads) are covered with silvery scales that age golden tan. (1 to 2 feet tall. Zone 3)

Marginal wood fern (*Dryopteris marginalis*), a favorite native, sports handsome leathery fronds of a blue-green color. Here it has colonized rock walls, banks and wooden steps and is a sturdy grower, preferring a site in morning sun. (1 to 2 feet tall. Zone 2)

The evergreen wood fern or fancy fern (*Dryopteris intermedia*) is a true shade lover. It seeks out the hidden spots where sunlight is elusive. Its lacy fronds fan out gracefully into an impressive clump. This fern often hybridizes with other related native species, and some of these are also good garden plants for our region. (2 to 3 feet. Zone 3)

While native ferns are most reliable, particularly in colder regions, more exotics are being grown here with equal success. The climate of southern New England approximates that of the northern maritime regions of Asia, Europe and Britain, and both their wild ferns and choice garden varieties are now being offered to American gardeners by selected nurseries, as well as through fern societies and botanical gardens.

Asian wood ferns

The golden-scaled male fern (*Dryopteris affinis*, *D. pseudomas*) is widespread throughout Europe and Asia. It has long been cultivated, and there are so many forms and cultivars that a whole garden could be devoted to the different varieties. It grows easily almost anywhere, and takes both wind and sun. The leathery fronds are bright olive green with coppery colored stems. The golden-scaled male fern makes a striking vertical accent plant, particularly the large crested clone, 'Cristata' (also called 'The King'). 'Revolvens' has blade margins turned down; 'Grandiceps' has a large terminal crest. (3 to 4 feet tall. Zone 4. Semi-evergreen.)

Two delightful dwarf forms for shaded rock gardens are *Dryopteris affinis* 'Congesta Cristata' (9 inches of frilly fronds) and *D. a.* 'Crispa Gracilis' (6 inches), which has uncommonly stiff dark needles like a diminutive conifer.

Dryopteris x complexa and *Dryopteris remota* are garden worthy hybrids. (Both grow 2 to 3 feet tall. Zone 4. Semi-evergreen.)

Autumn fern (*Dryopteris erythrosora*) is named for the color of its red indusia (the covering of the spore case clusters), which line the undersides of the fronds with rows of red spots. The fronds unfurl a glowing copper pink, turning at maturity to a bright glossy green, and are held erectly, even in winter, unless beaten down by ice and snow. As the crown slowly increases in size it makes an impressive clump. Nice planted where late sun can highlight its ruddiness. This is the fern that really got the attention of American gardeners. It surely got mine when I saw it in a famous hosta garden years ago and sought it for my own. (2 to 3 feet tall. Zone 5.)

Beaded wood fern (*Dryopteris bissetiana*) is another must-have Asian fern with an unusual quilted or puckered look earning it its common name. The triangular arching fronds have a blue-gray velvety cast in slanted sun, which it tolerates well. (2 feet tall. Zone 5.)

Asian holly ferns

Three Asian holly ferns are indispensable. All grow in erect crowns, have shiny arching fronds and are fully evergreen. Makino's holly fern (*Polystichum makinoi*) is the most striking, with lustrous wide shaggy fronds which can shelter and shade smaller, more delicate plants. (18 to 30 inches tall. Zone 5.)

Long-eared holly fern (*Polystichum neolobatum*) is smaller with very shiny, spiky, almost metallic looking narrow fronds. The "long ear" is an elongated first pinnule (leaflet), called an auricle, which is typical of these ferns. This fern needs a shaded nook. (1 to 2 feet tall. Zone 5.)

Bear's paw fern (*Polystichum rigens*) has stiff, shiny fronds with spiny tips to each segment. These sweep upward in a striking pattern, making it among the most beautiful of ferns. (1 to 2 feet tall. Zone 5.)

All these holly ferns are very distinctive and appealing, and not nearly as well known as they should be.

It sometimes takes a few seasons to get to know a new fern and how best to grow it. I have found over the years that it's easier to use ferns in ways that make sense ecologically. For naturalizing, I plant only natives – it's their home, after all. I try to group Asian ferns together beneath Japanese maples and holly where they might grow in nature. But I also try ferns in different places to see where they might grow best.

With careful siting, hardiness may sometimes be achieved beyond a designated zone. Ferns are not expensive to purchase compared to other plants, so I often feel free to experiment. Another big plus for ferns is that deer don't usually browse them, so they don't have to be protected or foresworn on that account.

Ferns are long-lived plants when happy, so it pays to pay attention to their needs. If you plant a fern where it doesn't want to grow, it won't. I learned from considerable losses that lime-loving ferns couldn't take my acidic soil. Finally I constructed a special bed for them next to a concrete foundation, amended with limestone, where I'm hoping they'll now feel at home and settle down.

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*Polystichum
neolobatum*

Dryopteris erythrosora

Autumn Fern – Japanese Shield Fern

James R. Horrocks
Salt Lake City, UT

It seems only appropriate that with the autumn season we focus on this most attractive fern. The species name literally means “red sori”, actually referring to the bright red indusia which covers the young sori. In some plants, they are more of a pink color and in some more rarely greenish-white, particularly in variety “viridisora”.

