

# Hardy Fern Foundation NEWSLETTER

Editor Sue Olsen • VOLUME 7 NUMBER 1 • WINTER 1997



## President's Message

Sylvia Duryee

I hope everyone has survived the weather entrapments of this winter! I am sure it has been very difficult for many people. The covered propagating used for growing very small juvenile ferns has been very helpful for me, and adding some lights keeps them from freezing.

In retrospect the HFF owes thanks to a number of our members. Members and Satellite Gardens alike wrote with favorable comments regarding the ferns received from our various distributions. We appreciate receiving your comments and it helps the morale of those trying to keep up with your needs and desires (as well as doing the packing).

All of the membership would like to thank Jim Horrocks, Joan Gottlieb and Catharine Guiles (all of whom have articles in this newsletter) for their regular contributions to the newsletter as well as to Robin Halley for writing and sharing articles from the San Diego Fern Society's bulletin *The Fern World*. Our editor, Sue Olsen appreciates receiving ideas and information from all of our readers. We also want to thank Sue Mandeville who is hard at work designing a web page for the HFF. Watch for us to hit cyberspace soon. (*Other sites already on line include the American Fern Society at <http://www.visuallink.com/fern>. And the San Diego site at <http://www.inetworld.net/~sdferr/> or for a chance to exchange information you can network by sending an e-mail to [listproc@gac.edu](mailto:listproc@gac.edu) and simply say "subscribe pteridonet" followed by your name. Ed.)*

The Bellevue Botanical Garden project is slowly moving forward. The energy needed to move onward is unbelievable!



Planting at Bellevue Botanical Garden. L-R, Tom Kuykendall, Herman Entz, Sue Entz, Pat Kennar, Harry Olsen, George Johnson, John van den Meerendonk, Dan Tanabe, Willanna Bradner. Photo by Sue Olsen.

Thanks to John van den Meerendonk who drew up the proposed planting plan and to John Putnam we have managed a small beginning. Some 133 ferns were planted in November but the project itself may take a good deal longer. The Bellevue Botanical Garden is a young garden that was established when the Shorts family generously donated their property to the City of Bellevue. To date the garden contains a perennial garden, a water wise garden, a fuchsia garden, Japanese garden, a ground cover garden (financed by the Shorts) and the beginnings of an alpine garden. In the summer of 1996 the Shorts (Cal and Harriet) gave a substantial amount of money to the Hardy Fern Foundation to establish a fern garden on the property. We would be very pleased to fulfill their desires. We are all saddened by the death of Harriet Shorts, and will continue our efforts to create a fern garden in her memory.

The next Northwest Flower and Garden Show is on the horizon and we need volunteers from Feb. 5th through the 9th. If you can help by being at our booth please call Janet Dalby at (206) 454-3447. Remember volunteering entitles you to free admission to the show. Again we are looking forward to hosting a joint exhibit with the Rhododendron Species Botanical Garden. Hope to see you there.

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## James Wood Dyce 1905 - 1996



James W. Dyce, 1991. Photo by Guy Huntley.

It had to happen but I still did not expect it, Jimmy Dyce has died at the grand old age of 91. Jimmy seemed indestructible, true, he had of late spent most of his days in his favourite armchair, but it was not unknown for him to venture out on social forays from time to time, indeed he died while away for Christmas with friends on the Norfolk Broads some 100 miles from his home at Loughton in North London. He became ill on Boxing Day and died in the hospital three days later on the 29<sup>th</sup> of December, two days short of his 92<sup>nd</sup> hogmanay. He would have been 92 on the 27<sup>th</sup> of May 1997.

Arguably no one has done more for the British Pteridological Society or for fern growing. His death marks the end of an era and certainly leaves a void in my life. There is no doubt he has been the single largest influence in my fern world. I owe him a tremendous amount - just like Jimmy himself owed so much to his 'mentors' - notably Percy Greenfield and the Rev. E. A. Elliott.

Although much has been written about Jimmy (see various 1985, Dyce, 1981, 1982, and 1991; Hall 1991; Busby, 1991) I am sure that an outline of his achievements in the fern world will interest members of the HFF:

Jimmy joined the British Pteridological Society in 1935 and attended his first field meeting in 1939. The Society went into limbo during the war and showed no signs of life afterwards, and it was almost entirely due to Jimmy's persistence and hard work that activities started up again. The Society grew in strength and when Jimmy eventually retired from his job in banking in the City of London in the sixties, he devoted a very large part of his time to the Society. He wrote many articles, answered mountains of mail, did a lot of backstage work and above all attended virtually every meeting for 10 or 15 years. This was no small commitment of time or money because the Society had grown and the norm was 9 meetings a year, some just a day, others a weekend but one or two lasted a week. As new members my wife and I knew

Jimmy would be at a meeting, We therefore knew in advance the meeting would be a success, fern-wise and socially. From such foundations the strength of the Society grew and grew. At one time or another Jimmy held almost every office in the Society, the one notable exception was Editor of the Fern Gazette. In recent years he was, unfortunately, not able to attend meetings but he retained a keen interest in all aspects of the Society's business and indeed anything ferny. Towards the end my contact was mainly down the phone but Jimmy was always cheerful, on the ball, helpful and, as ever, a pleasure to chat with.

His interest in ferns was not restricted to Britain. Jimmy made several ferny trips overseas culminating in his trip to the States in 1980. He stayed with Judith Jones in Seattle and enjoyed first hand the hospitality of many other fern growers in the western U.S. His presence was even written up in a local newspaper! I know Jimmy had very fond memories of this trip taking place as it did just after Mount St. Helens blew its top. Up to his death huge posters of the eruption still adorned his sitting room in Loughton.

For his services to the British Pteridological Society he was awarded the MBE in the 1993 New Year's Honours List, later receiving his award from Her Majesty the Queen at Buckingham Palace - a very fitting tribute, and no one deserved it more than Jimmy Dyce.

Busby, A. R., Gleanings from the Minute Book 1891-1991, pp. 95-103, in History of the British Pteridological Society, 1991.

Dyce, J. W., Presidential Notes, p. 109, in Bulletin of the British Pteridological Society, 1981.

Dyce, J. W., Ferns, the Fern Society and - Jimmy Dyce, pp. 185-187, Bulletin of the British Pteridological Society, 1982.

Dyce, J. W., The British Pteridological Society - the First Hundred Years, pp. 83 - 93, in History of the British Pteridological Society, 1991.

Hall, N. A., The Presidents of the British Pteridological Society, pp. 119 -126, in History of the British Pteridological Society, 1991.

Various, in issue of the Pteridologist, pp. 49 - 58, 1985; dedicated to Jimmy Dyce on the occasion of his 80<sup>th</sup> birthday.