D. erythrosora is a very popular and well known species from Japan, China, Taiwan, and Korea. Its occurrence elsewhere such as the Philippines may be in doubt, although *Flora of Japan* places it there. *D. erythrosora* is a medium size fern with glossy evergreen fronds that remain upright in winter, not reclining as in many other evergreen ferns. The new fronds are of special interest with their reddish-copper hues and as they turn green, the copper color is retained for a time, giving the fronds a unique look. As the fronds mature, they change to a deep glossy green. This fern is quite variable, which has caused considerable confusion. Hoshizaki notes that some plants circulating in the nursery trade as *D. bissetiana* and *D. purpurella* are actually *D. erythrosora*. (Ed...true *D. bissetiana* is a valid species.) *D. nipponensis*, *D. hondoensis*, *D. championii* and *D. kinkiensis* are often mistaken for it and there are other Japanese ferns that may be misidentified. A new introduction to the trade, *D. koidzumiana*, adds to the confusion with its reddish-bronze new growth. Although very similar to *D. erythrosora*, it is smaller and has in the past been considered a variety of *D. erythrosora* according to Rush. The Autumn Fern occurs in wooded areas in low mountains and hills, growing under low to medium-high light. There is a variety ‘Prolifica’ which is more triangular with narrower pointed pinnules and which produces occasional plantlets on the upper surface along the rachis.

Description: The rhizome is stout and ascending, short-creeping and occasionally branching. The arching evergreen fronds can be up to 2 or more rarely 3 feet long and quite variable. The fronds are broadly ovate to oblong, acuminate, and bipinnate. The rachis sports linear to linear-lanceolate scales. The stipe is usually one-third to sometimes half the length of the blade. It bears brown to black-brown scales that are linear to linear-lanceolate and nearly entire. There are from 8 to 12 pairs of pinnae which are acuminate and mostly sessile, that is, without a stalk. The pinnules are narrowly oblong to linear-lanceolate, acute to rounded at the apex, toothed and often pinnately lobed. They are glabrous above, but have appressed hair-like short scales found on the veins beneath. Of diagnostic interest, are the lowest basioscopic pinnules next to the rachis, which are shorter than the other pinnules and have marginal incurved teeth that are spine-tipped. The sori are mostly median, although they are usually closer to the midrib. A red to pinkish indusium that often retains its color throughout the growing season covers the sori. As has been mentioned, some varieties have a greenish-white indusium but this is rare. The sori run in two series on the pinnules with entire, orbicular-reniform indusia. This species is apogamous. There are no hybrids mentioned in the literature.

Culture: Because of its ease of cultivation, *D. erythrosora* has been very popular in the nursery trade. It does do better in areas of more humidity but can grow in gardens of drier climates such as here in Salt Lake. It is quite adaptable, growing in moist to moist-dry situations. It is a terrestrial fern, growing well in the open ground and makes splendid displays in mass plantings. David Jones mentions that it makes a good potted plant as well. It is prized for its ability to grow in deeper shade. The fronds are quite evergreen and remain standing even in winter unless heavy snows weigh them down. New fronds are produced throughout the growing season. Generally it does best in neutral to slightly acid soils, the latter producing darker green fronds. Being apogamous, it is easy from spores and even makes a good terrarium plant until it gets too big. In the late fall, overgrown terrarium cultures can be moved out into the garden with some protection. The Autumn Fern is an all-around versatile plant with many applications.

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Dryopteris erythrosora. Photo by Richard Young - Salt Lake City, UT.

This Just In...

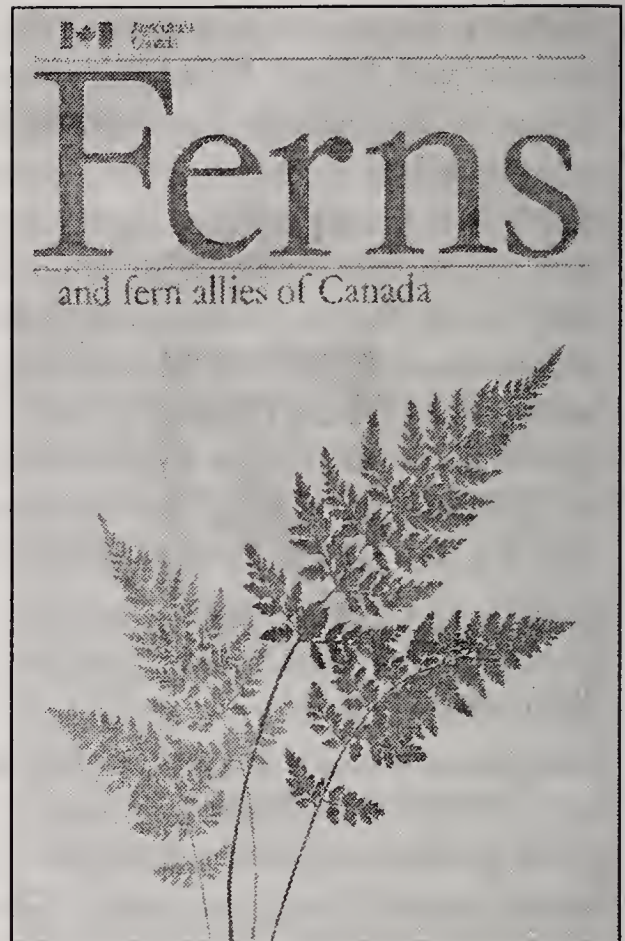
Jeanie Taylor
Seattle, WA

From the Botanical Electronic News (BEN), a newsletter e-mailed monthly to the subscriber list by curator Adolf Ceska at the University of Victoria (see subscription information at the end of this article). BEN numbers 304 and 305 in March, 2003 contained a rich variety of articles on ferns and fern allies.