*Martin Rickard  
Tenbury Wells, England*



## Addenda 1996 HFF Spore Exchange

1. <i>Adiantum aleuticum subpumilum</i>	dwarf western maidenhair	
2. <i>Adiantum pedatum</i> Miss Sharples	Miss Sharples maidenhair	96/173
3. <i>Aspidotis densa</i>	Indian dream	96/150
4. <i>Asplenium adiantum-nigrum</i> Silesiacum	Silesian black spleenwort	96/45
5. <i>Asplenium hondoensis</i>		96/157
6. <i>Asplenium scolopendrium Americanum</i>	American Harts tongue	96/150
7. <i>Asplenium scolopendrium Americanum</i> forked fronds		96/173
8. <i>Asplenium trichomanes Lovisianum</i>		96/45
9. <i>Asplenium trichomanes Melzeranum</i>		96/45
10. <i>Asplenium trichomanes Pachyrachis</i>		96/45
11. <i>Asplenium trichomanes x lusaticum</i>		96/45
12. <i>Athyrium ? Branford Beauty</i> 96/173		
13. <i>Athyrium filix-femina</i> Cruciato-cristatum		
14. <i>Athyrium filix-femina</i> Fieldiae		96/153
15. <i>Athyrium filix-femina</i> Frizelliae	Tatting fern	96/173
16. <i>Athyrium filix-femina</i> Grandiceps	Crested lady fern	96/173
17. <i>Cyrtomium ? Litorale</i>		96/173
18. <i>Cyrtomium fortunei</i> Clivicola		96/21
19. <i>Cystopteris bulbifera</i>	Bulblet bladder fern	96/156
20. <i>Diplazium acrostichoides</i>		96/173
21. <i>Dryopteris affinis</i> Polydactyla		96/153
22. <i>Dryopteris austriaca</i> Recurvata		96/173
23. <i>Dryopteris clintoniana</i> hexaploid		96/173
24. <i>Dryopteris decipiens</i>		96/173
25. <i>Dryopteris filix-mas</i> Cristata Angustatum		96/173
26. <i>Dryopteris goldiana x clintoniana</i>		96/173
27. <i>Dryopteris ludoviciana</i>	Southern wood fern	96/156
28. <i>Dryopteris pseudo-mas (affinis)</i> Cristata the King		96/158
29. <i>Dryopteris tokyoensis</i>	Tokyo wood fern	96/153
30. <i>Dryopteris uniformis</i>		96/157
31. <i>Isoetes</i> \$\$\$ melanopoda		96/184
32. <i>Matteuccia \$ struthiopteris</i> Asian form		
33. <i>Phyllitis hybrida</i>		96/185
34. <i>Polystichum acrostichoides</i> Cristata	Crested Christmas fern	96/173
35. <i>Polystichum setiferum</i> Proliferum Wollastonii		96/173
36. <i>Polystichum tagawanum</i>	Tagawa's holly fern	96/173
37. <i>Polystichum xiphophyllum</i>		96/21
38. <i>Woodsia alpina</i>	Alpine woodsia	96/45
39. <i>Woodsia manchuriensis</i>	Manchurian woodsia	96/150
40. <i>Woodsia polystichoides</i>	Holly fern woodsia	96/173

### Donors:

21 James Horrocks	45 PhDr Zdenek Seibert	150 Jens Nielson
153 Owen Hammerberg	156 Peggy McGill	157 Stephen Coppins
173 Peter Podaras		

**To Order:** Please print your selections clearly in alphabetical order using the scientific name. Include 25 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. **Maximum order 25 per year.**

### Mail Requests to:

Wayne "Bubba" Baxter ■ 307 Riverdale Cir. ■ Stephenson, VA 22656 ■ e-mail fernbubb@visuallink.com

The whole exchange, HFF and AFS can be accessed on the American Fern Society HomePage located at: <http://www/visuallink.com/fern>. Then simply push the Spore Exchange button. The list is updated whenever there are a lot of new donations and, of course, when I can get time to mess with it.

**The HFF Addendum '96 List:** There are several interesting ferns that have recently come on board, many are hybrids. There is a cross between *Dryopteris goldiana* and *Dryopteris clintoniana* and a *Dryopteris clintoniana* Hexaploid Yowza!!!! Then we also have something for you aquatic nuts *Isoetes melanopoda*, very primitive.... A late Christmas present in *Polystichum acrostichoides* 'Cristatum' (get it Christmas fern) recently discovered by Peter Podaras. Also one from distant China, *Woodsia manchuriensis*, oooooh exotic! Hopefully you can find something that will get your green thumb itching again.

We all need to consider that there is no endless source of spores that I can tap into. All of the spores come from members like you. If there are not enough donations then the quality of the whole exchange is affected. Please take time during the next year (it isn't really that much time, I have done it many times myself) to focus on the ferns in your area or country and get them on the exchange. There are ferns that are indigenous to everyone's area (get a fern book out and have a look) that other members can't get otherwise. Many of the spores on the list are old or few in number, even common ferns need fresh spores or their viability plummets. The Hardy Fern Foundation Spore Exchange is a unique institution and with your help it will continue to be the best in the world. Thank you for your help. *Bubba Baxter*



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## Satellite Profile

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### BIRMINGHAM BOTANICAL GARDENS

*(This is a continuation of the series featuring our Satellite Gardens. Ed.)*

Established in 1962 by the City of Birmingham, the Gardens sit on 67 ½ acres of land which were once Indian campgrounds. Nationally acclaimed landscape architect Robert Marvin designed the master plan for renovation and expansion which was begun in 1981 and continues.

#### Features (see map):

1. Sonat Lake and Lane Park Entrance
2. The Frances Dean Blount Plaza. A focal point is "The Granite Garden", a sculpture by Jesus Bautista Moroles. The Plaza is lined with Shumard oaks, native Southern trees.
3. The Garden Center with information, reception area, orientation center, restaurant, gift shop, meeting rooms and the Horace Hammond Memorial Library.
4. The Beth McReynolds Memorial Garden featuring plants that can be cut and used in floral arrangements.
5. The Rushton Pavilion, a European garden featuring latticed fences and gravel terraces under a canopy of linden trees.
6. The Hill Garden designed for gatherings for concerts, weddings or parties with a large glass-topped gazebo amidst a bosk of Zelcova and a water garden.
7. The Dunn Formal Rose Garden and Pergola with 150 types of hybrid roses in bloom from April until frost.
8. The Ireland Old Fashioned Rose Garden features 50 types of roses from around the world that were in cultivation prior to 1867 when the first hybrid teas were introduced.
9. The Formal Garden is the foreground to the Conservatory with walks lined with Crape Myrtles and accented with two large fountain urns.
10. The Floral Clock which embellishes the entry to the Conservatory.
11. The Conservatory is the largest clearspan greenhouse in the Southeast and shelters many types of tropical plants and displays seasonal greenhouse grown flowers. To the North is the Camellia House where camellias of various types bloom during the winter. On the South is the Desert House displaying many unusual plants. The Conservatory also houses permanent collections of bromeliads, tropical ferns and award winning orchids.
12. The Thompson Enthusiast Garden suggests creative uses for small residential spaces.
13. The Bruno Vegetable Garden features new selections of vegetables with growing techniques for the home gardener.
14. The Herb Garden features raised terraced beds with culinary, medicinal and aromatic herbs.
15. The Hess Camellia Garden features the State Flower of Alabama blooming in many colors and variations during fall, winter and early spring.
16. The Turlington Camellia Solar House focuses on design and location for a passive solar greenhouse.
17. The Bog Garden contains a variety of wetland habitats and plants.
18. The Kaul Wildflower Garden located on the site of an old rock quarry is noted for its extensive wildflower collection.
19. The Fern Glade contains worldwide representatives of hardy ferns and a synoptic garden for serious fern study. Sizes vary from miniature to head-high and plants may be evergreen or deciduous.
20. The Curry Rhododendron Garden features hybrids that begin to bloom in late spring.
21. The Abroms Rhododendron Species Garden tests species rhododendrons from around the world.
22. The Jemison Lily Garden houses award winning and newly-introduced daylilies blooming in June & July which can be viewed from the Walter Overlook.
23. The Iris Garden contains a variety of iris types as well as a flower border.
24. A Garden for Southern Living displays continuous seasonal color.
25. The Lawler Gates entrance to the Birmingham Zoo.
26. The Barber Alabama Garden stretches to six acres with native Alabama plants.
27. The Hulsey Woods are a natural woodland separating the formal gardens & the Japanese Garden.
28. The Japanese Gardens covering 7 ½ acres was officially opened by the Japanese Ambassador to the U.S. in 1967 and includes The Torii, The Zen Garden, A Ribbon of River Gravel, The Dragon's Head Stone, The Bonsai House, The Stone Bridge, The Falls of the Seven Virtues, The Turtle Rock, Long Life Lake, Cooling Breeze Shelter, The Bridge of Accomplishment, The Circle of Life Fulfillment Bridge, and a traditional teahouse.

*The Gardens are open daily from dawn until dusk.*



## THE BIRMINGHAM FERN SOCIETY

In 1970, Edgewood Garden Club members Mrs. Ida Burns, Mrs. Sue Clisby and Mrs. Dora Smith were talking in the Hodges room of the Birmingham Botanical Gardens. The director of the Botanical Gardens, Mr. Mel Wallace, presented the ladies with a fern catalog and asked if they would like to order some ferns to plant in the Botanical Gardens. Soon afterward, several members brought ferns from their own gardens and began to plant them along a stream that is now the Botanical Garden's Fern Glade. That is how it all began.

By 1975 the project had grown so large that a separate club was organized and Mrs. Debbie Rogers became the first president. The purpose of the club was to promote interest in ferns and maintain the fern glade.

The present glade is about four or five acres with rock borders at the top and a stream of water flowing through the center. The Fern Society has purchased a pump to circulate the stream creating a waterfall. A sprinkling system has also been added. A holding bed of potted ferns is maintained for selling at the annual Fiesta in April and the fern sale in June.

In 1990 a gift of \$10,000. was presented to the Botanical Gardens to purchase necessary items for the new building at the Botanical Gardens.

At a spring meeting in 1989, Mrs. Pat Sholund proposed that we develop an area for each genus grown in the fern glade. Each species of fern is grouped in their genus therefore this area is called the Synoptic Garden.

The club was asked to be a satellite garden for the Hardy Fern Foundation in 1991. The test garden is located in the Synoptic Garden area. Visitors can now observe new ferns and learn which ones are hardy for our area.

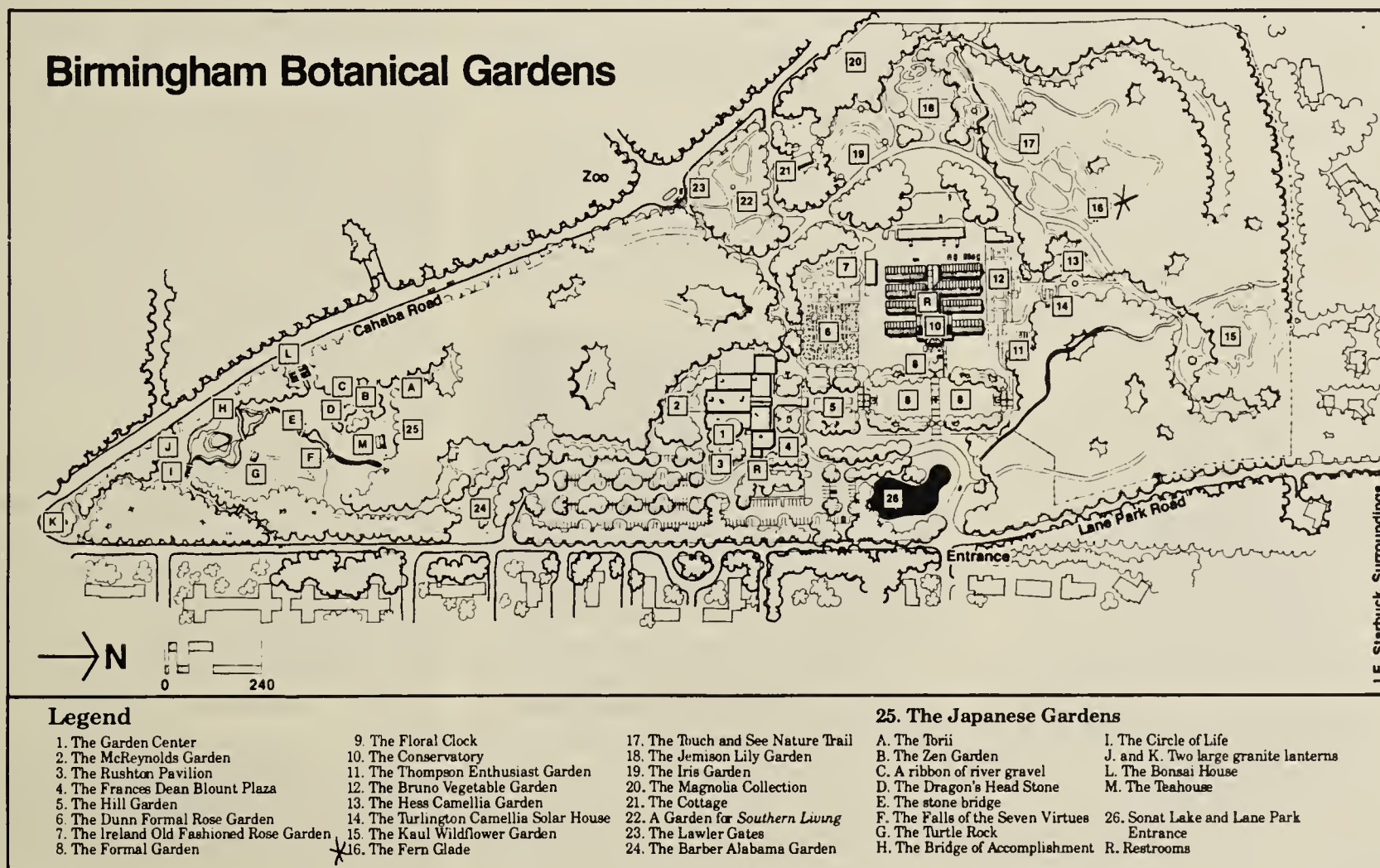
On March 29, 1991, a tornado swept through the Birmingham area and devastated the fern glade. The plants that were not lost to felled trees were destroyed by the tractors that had to clear the area. The sprinkling system was also destroyed.