Both issues were dedicated to Donald M. Britton in honor of his 80th birthday. Described by Dan F. Bruton as “the most important Canadian pteridologist ever as no other has so influenced North American fern taxonomy. And that influence extends world-wide, as his extensive network of international associates and correspondents demonstrates”. Other tributes show the same admiration from his former students and colleagues, and reveal a truly great mentor, scholar and teacher who shares his knowledge generously and democratically with amateurs and professionals alike.

Paul Catling’s comments on the occasion of Dr. Britton’s receipt of the Lawson medal in 1991 list Dr. Britton’s many accomplishments: “Dr. Britton published his first paper on ferns in 1953. This group was to become his specialty and his work on it made him an internationally recognized expert. He was one of the pioneers in the use of cytogenetic techniques to reveal relationships, the use of the scanning electron microscope in systematics and the use of cytological data in the systematics of ferns. Whenever evolution of pteridophytes is discussed, his name will be mentioned. Dr. Britton was also a rather early biosystematist in that he integrated micromorphology, morphology, cytology, chemistry and phytogeography in his work....(H)e studied some of the most intractable groups of ferns including *Dryopteris*, *Woodsia*, and *Isoetes*...” His graduate students’ work includes *Pellaea* (S.J. Rigby), *Polypodium*, *Isoetes* (L. Kott), *Lycopodium* (R. E. Newell), and *Gymnocarpium* (K.M. Pryer). “Dr. Britton has acted as chairman of the Pteridology Section of the Botanical Society of America and has been a leader in the New England Fern Conference since 1970. He is described by his friends, scientists and students as a ‘pro’ and ‘a friendly person, a little quiet but with a sly sense of humour’.

“Dr. Britton has co-authored *The Ferns of Canada* with W. J. Cody. [He] has chosen to publish rather than perish in retirement. He is still publishing at a remarkable rate, mostly in the Canadian Journal of Botany. His recent publications on *Isoetes* represent a major contribution to our understanding of that group, and are the kind of publications that can only come from a highly skilled taxonomist with a very deep understanding of the organisms he studies. He has served as the regional reviewer for pteridophytes of



eastern Canada for the Flora North America Project and a co-author for the treatment of *Isoetes*. *Isoetes x brittonii* (*American Fern J.* 83(3):85.1990) was recently named in his honour...He is an outstanding field botanist and has lead a great many field trips. His collection numbers exceed 13,000...”

Kathleen Pryer gives an entertaining anecdotal account of working with Dr. Britton, also including an abstract of a new paper on *Equisetum* (“Phylogenetic relationships and evolution of extant horsetails, *Equisetum*, based on chloroplast DNA sequence data (*rbcl* and *trnL-F*):

DON BRITTON (DMB) TURNS 80?

From: Kathleen Pryer [pryer@duke.edu]

Hard to imagine. I know, we've all gotten older, but my memories of DMB are almost frozen in time when he must have been 57 or so and was my Master's thesis advisor at the University of Guelph where I undertook my first venture doing fern research under his able guidance. I've seen DMB since, of course, but every time I find him to be just the same as ever and not to have aged in any way, and so it's a bit of a shock to learn that he reaches the 80th milestone this week.

I am really proud to have done my M.Sc. with DMB and today, more than ever, I truly appreciate what a wonderful mentor he has been. DMB always listened intently, but didn't always react immediately. This took a bit of getting used to, especially in my early student days when I thought he might just be enjoying his pipe (yes, you could smoke inside in those days!) and perhaps thinking of something more profound than what I was talking about. For example, sometimes I'd mention in these conversations how I'd like to get my hands on “such and such” a rare article and then shuffle back to my office when there was no apparent reaction. The next day whatever I had been looking for would magically appear on my desk. No fanfare, but I knew who had put it there. Often accompanying the article I'd asked about were a

continued on page 108

This Just In *continued from page 107*

couple of others he thought I'd better also have a look at. DMB is a true scholar and has a wonderful gift for sharing his knowledge with others in a very quiet and gentle (and often humorous) manner.

Doing fieldwork with DMB is a treat. He has radar for finding plants in the field that is awesome - he goes right to what he's looking for. If he can't find it - it's not there - and he won't waste anyone's time beating the bushes for it. We'd just get back in the car and race off to the next hopeful spot. Field trips with DMB were so meticulously planned - everything happened on schedule, ALWAYS with good humor, and without a hitch. Except for once. We were somewhere in Wellington Co. in search of *Gymnocarpium* hybrids. It was May - lilacs were blooming - just the right time of year to "pickle" these ferns for getting good chromosome squashes. We parked the car next to a farmhouse and began to cross a huge pasture to get to the patch of woods in question. Suddenly DMB pointed out that there was a bull at the far end of the pasture. I peered in the distance and saw it pawing at the ground and looking intently in our direction. I quietly asked DMB what we should do. When he didn't answer, I turned to look at him - just in time to see his lanky 6 ft.+ frame hightailing it over the fence some 50 feet away. Nice guy, but so damn quiet, even in emergencies. I never ran so fast in all my life. We still chuckle over that "incident" to this day.

DMB always has time for everyone, many with whom he has communicated regularly on his famous typewriter (did he ever own one that didn't have maladjusted keys?). If you ever received a letter from DMB - you know what I'm talking about. His peers such as Rolla Tryon at Harvard and Herb Wagner at Michigan

communicated with him regularly; graduate students everywhere, including his own (Laima Kott, Ruth Hersey, and me at that particular time) were always looking for his insight into their projects; and every amateur botanist within a day's drive of Guelph, and many more far beyond, all eventually found their way to his office door. DMB's patience and good humor with everyone, no matter what their official affiliation, was a wonderful example. I know that his example and the joy he gets from working with ferns is what inspired me to study ferns for the long haul.

In the summer of 2000, I had the good fortune to race around the southern Ontario countryside with DMB again - this time in search of 9 species of *Equisetum* that are within a 20-mile radius of Guelph. (Nine of the 15 species of *Equisetum* that are known in the world are found right around Guelph - isn't that amazing?!) This time I was the one driving, while DMB instructed me to turn right, then left, then right and so on, all the while telling me (Québec driver) to slow down - "now we don't want them throwing us in the slammer!" he'd exclaim every once in a while. In 2 short days, we zeroed in on *variegatum*, *laevigatum*, *hyemale*, *arvense*, *scirpoides*, *fluviatile*, *pratense*, *sylvaticum*, and *palustre* and I had all the material I needed to set about doing a phylogenetic study of the genus (the other 6 taxa, *bogotense*, *ramosissimum*, *telmateia*, *giganteum*, *diffusum*, and *myriochaetum*, were sent to me from various botanists across the globe). I handed the material to a young Berkeley undergraduate student (Dave Des Marais) who was doing an internship with me that summer and he ran with the project by sequencing two chloroplast genes for each of the 15 species, doing the phylogenetic analyses, and even managing to date the time of divergence of the living

continued on page 110

This Just In *continued from page 109*

members of *Equisetum*. The manuscript is currently in press in the International Journal of Plant Sciences and I append an abstract below.

Happy 80th Birthday DMB!!! Thank you for being such a great mentor, and when is our next field trip, by the way?

Des Marais, D.L., A.R. Smith, D.M. Britton, & K.M. Pryer. 2003.

Phylogenetic relationships and evolution of extant horse-tails, *Equisetum*, based on chloroplast DNA sequence data (*rbcL* and *trnL-F*). *International Journal of Plant Sciences* 164: in press.

Abstract: *Equisetum* is a small and morphologically distinct genus with a rich fossil record. Two subgenera have been recognized based principally on stomatal position and stem branching: subg. *Equisetum* (8 species; superficial stomates; stems branched) and subg. *Hippochaete* (7 species; sunken stomates; stems generally unbranched). Prior attempts at understanding *Equisetum* systematics, phylogeny, and character evolution have been hampered by the high degree of morphological plasticity in the genus, as well as frequent hybridization among members within each subgenus. We present the first explicit phylogenetic study of *Equisetum*, including all 15 species and two samples of one widespread hybrid, *E. x ferrissii*, based on a combined analysis of two chloroplast markers, *rbcL* and *trnL-F*. Our robustly supported phylogeny identifies two monophyletic clades corresponding to the two subgenera recognized by earlier workers. The phylogenetic placement of *E. bogotense*, however, is ambiguous. In maximum likelihood analyses, it allies with subg. *Hippochaete* as the most basal member, while maximum

parsimony places it as sister to the rest of the genus. A consensus phylogeny from the two analyses is presented as a basal trichotomy (*E. bogotense*, subg. *Hippochaete*, subg. *Equisetum*) and morphological character evolution is discussed. We detected rate heterogeneity in the *rbcL* locus between the two subgenera that can be attributed to an increased rate of nucleotide substitution (transversions) in subg. *Hippochaete*. We calculated molecular-based age estimates for the Equisetaceae using the penalized likelihood approach, which accounts for rate heterogeneity and does not assume a molecular clock. Extant species of *Equisetum* appear to have diversified in the early Cenozoic, which is in remarkable agreement with current interpretations of the fossil record.

Other articles in these two issues which fern enthusiasts will enjoy:

- *Botrychium lineare* (Slender Moonwort): A New Fern For Alberta by Patrick Williston
- Oak Ferns (*Gymnocarpium dryopteris* And Related Taxa) In the Pacific Northwest...And Beyond by Ed Alverson
- Ferns and Fern Allies of Southeast Alaska: A Preliminary Checklist by Mary Stensvold (see pages 119-124)
- Notes on Hawaiian Pteridophytes by Florence S. Wagner
- Taxonomic Status and Evolutionary Relationship of *Isotetes Minima* A.A.Eaton (Isoetaceae) Based on Nuclear Ribosomal DNA Internal Transcribed Spacer Sequences by W. Carl Taylor, Neil T. Luebke and Angel R. Lekschas
- Nardoo by Robbin C. Moran (originally published in the Fiddlehead Forum of the AFS - a fascinating natural history of the use of *Marsilea drummondii* A. Braun as food by native Australians and how it poisoned European explorers)