Today the area is cleared and the trees and ferns have been replanted. It is amazing how well the ferns are doing even though they have lost so much of their shade.

The Fern Society meets at the Botanical Gardens the third Wednesday of each month except December. They sponsor an annual Fern Show and Sale in June and have a guest speaker following the sale. *(Your editor was delighted to be invited to speak in June of 1996. I thoroughly enjoyed meeting the many members and visiting the lovely and extensive fern garden.)*

Future projects include maintaining the fern glade, potting ferns for sales and reclaiming undeveloped areas by removing privet and honeysuckle vines.

Linda Brock, Edythe Crumpton, Co-Chairmen of the HFF Test Garden





## The Unchanging Fern

Catharine W. Gulles  
New Gloucester, ME 04260

The fronds of a particular fern in Cambridge, Massachusetts are caught in time. Season after season, year after year, in a quiet corner, they never change, remaining fresh and green, on view even when the ground is covered with snow. Likewise, the life stages of this fern, from its spores, through the prothallium, embryo sporophyte, and sori are there to be seen without a magnifying glass or microscope. How can this be?

Very simple—and yet not so simple. This fern, identified as the Male fern but probably another species (1), rests in a case at the Botanical Museum at Harvard University. It is part of that institution's famous and unique Ware Collection of Glass Models of Plants, more usually known as the "glass flowers." "Simple," because it is a model, not the real thing. "Not so simple," because it is agreed that the artistry of those who created these models has never, and perhaps can never, been equaled.

In the articles I have written on ferns in New England for this newsletter, readers have perhaps noted that Harvard University and people associated with it are a constant theme. This is not surprising. Beginning in 1847, when Louis Agassiz became a professor at Harvard, this institution became a leading center for scientific studies in the United States. Agassiz had ambitions to develop a museum which would represent all the branches of natural history, and he and, later, his son, Alexander Agassiz, worked to achieve this goal. The botanical section of this museum was established in 1858 by Asa Gray, for whom one of the university's herbaria is named. At that time, economic botany was the focus of instruction and research.

The first director of the Botanical Museum, Professor George Lincoln Goodale, had a problem. He wished to find a medium from which plant models could be made that would both convey scientific accuracy—important for students—and interest and instruct the public. Herbarium specimens lack appeal for

the general public, and he found the wax and paper-mache models of the period inadequate. After seeing some models of marine invertebrates made of glass, he concluded that this was the medium he sought. Yet the artisans who made them lived near Dresden, Germany. Thus, in 1886 Goodale went to that country to consult with a father-and-son team of glass artisans who practiced the difficult technique of lampworking, Leopold and Rudolf Blaschka. They belonged to a family of Bohemian origin whose members had been glass workers since the 1600s.

Goodale was successful in persuading the Blaschkas to change their specialty from marine biology (and glass eyes) to botany, and when the first of their efforts were displayed, two Boston ladies, Elizabeth C. Ware and her daughter, Mary Lee Ware, who were "struck by the beauty and excellence of the artistry and workmanship," (2) offered to underwrite the project, which was to be a memorial to Mrs. Ware's late husband, Dr. Charles Eliot Ware, a Harvard graduate. The original contract was for ten years; the actual creation of the collection took from 1887 to 1936!

In total, the collection includes "847 life-size models representing some 780 species and varieties of plants in 164 families, with over 3,000 detailed models of

enlarged flowers and anatomical sections of various floral and vegetative parts of the plants." (3) The plants reproduced were chosen for their instructional value, and botany students at Harvard to-

day use the collection. Yet on some days, these students must lose patience and retreat to an herbarium or their books



Fig. 1. The mature prothallium. This model is 8 to 10 cm long. The photo also includes a portion of the life-size frond. All photos are by C.W. Gulles.

because the glass flowers are Harvard's most popular tourist attraction. According to *The Glass Flowers at Harvard*, some 100,000 visitors come to the Botanical Museum each year. During the school year, yellow buses line Oxford Street, outside the entrance to the museum. On one of the days when I visited the glass flowers, a gentleman who was examining the cases said to me, "I have seen most of the jewels and things in Europe, but this is far more impressive."

The mentioned book, with its beautiful photographs, including one of the exquisite bouquet of flowers created by Leopold Blaschka in 1889 for his two patronesses, does not include the fern. And I doubt if many of the tourists pause long before the case that contains it. Understandably, they wish to spend more time admiring the orchids, the mountain laurel, gentians and other colorful marvels.

Those interested in ferns, however, will certainly want to study what is truly a sculptural presentation on the life cycle of the fern. The fern display is part of a series the Blaschkas did to demonstrate the life histories of the "lower plants." These include wheat rust fungus; the liverwort *Marchantia polymorpha*; the mosses *Georgia pellucida* (now classified as *Tetraphis pellucida* Hedw.), *Funaria hygrometrica* and *Catharinea undulata* (now classified as *Atrichum undulatum* (Hedw.) P. Beauv.; two other

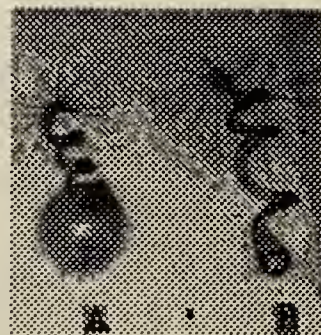
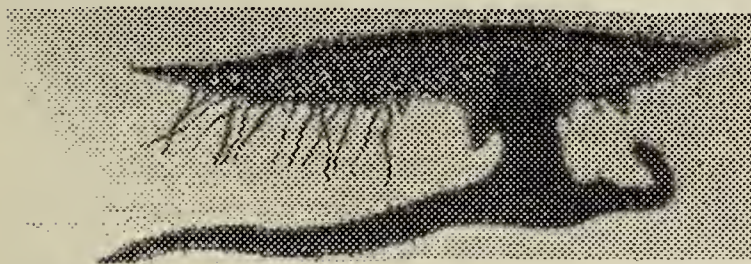


Fig. 2. Two examples of antherozoids, showing the spiral shape and cilia



fems, *Salvinia natans* and *Marsilea* sp., and two club mosses, *Selaginella rupestris* and *Selaginella lepidophylla*. The curator of the collection, Susan Rossi-Wilcox, has recently been researching the history of its creation, and she said that, unfortunately, there is very little information about the life history series. The fern models were made in the 1890's or later; in contrast, all the flower models are dated.

With Germanic thoroughness, the Blaschkas present the life cycle of the fern in 21 steps (a botany textbook that I own does the job in nine). For those



**Fig. 3. A stage in the development of the young sporophyte**

interested in this degree of detail, these steps are listed at the end of the article. The first things that catch the eye when one approaches the yard-square display are the two life-size fronds, which look for all the world like the real thing. In their life-size models, the Blaschkas reproduced in glass the exact dimensions and color of every detail of the plant. One of these models presents the front of the frond and the other, the underside, with its sori. Unfortunately, the sori are very difficult to see through the glass case protecting the exhibit, probably because oxidation of the paint or enamel used in coloring them has caused them to darken.