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American Fern Society

Fern Foray 2003

Sue Hollis
Kansas City, MO

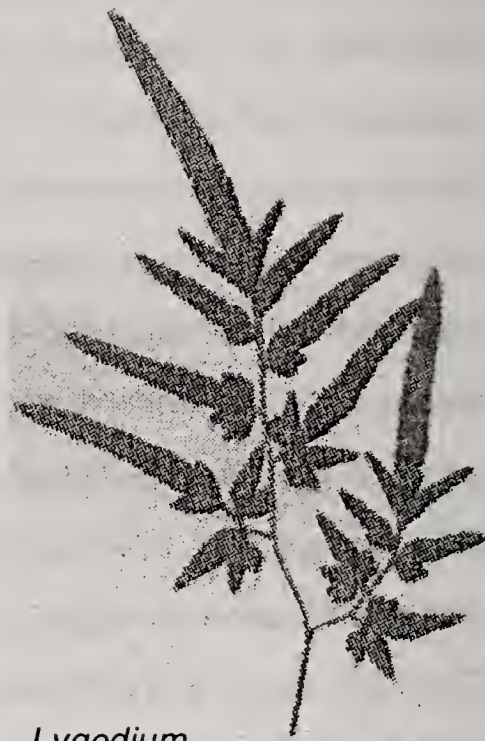
The American Fern Society's 2003 Fern Foray was held in Mobile, Alabama, in connection with the Botanical Society of America's annual meeting on the last weekend of July.

Just arriving in Mobile was a treat to a very different climate with the accompanying botanical spectrum. Streets were lined with southern species of oaks and other genera familiar farther north, all dripping Spanish moss, and a generous use of palms. One garden had a huge bed of the Caladium species called elephant ears with every evidence that it is perennial there.

The Foray began at 7:00 am on Saturday morning, when seventeen of us boarded a bus for the two-hour drive to Conecuh National Forest east of Mobile on the Florida line. Garrie Landry of University of Louisiana and Pat Cox of University of Tennessee led the Foray. They had spent a lot of time checking the area ahead of time to make sure of a productive Foray and had prepared a booklet packed with itinerary, maps, illustrations and habitat descriptions from which a lot of this report has been lifted with permission.

This area consists mostly of what had in presettlement times been wet pine savannas. These were created by high rainfall, low flat topography and waterlogged clay soil which is infertile and acidic. Fire suppression has allowed pines and shrubs to invade and out compete native savanna plants. Less than five percent of the original savanna area has survived planting and ditching, mainly for pine plantations. It is now one of the most endangered ecosystems in the country, harboring very high species diversity and countless varieties of microhabitats.

The first stop was at Parker Springs Bog, formed by seeps being trapped by a clay hardpan under the sandy soil. Between the road and the bog, we found *Pteridium aquilinum* (bracken), *Lycopodiella prostrata* (prostrate bog clubmoss), *Woodwardia areolata* (netted chain fern), *W. virginica* (Virginia chain fern), *Lygodium japonicum* (the invasive Japanese climbing fern) and *Osmunda cinnamomea* (cinnamon fern). Other plants included longleaf pine, turkey and water oak overhead, poison sumac and clethra shrubs and at least two species of *Sabatia*, *Aletris*, *Eriocaulon*, *Hypoxis* and a couple of *Rhexias*.



*Lygodium
japonicum*

Excitement was rampant at first sight of the hundreds of *Sarracenia* (pitcher plants). We found three species: *S. filiforma*, *S. flava*, *S. psittacina* and the hybrid of *S. filiforma* and *S. flava*. As we calmed down to more careful searching, we found *Pseudolycopodiella caroliniana* (slender bog clubmoss) and *Lycopodiella alopecuroides* (fox tail bog clubmoss) running through the grasses at ground level and learned to distinguish one from the other. *Osmunda regalis* (royal fern) grew in the edge of the bog. *Drosera filiformis* (sundew), *Polygalas*, *Xyris* and numerous sedges and grasses densely covered the bog.

Our second stop was at the side of the road to see *Thelypteris kunthii* (widespread maiden fern). Bonuses at this stop were *Pteridium aquilinum*, *Woodwardia areolata*, *Osmunda cinnamomea*, *Macrothelypteris torresiana* (the very invasive Pacific Mariana maiden fern) and *Ophioglossum petiolatum* (stalked adder's tongue), which proved to be a record for Conecuh National Forrest.

After a lunch stop at Blue Pond, we stopped at the junction of Covington County Road 24 and Alabama Highway 55 to check a creek where *Isoetes* had been reported. By this time, it was pouring rain and the creek was flooded. However, a bit of water never stopped an isoetiac so a number plunged into the wet. A few minutes later, we could distinguish pteridologists from drowned rats only by the grins on their faces and *Isoetes* in their hands. The species was tentatively determined to be *I. louisianensis* (Louisiana quillwort), which, if confirmed, is also a record for Conecuh National Forest.

The rain had stopped by the time we arrived at our last stop, Crawford's Bog, but the red dirt road was still very soft so we walked the 1.8 miles to it. Along the road, we found *Pleopeltis polypodioides* (resurrection fern) growing on trees. This bog was large and filled with many sedges, grasses and forbs, most of which we had seen before. We found *Osmunda regalis*, *O. cinnamomea*, *Woodwardia areolata*, *Lycopodiella alopecuroides*, *L. prostrata*, *L. caroliniana*, and a possible hybrid between *L. alopecuroides* and *L. prostrata*.

A brief last stop at a pond produced *Pleopeltis polypodioides* growing on a tree and on the ground around it, allowing us a closer look. The pond appeared to be a likely habitat for *Isoetes* but even the enthusiastic Carl Taylor quailed after hearing alligator stories.

Sunday also began at 7:00 am with about 22 of us once again eager for a day of ferning. We had lost the Hickey delegation as they had computer problems to resolve for the next day's presentations but had gained several others.

Our first stop was at the Battleship Alabama Memorial Park where *Ophioglossum petiolatum* had been reported. Despite much careful looking, this little fern remained elusive. (After getting more specific information about the location, I returned on Tuesday to look for it. Because of the daily rains, much of that area was underwater so I did not find it either.)

continued on page 114

American Fern Society Fern Forray 2003 *continued from page 113*

A roadside stop on Alabama Highway 59 at a spring and golden club swamp proved of great interest. We found *Selaginella apoda* (meadow spike-moss), *Woodwardia areolata*, *W. virginica*, *Osmunda regalis*, *Thelypteris palustris* (marsh fern) and a very large *Lygodium japonicum* climbing into a tree. Pat collected a plant and handed it to the "experts" for identification. After several minutes of speculation on which *Lycopodium* it was, she pointed out a small flower bud. The plant was *Mayaca aubertii* and it really did look like a *Lycopodium*. The vast numbers of golden club and water lilies must have been awesome in bloom earlier in the year.

The big stop for the day was at Haines Island, a series of trails and bluffs located along the banks of the Alabama River. Since this was a very different habitat from our previous stops, we found a lot of new ferns: *Dryopteris celsa* (log fern), *Asplenium platyneuron* (ebony spleenwort), *Thelypteris kunthii*, *Athyrium filix-femina* var. *asplenioides* (southern lady fern), *Cystopteris protrusa* (southern fragile fern), *Botrychium biternatum* (southern grapefern), *B. virginianum* (rattlesnake fern), *Polystichum acrostichoides* (Christmas fern), *Thelypteris dentata* (downy maiden fern), *Macrothelypteris torresiana*, *Lygodium japonicum*, *Onoclea sensibilis* (sensitive fern), *Pleopeltis polypodioides*, *Phegopteris hexagonoptera* (broad beech fern), *Woodwardia areolata*, and *Thelypteris hispidula* (variable maiden fern).

This wooded habitat also sheltered *Asarum shuttleworthii*, *Aristolochia serpentaria*, *Hydrangea quercifolia*, *Hymenocallis* and several *Magnolia* species and many other woodlanders, both familiar and unfamiliar.

The last stop for the day was at Claude D Kelley State Park, at a forested swamp. We found *Woodwardia areolata*, *Osmunda cinnamomea*, *Lycopodiella alopecuroides*, *Pteridium aquilinum*, *Osmunda regalis* and *Thelypteris palustris*. A short search for *Isoetes* was unsuccessful.

Soon, we arrived back in Mobile and parted with thanks to our leaders and many promises to "See you next year".



Hardy Fern Foundation Spore Exchange List 2003

To order: Please print your selections in alphabetical order. Include 50 cents for each fern requested (check payable to the Hardy Fern Foundation) and a self-addressed stamped envelope. No charge for overseas members but please enclose an international postal coupon (2 for large orders) and an envelope. Please list a first and second choice. Some items are limited so order early for best selection. If both of your choices are unavailable would you like to donate the 50 cents to the HFF or receive a refund? If neither is indicated, we will consider it a donation to our endowment fund. Thanks for your support!

Your fresh spores are always appreciated!!!

Mail requests to:

Katie Burki
501 South 54th Street
Tacoma, WA 98408

Genus species	var. or cv.	Year	Donor
Adiantum aleuticum	'Imbricatum'	'02	Steffen
Adiantum aleuticum	'Subpumilum '	'03	RSF
Adiantum aleuticum	'Subpumilum'	'03	Duryee
Adiantum aleuticum	'Subpumilum'	'03	Taylor
Adiantum pedatum		'02	Several
Arachniodes standishii		'03	RSF
Asplenium foreziense		'00	Seibert
Asplenium trichomanes		'03	Duryee
Asplenium trichomanes ssp. Trichomanes		'03	Taylor
Asplenosorus ebenoides		'03	Olsen
Athyrium filix-femina	'Bornholmiense'	'03	Duryee
Athyrium filix-femina	'Asplenioides'	'02	Briegel
Athyrium niponicum		'00-'03	Olsen
Athyrium niponicum	'Pictum'	'00	Several
Athyrium otophorum		'00-'02	Several
Athyrium pycnocarpon		'00	???
Blechnum cordatum	(chilense)	'03	Olsen

continued on page 116

Spore Exchange List 2003 *continued from page 115*

Blechnum cordatum (chilense)	'03	RSF
Blechnum fluviatile	'00	Olsen
Blechnum penna-marina	'03	Duryee
Blechnum penna-marina 'Cristata'	'03	Duryee
Blechnum spicant 'Crispum'	'03	Olsen
Blechnum spicant "forked" cw WA	'03	Olsen
Blechnum spicant 'Rickard's Serrate'	'03	Duryee
Blechnum wattsii	'00	RSF
Botrychium multifidum	'00	Olsen
Botrychium virginianum	'02	Briegel
Ceterach officinarum	'03	RSF
Ceterach officinarum	'03	Burki
Cheilanthes intertexta	'99	Schwartz
Cryptogramma acrostichoides	??	Gassner
Cyrtomium falcatum	'03	McGill
Cyrtomium macrophyllum	'01	Bundy
Dennstaedia punctilobula	'02	Briegel
Doodia media	'01	RSF
Dryopteris arguta	'03	Olsen
Dryopteris celsa	'00	RSF
Dryopteris championii	'03	RSF
Dryopteris corleyi	'03	RSF
Dryopteris cystolepidota	'03	RSF
Dryopteris cystolepidota	'00	RSF
Dryopteris dilatata 'Jimmy Dyce'	'03	Duryee
Dryopteris erythrosora	'03	Hay
Dryopteris erythrosora	'00	RSF
Dryopteris expansa	'03	Taylor
Dryopteris filix-mas	'03	RSF
Dryopteris formosana	'03	RSF
Dryopteris formosana	'01	RSF
Dryopteris fragrans v. remotiuscula	'03	RSF
Dryopteris goldiana	'02	Olsen
Dryopteris lepidopoda	'03	RSF