The remaining models in the series are magnified anywhere from 20 to 2,000 times. Among the models of the gametophyte, I draw the reader's attention to the photos of the mature prothallium (Fig. 1) with a portion of the life-size frond) and the antherozoids, or sperm cells (Fig 2). The prothallium was probably made of clear glass and then colored. Note, in the photo of the sperm cells, the delicate cilia—all glass.

Figure 3 shows the elongating root of the new sporophyte (left) and the tip (right) as it grows toward the light. The rhizoids and archegonia of the prothallium are clearly visible.

Of the whole fern group, Figure 4 is perhaps the most virtuoso demonstration of the lampworker's art. It is a vertical section of the sorus, magnified 150 times, showing the cellular structure of the frond, the indusium and, between them, the developing sporangia. It is about 30 cm wide and perhaps 13 cm high, and it is made of clear glass, colored a pale green. Additional models, not illustrated here, also show the sporangium as it develops and present a section of it.

To conclude with the photographs, Figure 5 shows not a fern but a bachelor's button in the process of being pollinated by a butterfly. Alas, this photo cannot show the colors of the flower and butterfly, but it does give an idea of the delicacy of the Blaschkas' art and the lengths they were willing—and apparently eager—to go to carry out the wishes of the directors of the Botanical

Museum that the collection have scientific and educational value.

Questions came to mind as one wanders among the cases holding the glass flowers. The most intriguing is: Could the items in this collection be reproduced? In finding the Blaschkas, Professor Goodale found two artists whose skill in glass working was equaled by their concern for exactitude and a deep interest in botany. For example, at one point, Rudolph Blaschka came to the United States and, in company with a botanist, W.F. Ganong, a member of the faculty of Smith College, traveled to the west coast, making drawings and collecting herbarium specimens for the project. Paul Stankard, a glass artisan known for his beautiful floral pa-



**Fig. 4. Verticle section of sorus, showing the umbrella-like indusium, leaf tissue and "The group of sporangia [developing] from the columnar placenta supporting it"**

perweights, believes it would be possible to reproduce the collection (assuming, as one must, infinite time and funds). Ms.

Rossi-Wilcox said that lampworkers who have seen the glass flowers are challenged to try their hand at a specimen. Others, however, believe it could not be done.

Admittedly, this article strays very far from the central concerns of this newsletter. However, botanically-minded visitors to the Boston area will certainly want to head for Harvard's Botanical Museum, where the glass fern and its unchanging companions await admiration.

*I wish to offer many thanks to Susan Rossi-Wilcox, Curator of the Ware Collection, for her help. Also, I am grateful to Prof. R. Stotler, of Southern Illinois University, for assistance, through the Internet, with taxonomic questions; and to Sue Olsen for her help with details.*

#### Footnotes and references

(1) The mentioned fern is labeled as the Male fern, *Dryopteris filix-mas*; however, a study of the silhouettes of the two life-size fronds compared with drawings of Male ferns in fern guides suggests that this may not be the case. The closest identifications that Sue Olsen and I could make are *Dryopteris intermedia*, the Evergreen wood fern, or *Dryopteris marginalis*, the Marginal wood fern. As the Blaschkas grew plants of North American origin in their garden specifically to help them in their work, it is possible that they could have imported one of these species as the model for their fern. As I noted, probably because of oxidation of the models' coloring agents, it is difficult to see the sori on the life-size model of the fern. I was given to understand by Ms. Rossi-Wilcox that, though nomenclature has changed over the decades, reidentifying the plants in the collection has not been a problem.

(2) Schultes, R.E., and Davis, W.A. 1982. *The Glass Flowers at Harvard*. Photographs by Hillel Burger. Cambridge: Botanical Museum of Harvard University, p.3.

(3) Schultes, R.E., and Davis, W.A. 1982. Inside front cover.

*continued on page 10*



**Fig. 5. Halved bachelor's button flower, showing the process of pollination by the butterfly *Zygaena*.**

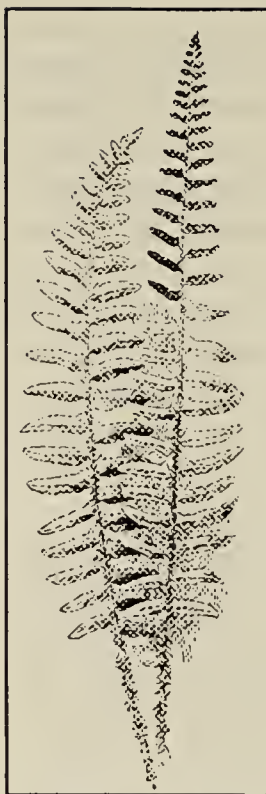


## *Polystichum acrostichoides*

### Christmas Fern

James Horrocks, Salt Lake City

According to Wherry, the name "Christmas" fern comes from the fact that early settlers used the fronds for Christmas decorations. A more fanciful explanation has been that the individual pinnae have a Christmas stocking-like appearance. It is also called "Dagger" fern locally in some areas. This is a robust evergreen fern native to eastern North America from Nova Scotia to Ontario southward throughout New England to the Gulf States. It is also found in Oklahoma, Kansas, upward to Minnesota. It is terrestrial by nature in neutral to slightly acid soils with good drainage. It is often found in comparatively sterile soils in some locales. It is a great plant to grow on hillsides to check erosion and is often found in the company of *Dryopteris marginalis*. Being one of the most common northeastern ferns, this species is often found growing in great abundance. The author has personally seen vast colonies of the Christmas fern growing in certain locations in Ontario, Quebec, and Vermont. John Mickel points out that generally this species has not done well in the Northwest, and I must add that it has been short-lived here in northern Utah. Similarly, the abundant northwestern species, *Polystichum munitum*, has been generally a failure in the Northeast. These two species are often confused at nurseries. The differences are obvious if the fronds are placed side by side. *Polystichum acrostichoides* has slightly wider pinnae with tips less tapered to a point than in *Polystichum munitum*. More importantly, the fertile pinnae in *P. acrostichoides*, located in the upper third of the frond, are greatly contracted, whereas in *P. munitum*, they are not. (A parallel example of this contraction of fertile pinnae is found in the Japanese wood fern, *Dryopteris lacera*. A similar Sino-Himalayan species, *Dryopteris sublacera*, does not have contracted pinnae.) Finally, *Polystichum lonchitis* may cause some confusion, but the pinnae are more bristly and much shorter.



#### *Polystichum acrostichoides*

**Description:** According to Mickel, the rhizome or crown of the Christmas fern is actually several. This species is rather unique since the rhizome is slender and branched with several growing tips. Other members of this genus have compact crowns that branch only rarely. The silvery-white scaled crosiers are among the earliest to appear in the spring and are in stark contrast to the darker green fronds of the previous year. As they begin to grow, the crosiers are tossed backward or droop backward, a condition characteristic of several other *Polystichums*, most notably *P. polyblepharum*, the so-called "Tassel Fern". The first fronds to appear are generally fertile, soon followed by the sterile ones. As in many other *Polystichums*, fronds are occasionally produced through the summer, mostly sterile. The fronds are from eight to twenty inches long and two to five inches wide, evergreen, once pinnate, and fringed with bristles. The pinnae have the distinct auricle of "thumb", characteristic of most members of this genus. The fertile fronds are taller than the sterile and the pinnae are somewhat narrower. As has been mentioned, the fertile pinnae on the upper part of the frond are noticeably contracted. They often wither and fall off after the spores have dropped. The sori are circular with a round indusium attached in the middle. The sori are

There are several varieties of *Polystichum acrostichoides* with crisped, truncated, cristate or twisted pinnae and one variety is twice pinnate, but these seem to be more on the order of abnormally developed forms rather than perhaps stable variants. In nature, *P. acrostichoides* has hybridized with *P. Braunii* and also *P. lonchitis*.

arranged in rows on both sides of the costa or central axis of the pinnae. At first, the green sori appear as separate dots, but as they mature, they converge, forming a golden-brown covering. As the indusia mature, they shrivel and disappear. The sporangia then appear to be densely scattered across the underside of the pinnae instead of in distinct sori, a condition termed "acrostichoid", hence the species name. The spores are yellowish.

**Culture:** The Christmas fern frequents several habitats. It is a denizen of moist shaded woodlands but is also found in sunny locales if ample moisture is present. It can even be found on barren hillsides in sterile soils. Hence, there is some confusion as to its needs in cultivation. Wherry refers to it as a "most useful plant", but cautions that if planted in too rich a loam, it becomes "flabby, less evergreen, and short-lived". This may be a key to why it has not been successfully grown in certain areas of the country. Foster says that it is easily grown in a "deep woodland, stony mulch", and Mickel notes that it is "not at all fussy", its preference being "moist woodland" but also "among rocks on dryish hillsides". My own experience with it here in Utah, noted earlier, has always been disappointing. For those who have been successful in its culture, it has proven to be a valuable member of the shaded garden. Thus, a little experimenting may be in order to establish its needs. It is well worth the effort.

#### References:

- The Fern Guide*, Edgar T. Wherry, (1961) University of Pennsylvania, Philadelphia
- Field Book of Common Ferns*, Herbert Durand, (1949) G. P. Putnam's Sons, New York
- Ferns & Fern Allies of the United States and Canada*, David B. Lellinger, (1985) Smithsonian Institute, Washington, D.C.
- Ferns for American Gardens*, John T. Mickel, (1994) Macmillan Publishing Co., New York
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# Member's Garden Evaluations continued (Reminder 5 is excellent)

Page No. 1  
03/29/96

FERN GARDEN EVALUATION  
Sue & Herman Entz  
14260 Forsman Rd. SE  
Olalla, Wa. 98359

Fern Name	Rating	Year Planted	Fern Name	Rating	Year Planted
ADIANTUM aleuticum Japonicum	1	92	OSMUNDA regalis European form	3	83
ADIANTUM p. Asiaticum	4	91	OSMUNDA regalis crispa	3	92
ADIANTUM p. Miss Sharples	4	92	OSMUNDA regalis type (Brazil)	5	92
ADIANTUM p. Tesselate form	4	92	OSMUNDA regalis v. Purpurascens	4	91
ADIANTUM p. var. Subpumilum	2	90	OSMUNDA regalis v. cristata	4	90
ADIANTUM pedatum	5	75	OSMUNDA regalis v. regalis	4	90
ADIANTUM venustum	5	75	OSMUNDA regalis v. regalis Cristata	3	91
ADIANTUM capillus-veneris 'daphnites'		93	PELLAEA atropurpurea	2	93
ARACHNIODES aristata Variegatum	4	91	PELLAEA ovata	2	91
ARACHNIODES cavalerii	5	93	PELLAEA rotundifolia	2	92
ARACHNIODES simplicior v. Major	2	90	PHYLLITIS scolopendrium	5	83
ASPLENIUM ruta-muraria		93	PHYLLITIS scolopendrium Furcans	2	92
ASPLENIUM trichomanes	5	90	PHYLLITIS scolopendrium Keratoides	2	92
ASPLENIUM trichomanes v. Trogyense	4	93	PHYLLITIS scolopendrium Laceratum(Kaye's Var)	4	91
ASPLENOSORUS x Ebenoides	3	92	PHYLLITIS scolopendrium Marginatum irregulare	4	91
ATHYRIUM f-f (English Crested)	3	78	PHYLLITIS scolopendrium Undulata	3	92
ATHYRIUM f-f Frizelliae	5	92	PHYLLITIS scolopendrium cristatum	2	92
ATHYRIUM f-f Vernoniae Cristatum	3	91	POLYPODIUM glycyrrhiza	4	74
ATHYRIUM f-f Victoriae	5	79	POLYPODIUM scouleri	1	87
ATHYRIUM f-f dwf. Fimbrata	5	92	POLYPODIUM vulgare type, ruffled.	3	90
ATHYRIUM filix-femina	3	75	POLYPODIUM vulgare v. Cornubiense		93
ATHYRIUM niponicum cv. Pictum	4	90	POLYSTICHUM acrostichoides	2	90
ATHYRIUM niponicum metallicum cristato-flabellatum	4	92	POLYSTICHUM aculeatum	2	90
ATHYRIUM otophorum	3	90	POLYSTICHUM andersonii	2	92
BLECHNUM (unkn. spicant type)	3	93	POLYSTICHUM braunii	3	93
BLECHNUM penna Marina	4	90	POLYSTICHUM makinoi	4	91
BLECHNUM penna Marina Cristatum	2	92	POLYSTICHUM mayebarae	5	92
BLECHNUM spicant	4	75	POLYSTICHUM munitum	4	74
CHEILANTHES lanosa	0	91	POLYSTICHUM polyblepharum	3	90
CRYPTOGRAMMA crispa	2	90	POLYSTICHUM rigens	2	91
CYRTOMIUM caryotideum	4	91	POLYSTICHUM setiferum 'Plumosum'	5	78
CYRTOMIUM fortunei v. Intermedia	3	90	POLYSTICHUM setiferum 'Wollastonii'	4	92
CYRTOMIUM lonchitoides	5	93	POLYSTICHUM setiferum acutilobum	5	78
CYRTOMIUM macrophyllum	0	90	POLYSTICHUM setiferum latipes	3	75
DRYOPTERIS affinis	5	92	POLYSTICHUM setiferum rotundatum cristatum	5	83
DRYOPTERIS affinis 'The King'	5	92	POLYSTICHUM setosum	4	75
DRYOPTERIS affinis Crispa Congesta	5	91	POLYSTICHUM sp. China #1	3	92
DRYOPTERIS affinis Crispa Gracilis	4	91	POLYSTICHUM sp. China #2	5	93
DRYOPTERIS affinis ssp. Cambrensis	4	92	POLYSTICHUM squarrosom	3	91
DRYOPTERIS arguta	0	74	POLYSTICHUM tripteron	1	90
DRYOPTERIS bissetiana	4	91	POLYSTICHUM tsus-simense	4	90
DRYOPTERIS borreri	5	75	POLYSTICHUM x illyricum	5	93
DRYOPTERIS championii	3	90	PTERIS multifida		93
DRYOPTERIS crassirhzoma		93	RUMOHRA adiantiformis	3	92
DRYOPTERIS cycadina	3	90	THELYPTERIS decursive-pinnata	4	92
DRYOPTERIS cystolepidota	4	92	THELYPTERIS phegopteris	4	76
DRYOPTERIS darjeelingensis	3	93	WOODSIA polystichoides	5	92
DRYOPTERIS dilitata	4	90	WOODWARDIA fimbriata	4	90
DRYOPTERIS dilitata Jimmy Dyce	5	92	WOODWARDIA spinulosa	4	92
DRYOPTERIS dilitata Lepidota Cristata	2	90			
DRYOPTERIS dilitata Whiteside's crisped'	4	92			
DRYOPTERIS dilitata var. dolobrata	4	83			
DRYOPTERIS erythrosora	5	75			
DRYOPTERIS erythrosora 'White sori form'	3	92			
DRYOPTERIS erythrosora prolifica	2	90			
DRYOPTERIS f-m Cristata	0	78			
DRYOPTERIS f-m Grandiceps	3	92			
DRYOPTERIS f-m Polydactyla	5	75			
DRYOPTERIS f-m crested form	5	78			
DRYOPTERIS filix-mas Barnesii	5	91			
DRYOPTERIS filix-mas Stableri		93			
DRYOPTERIS goldiana		93			
DRYOPTERIS juxtaposita	3	93			
DRYOPTERIS marginalis	3	90			
DRYOPTERIS nipponensis	3	90			
DRYOPTERIS polylepis	3	90			
DRYOPTERIS purpurella	3	92			
DRYOPTERIS pycnopteroides	4	92			
DRYOPTERIS sieboldii incisum	4	83			
DRYOPTERIS spinulosa	3	74			
DRYOPTERIS uniformis	5	75			
DRYOPTERIS wallichiana	2	93			
DRYOPTERIS x Complexa	4	92			
DRYOPTERIS x remota	3	93			
GYMNOCARPIUM dryopteris	5	74			
GYMNOCARPIUM dryopteris plumosum	4	90			
LUNATHYRIUM japonicum	5	93			
LYGODIUM japonicum	2	93			
MATTEUCIA struthiopteris	2	92			
ONOCLEA sensibilis	4	76			
OSMUNDA cinnamomea	4	76			
OSMUNDA claytoniana	3	90			
OSMUNDA japonica	5	90			
OSMUNDA regalis	4	76			