Dryopteris ludoviciana	'03	RSF
Dryopteris ludoviciana	'03	Hay
Dryopteris ludoviciana	'01	Mandeville
Dryopteris marginalis	'03	Hay
Dryopteris marginalis	'02	Briegel
Dryopteris namegatae	'01	Olsen
Dryopteris polylepis	'03	RSF
Dryopteris pycnopteroides	'03	RSF
Dryopteris remota	'03	Hay
Dryopteris remota	'01	RSF
Dryopteris sacrosancta	'00	McGill
Dryopteris scottii	'03	RSF
Dryopteris sieboldii	'03	Olsen
Dryopteris sublacera	'03	RSF
Dryopteris tokyoensis	'03	RSF
Dryopteris wallichiana	'01	Bundy
Gymnocarpium oyamense	'03	Duryee
Lygodium scandens	'02	Briegel
Matteuccia struthiopteris	'02	Briegel
Onocela sensibilis	'02	Briegel
Pellaea cordifolia	'00	Schwartz
Pellaea viridis	'01	McGill
Pentagramma triangularis	'01	Duryee
Phyllitis scolopendrium	'01	Bundy
Phyllitis scolopendrium 'Corkscrew'	'03	Olsen
Phyllitis scolopendrium 'Digitata'	'01	Mandeville
Polypodium glycyrrhiza	'03	RSF
Polypodium glycyrrhiza	'01	Taylor
Polypodium interjectum	'03	RSF
Polypodium scolieri	'03	RSF
Polypodium scolieri	'01	RSF
Polystichum lonchitis	'03	Taylor
Polystichum luctuosum	'03	RSF
Polystichum luctuosum	'02	Olsen

continued on page 118

Spore Exchange List 2003 *continued from page 117*

Polystichum mayebarae	'03	Olsen
Polystichum munitum	'00	Several
Polystichum neolobatum	'01	Bundy
Polystichum richardii	'00	Seibert
Polystichum setiferum	'03	Duryee
Polystichum setiferum cv aff. 'Pulcherrimum'	'03	Olsen
Polystichum sp. (hardy collected in Yunan)	'03	Olsen
Polystichum tripterum	'00	Olsen
Polystichum tsus-simense	'03	Duryee
Pyrrosia shearerii	'02-03	Olsen
Thelypteris palustris	'00	Schott
Thelypteris patens	'02	Briegel
Woodsia intermedia	'01	Bundy
Woodsia polystichoides	'03	Olsen
Woodsia scopulina	'03	Taylor
Woodwardia areolata	'02	Several
Woodwardia fimbriata	'02	Mandeville

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Ferns & Fern Allies Of Southeast Alaska: A Preliminary Checklist

From: Mary Stensvold [kruzov@yahoo.com]

The following is a preliminary list of 65 ferns and fern allies known from southeastern Alaska. This portion of the state is located between the latitudes of 54°40' and 60°22' degrees north and is bounded on the west by the North Pacific Ocean, on the north by the Wrangell-St. Elias Mountains, on the east by the Coast Range, and on the south by Dixon Entrance.

Plant names are listed alphabetically by family and follow the family arrangement of the *Flora of North America* (Flora of North America Editorial Committee, 1993). Scientific names were generally taken from treatments in *Flora of North America*. Synonymous names from older floras covering southeastern Alaska are also listed: however, this is not a complete synonymy. These floras include: *Anderson's Flora of Alaska and adjacent parts of Canada* (Welsh, 1974), *Flora of Alaska and Neighboring Territories* (Hulten, 1968), *Vascular Plants of the Pacific Northwest* (Hitchcock, et al. 1955-61), *Flora of the Queen Charlotte Islands* (Calder & Taylor, 1968).

LYCOPODIACEAE

Diphasiastrum alpinum (L.) Holub

Lycopodium alpinum L.

Diphasiastrum complanatum (L.) Holub

Lycopodium complanatum L.

Diaphiastrum sitchense (Ruprecht) Holub

Lycopodium sitchense Ruprecht

Huperzia haleakalae (Brackenridge) Holub

Lycopodium selago L. var. *haleakalae* Brackenridge

Lycopodium selago L. var. *selago*

Lycopodium selago L. var. *appressum* Desv.

Huperzia chinensis (Christens.) Ching

Huperzia miyoshiana (Makino) Ching

Lycopodium selago L. var. *miyoshianum*

Makino

Lycopodium selago L. ssp. *chinense*

(Christens.) Hult.

continued on page 120

Ferns and Fern Allies of Southeast Alaska *continued from page 119*

Huperzia occidentalis (Clute) Kartesz & Gandhi

Lycopodium lucidulum Michx. var.

occidentale (Clute) L.R. Wilson

Lycopodium selago L. ssp. *patens* (Beauv.)

Calder & Taylor

Lycopodium annotinum L.

Lycopodium clavatum L.

Lycopodium dendroideum Michaux

Lycopodium obscurum L. var. *dendroideum*

(Michx.) D.C. Eat.

Lycopodium lagopus (Laestad. ex Hartm.) G

Zinserl. ex Kuzen

Lycopodium clavatum L. var. *monostachyon*

Grev. & Hook.

Lycopodiella inundata (L.) Holub

Lycopodium inundatum L.

SELAGINELLACEAE

Selaginella selaginoides (L.) Palisot de

Beauvois ex Martius & Schrank

ISOETACEAE

Isoetes echinospora Drieu

Isoetes maritima L.

Isoetes occidentalis L. F. Henderson

Isoetes x truncata (A. A. Eaton) Clute

EQUISETACEAE

Equisetum arvense L.

Equisetum fluviatile L.

Equisetum hyemale L. subsp. *affine* (Engelmann)

Calder & Taylor

Equisetum x litorale Kuehlewein ex Ruprecht

Equisetum palustre L.

Equisetum pratense Ehrhart

Equisetum scirpoides Michaux

Equisetum sylvaticum L.

Equisetum telmateia subsp. *braunii* (J. Milde)

Hauke

Equisetum variegatum Schleicher ex F. Weber & D.

Mohr subsp. *alaskanum* (A. A. Eaton) Hulten

Equisetum variegatum Schleicher ex F. Weber & D.

Mohr subsp. *variegatum*

OPHIOGLOSSACEAE

Botrychium alaskense W. H. Wagner & J. R. Grant

Botrychium ascendens W. H. Wagner

Botrychium lanceolatum (S. G. Gmelin) Angstroem

ssp. *lanceolatum*

Botrychium lunaria (L.) Swartz

Botrychium minganense Vict.

Botrychium lunaria (L.) Swartz var.

minganense (Vict.) Döll

Botrychium multifidum (S. G. Gmelin) Rupr.

Botrychium pinnatum H. St. John

Botrychium boreale (Fries) Milde

Botrychium tunux Stensvold & Farrar

Botrychium virginianum (L.) Swartz

Botrychium yaaxudakeit Stensvold & Farrar

PTERIDACEAE

Adiantum aleuticum (Rupr.) Paris

Adiantum pedatum L. var. *aleuticum*

continued on page 122

Ferns and Fern Allies of Southeast Alaska *continued from page 121*

Ruprecht

Cryptogramma acrostichoides R. Br.

Cryptogramma crispera (L.) R. Br. ex Hook.

ssp. *acrostichoides* (R. Br.) Hulten

Cryptogramma sitchensis (Rupr.) T. Moore

Cryptogramma crispera (L.) R. Br. ex Hook.

var. *sitchensis* (Rupr.) C. Christens

Cryptogramma stelleri (S. G. Gmelin) Prantl in

Engler

HYMENOPHYLLACEAE

Hymenophyllum wrightii Bosch

Mecodium wrightii (Bosch) Copeland

DENNSTAEDTIACEAE

Pteridium aquilinum (L.) Kuhn var. *pubescens* Underwood

THELYPTERIDACEAE

Phegopteris connectilis (Michx.) Watt

Thelypteris phegopteris (L.) Slosson

Thelypteris quelpaertensis (Christ) Ching

Thelypteris limbosperma auct. non (All.)

Fuchs

BLECHNACEAE

Blechnum spicant (L.) Smith

ASPLENIACEAE

Asplenium viride Huds.

Asplenium trichomanes-ramosum L.

Asplenium trichomanes L. ssp. *trichomanes*

DRYOPTERIDACEAE

- Athyrium americanum* (Butters) Maxon
Athyrium alpestre (Hoppe) Milde var.
americanum Butters
Athyrium distentifolium Tausch ex Opiz var.
americanum (Butters) Cronq.
Athyrium filix-femina (L.) Roth ssp. *cyclosorum*
(Rupr.) C. Christens.
Cystopteris fragilis (L.) Bernh.
Cystopteris montana (Lam.) Bernh. ex Desv.
Dryopteris expansa (C. Presl) Fraser-Jenkins &
Jermy
Dryopteris dilatata (Hoffmann) Gray ssp.
americana (Fisch.) Hultén
Dryopteris austriaca (Jacq.) Woyner ex
Schinz & Thell.
Gymnocarpium disjunctum (Ruprecht) Ching
Gymnocarpium dryopteris (L.) Newman var.
disjunctum (Rupr.) Ching
Gymnocarpium dryopteris (L.) Newman
Polystichum andersonii Hopkins
Polystichum braunii (Spenner) Fée ssp.
andersonii (Hopkins) Calder & Taylor
Polystichum braunii (Spenner) Fée
Polystichum braunii (Spenner) Fée ssp.
purshii (Fern.) Calder & Taylor
Polystichum kruckebergii W.H. Wagner
Polystichum lonchitis (L.) Roth
Polystichum munitum (Kaulf.) C. Presl
Polystichum setigerum (C. Presl) C. Presl
Polystichum braunii (Spenner) Fée var.
alaskense (Maxon) Hultén

continued on page 124

Ferns and Fern Allies of Southeast Alaska *continued from page 123*

Woodsia alpina (Bolton) S.F. Gray

Woodsia ilvensis (L.) R. Br.

Woodsia scopulina D.C. Eat. ssp. *scopulina*

POLYPODIACEAE

Polypodium glycyrrhiza D.C. Eat.

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