## PLANT TALK

You editor has been asked to pass along information regarding a publication called Plant Talk. According to the literature this magazine is the first to address plant conservation worldwide. The brochure reads, "Catch up with new activities, developments and techniques in a magazine that combines scientific integrity with a lively and pleasurable style. Plant Talk is intended to be as enjoyable as it is informative!.....contents will appeal to all who are interested in plant conservation, not only experts but also beginners who wish to turn their concern into practical action and support. Here is the encouragement, expertise and information you need." The annual subscription is \$25. from Plant Talk, PO Box 65226, Tucson, AZ 85728-5226.



## The Unchanging Fern *continued*

Models in the fern display at the glass flowers collection, Harvard University. (The question marks after the magnifications are on the specimens' labels.)

1. A frond, natural size.
2. Four egg-shaped spores (x750).
- 3 & 4. Early stages of the prothallium (x500).
5. Mature prothallium (x30?)
6. A single antheridium (x1000?)
7. Semi-mature and mature antheridia (x1000).
8. Two examples of antherozoids, showing their spiral shape and cilia (x2000?)
9. Cross section of an archegonium (x2000).
10. Longitudinal section of an archegonium showing the female gamete (x2000?)
11. Embryo sporophyte within the archegonium (x1000).
12. Later stage of the embryo within the archegonium (x1000).
13. Young sporophyte emerging from the archegonium; vertical section of the prothallium (x20?).
14. Later stage of the young sporophyte, showing root and tip starting to grow up toward the light (x20?)
15. Cotyledon and growing root of sporophyte, still attached to prothallium (x30).
16. A frond of the mature sporophyte, showing sori. Natural size.
17. Sorus and indusium (x20).
18. Three examples of sori of ferns of other genera (no magnifications).
19. Vertical section of sorus, showing the indusium, leaf tissue and sporangia (x150).
20. Development, in four stages, of a sporangium, showing crest of thickwalled cells (x150).
21. Transverse section of a part of the interior of a sporangium showing the spore mother cells developing tetraspores (x500).

## Rhododendron Species Botanical Garden Spring 1997 Sale



The annual Species Foundation sale will be held on Friday April 4 from 3-6 pm and Saturday April 5 from 9-3 pm. This is one of the best plant sales in the Northwest and features an outstanding selection of ferns, trees, perennials and alpiners in addition to an extensive selection of rhododendrons and azaleas. See you there!

## "Southern Alpines '96" And Beyond - Part I

Joan Eiger Gottlieb

Fern enthusiasts can be effusive and very exuberant on field trips. They have been known to emit squeals of delight when particularly choice species are found. A rare variety or hybrid may elicit a scream or two. A three-screamer fem-fid is the ultimate pteridophyte "trip." But these behaviors seem restrained when compared with those of alpinists. They are the true fanatics of the foray, compulsive sleuths of the slopes.

Spending sixteen days with a group of them in New Zealand recently was a lesson in focused concentration, not to mention stamina.

### The Conference and Field Trips

Every ten years the alpine societies hold an international meeting at a site on the planet that boasts peaks with "herb-fields" above tree line. In 1996 that site was **Christchurch**, a Londonesque city of 288,000 (complete with a River Avon) on the east coast of New Zealand's **South Island** in Canterbury Province. On January 5th an eclectic group of 250 alpine plant scientists, gardeners, hobbyists and spouses gathered at the Christchurch College of Education for "Southern Alpines '96." In five ensuing days we heard beautifully illustrated talks on important alpine genera - *Raoulia* and *Celmisia* (Compositae,) *Hebe* (Scrophulariaceae,) *Wahlenbergia* (Campanulaceae) and *Ranunculus*, on unique floras of the Australian, South African and Andean "Alps" and on the vicissitudes of growing alpiners in low altitude gardens. Seed collecting was a particular passion of some participants and an excellent lecture on the experiences of a collector was given by John Watson following a special barbecue dinner. His slides were among the best we had seen, but our tummies were full, eyelids were heavy and John enthused a bit long. True alpinists, like the speaker, literally structure their lives around their trips and collections, with little thought to creature comforts, family finances and other distractions. Most conference attendees were merely seri-

ous amateurs, i.e., they reserve their obsession with alpine plants for leisure and vacation time.

During the conference there were several field trips. The first was to **Landcare**, an industrial research institute in Lincoln focusing on sustainable land management for New Zealand. There was an old-fashioned, decidedly low-tech herbarium at this facility which had about 400,000 specimen sheets and excessive collections of rare, endemic New Zealand pteridophytes like *Loxsonia*, *Phylloglossum* and *Tmesipteris*, ironically contributing to their decline in nature. Some of the specimens dated from Captain Cook's "discovery" voyage to the country in 1769.

A second trip was to **Mt. Hutt**, a popular ski area about two hours by bus in the front range mountains west of Christchurch, along the salmon-rich Rakaia River. A gravel road ascends to the alpine zone of this rain shadow (dry) peak (7,195'). A lovely find here was the alpine shield fern, *Polystichum cystostegia*, growing in sizable clumps in rocky crevices. It is deciduous and its lime-green fronds, newly mature in early summer, were delicately offset by the pale, greywacke (sedimentary sand-, mud- and siltstone) boulders. Angiosperm treasures here included *Notothlaspi rosulatum*, with a camouflaged rosette of rock-gray leaves and a low inflorescence of cream-colored, cruciferous flowers. Also well-concealed was the rare *Ranunculus chordorhizos* with dense woolly foliage reduced to spidery fingers. It was past flowering but seed collection was avid. This rare buttercup is elevation-confined to a narrow zone between 4,000'-4,500' on dry mountains.

The last conference foray was to **Arthurs Pass National Park**, northwest of Christchurch on the Main Divide between the wet, western Southern Alps and the dry, eastern Canterbury Plains. En route we crossed the irrigated farms and sheep paddocks of the plains, following the Waimakariri River valley and climbing slowly to Porters Pass (3,042') to catch a heart-stopping view of the Bealey Glacier. Finally we were in Arthurs Pass N.P. (created in 1929 and named for Arthur



Dudley Dobson, the first European to cross the 2,940' pass in 1864, although the Maoris were already very familiar with this major route across the Southern Alps.) The Mt. Beech (*Nothofagus solandri*) - Southern Rata (*Metrosideros umbellata*) forest is very lush here - a response to 150" of average, annual rainfall (contrasted with 26" in the Canterbury Plains and 78" on Mt. Hutt.) However, the forests of New Zealand are under attack from the insatiable browsing of introduced animals like the Australian opossum, now estimated to number 70 million throughout the country.

In response to all the moisture the ferns along the road were exceptionally vigorous, with impressive clumps of *Polystichum vestitum*, huge rosettes of *Blechnum discolor* and cascades of kiokio - *Blechnum* species 1, 2 and 3 (formerly *B. capense*) festooning the banks and hillsides. At the Twin Creek "carpark" well-acclimated Mt. Parrots called "keas" (*Nestor notabilis*) with iridescent, olive-green plumage begged for handouts from our box lunches. The trail we took led to the Otira Valley saddle through a sub-alpine zone of *Dracophyllum* (turpentine bush,) *Plyllocladus* (celery "pine,") *Hebe* (several species of common New Zealand shrubs,) *Chionochoa* (snow-tussock grass) and other scrub plants. Among these larger species many herbaceous angiosperms were abundant, including *Senecio*, *Ounisia* and *Anistome*. *Blechnum penna-marina* filled nearly every rock nook and cranny. On exposed ground *Lycopodium fastigiatum* formed tight mats and displayed numerous bronze-tinted strobili. *Polystichum vestitum* poked out of protected depressions and *Hymenophyllum multifidum* (?) covered a large rock outcrop near a trailside waterfall.

The trail wound its way to the alpine zone, a barren-looking glacial gravel and scree area with low fertility and pH. A powerful mountain stream cut its way down the slope and had to be crossed over a minimalist wood bridge. We were rewarded for the effort by snow marguerites (*Dolichoglottis lyallii*), south island edelweiss (*Leucogenes grandiceps*) and the spectacular Mt. Cook "lily" (*Ranunculus lyallii* - largest buttercup in the world.)

All were in full bloom at the lower edge of this zone as was the magnificent, burgundy-veined mountain daisy (*Celmisia verbascifolia*.) There are 60 species (plus hybrids) of *Celmisia* in New Zealand's mountains - all endemic and 18 of them can be found in the Arthurs Pass area. This ubiquitous genus was a major focus of interest for the alpine enthusiasts.

On the return hike we had time to observe some of the smaller jewels of the successive communities through which we passed. Several tiny orchids were blooming in the tussock zone, including *Aporostylis bifolia*, *Calodenia lyallii* and *Lypanthis antarctica*. Eighteen species of self-pollinating, terrestrial orchids reach sub-alpine and alpine zones in New Zealand in addition to the many epiphytic and ground species of the lowland forests. The tiny, parasitic *Euphrasia cockayniana* and the delicate *Forstera bidwillii* and *Geum uniflora* completed the garden of miniatures here. Primitive-looking, gray grass-hoppers (*Paprides* sp.) sprang up from the ground between our feet and tussock butterflies spread their brown-orange wings before our ad-

miring eyes. The silky nests of the butterflies looked like discarded tissue paper on the grass tufts. Some hikers were bothered by the painful, itchy bites of pesty sand flies (*Austrosimulium* sp.), all part of the experience!

to be continued in the  
spring 1997 newsletter . . .

### *The Hardy Fern Foundation*

#### NEWSLETTER

The Hardy Fern Foundation Newsletter 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: Janet Dalby, Sylvia Duryee, Sue & Herman Entz

Graphics: Karie Hess

## Ferning in the Spice Islands

April 23 to May 7, 1997

\$3050 per person, based on double occupancy

Barbara Hoshizaki will lead a 15 day tour of famous botanical gardens and nature reserves. Other group members include Bill Paylen, who grew up in Indonesia, and Norio Sahashi, who led the Yakushima Fern Foray. In addition to ferning, the group will spend time relaxing and sight seeing. Have fun discovering exotic plants and ferns, spend four days on the Bali Sea Dancer and see giant Komodo Dragons. For more information, phone Takashi Hoshizaki at (213) 662-0655 or write to him at 557 N. Westmoreland Ave., Los Angeles, CA 90004.

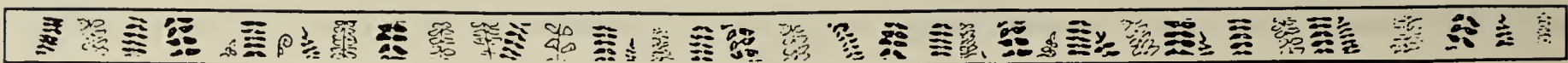
### Dr. Tadeus Reichstein

Dr. Tadeus Reichstein, honorary member of the American Fern Society, died August 1, 1996 at the age of 99 in Basel, Switzerland. A well-known Polish born chemist who won the Nobel Prize in medicine, Reichstein is famous in pteridological circles for his work on hybrid ferns, mostly accomplished after he retired in 1967 from the University of Basel. He remained active in research until recently, publishing close to 100 papers on ferns, mainly on *Asplenium* and *Dryopteris*.

Dr. Reichstein was known internationally for his work with cortisone, and in 1950 he shared the Nobel Prize in medicine with two Americans for this hormone discovery. In 1933, he had his first achievement, developing a process for synthesizing Vitamin C.

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