



**Hardy Fern Foundation
Quarterly**



Summer 2010

THE HARDY FERN FOUNDATION

P.O. Box 3797

Federal Way, WA 98063-3797

Web site: www.hardyferns.org

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

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

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

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

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

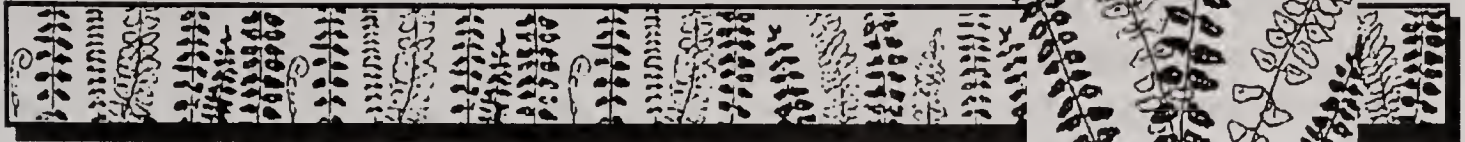
Cover design by Willanna Bradner

HARDY FERN FOUNDATION QUARTERLY

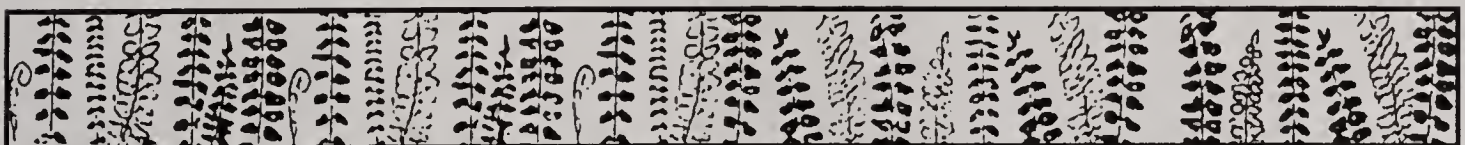
THE HARDY FERN FOUNDATION QUARTERLY

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President's Message

Summer is officially here. Now if the weather would cooperate and accept the fact, we could move on with our lives! At a beach I saw two lifeguards in wet suits hugging each other. In my yard "Roses are Blue and Violets are too", and I saw a duck with blue feet (actually, a Blue-footed Booby). As Washingtonians, we are ecstatic over the psychedelic green outside.

This June, we again dodged the rain bullet with a weekend window of relatively dry weather for Fern Festival 2010. Considering the economy and less than ideal weather I think we should feel quite fortunate to have equaled or slightly surpassed the sales figure of last year. Many thanks to Pat Riehl and the volunteer crew for making this such a success.

We were very pleased to have our dear friend and patron, Naud Burnett, of Dallas, Texas (Casa Flora), join us for this occasion. It wouldn't seem right without his wisdom and support.

It was also a privilege to welcome out of state guest, Catharine Guiles from Topsham, Maine. She is affiliated with and actively supports our fern display and test garden at the Coastal Maine Botanic Garden.

We also, took the opportunity to honor two of our most cherished founding members, Jocey Horder and Sylvia Duryee as Honorary Board Members. It has been such an honor and privilege to know and work with them, and to benefit from all of the knowledge and encouragement contributed during their active tenure.

Our evening lecture featured David Schwartz of Bakersfield, California, a recognized authority on xeric ferns. During the course of his discussion, he displayed 92 slides covering over 56 species, hybrids and garden shots. David demonstrated his vast knowledge and familiarity with the growing habits of these fascinating and unusual ferns. The audience was large and appreciative of his presentation.

The annual meeting of the Hardy Fern Foundation featured a report on financial income and expenditures for the fiscal year as well as a recap of our accomplishments and projects for future consideration. Our Stumpery, started in January 2009 and dedicated in September 2009, has been a smashing success. A tour was conducted there for the Bellevue Botanical Garden staff Monday, June 7, 2010, adding to a growing bond between our gardens. Also at the garden we purchased and erected a new, larger hoop house which more than doubles the capacity for plants. We are continuing to finalize the working agreement between the Hardy Fern Foundation and the Rhododendron Species Foundation.

Thanks to member Tim McNitt, a group of our hardy enthusiasts enjoyed a late summer outing on Mt. Baker where many rarities were found, photographed and enjoyed, along with spectacular views. Our fall events concluded with a two week joint Hardy Fern Foundation/British Pteridological Society tour of fern highlights in California. Thanks for many volunteer hours go to Sue Olsen, Dan Yansura and his wife Patricia Tanttilla who arranged such a varied and interesting trip.

In the future we are considering a design for a vertical or wall garden, featuring ferns, at some future location. A fern garden at the new Bellevue Children's Hospital Clinic, honoring Doctor Jack Docter and Diggs Docter, is under negotiation. A future marsh garden with ferns along with a vertical garden featuring ferns is in the design phase by the Bellevue Botanical Garden where this year we added over 100 additional

ferns to our collection there.

On behalf of the Hardy Fern Foundation, I offer my profound appreciation and gratitude for all of our loyal volunteers who have given their time and contributed much over this past year.

Have a better summer.

Best Regards,
Patrick D. Kennar

Osmundastrum reinstated, for *Osmunda cinnamomea*, Cinnamon fern Alan R. Smith and Heather Driscoll, University Herbarium, University of California, Berkeley

Cinnamon fern, traditionally known as *Osmunda cinnamomea*, is a widespread species, known from e. Canada, e. U.S.A., Greater Antilles, s. Mexico, Central America, Colombia, Venezuela, Ecuador, Peru, Brazil, Paraguay, and e. Asia. Recent phylogenetic evidence has shown that *Osmunda*, when circumscribed in the broad traditional sense, is paraphyletic (having taxa, species in this case, that trace back to different common ancestors), when *Osmunda cinnamomea*, the cinnamon fern, is included in its definition (Yatabe et al., 1999; Metzgar et al., 2006). Removal of this species from *Osmunda* and placing it in *Osmundastrum*, an old resurrected generic name created by C. B. Presl in 1848, re-establishes a monophyletic (group with a single common ancestor) *Osmunda* (Fig. 1). An alternative, and perfectly permissible classification, if phylogenetic evidence is incorporated, is to subsume both *Todea* and *Leptopteris*, two morphologically well-defined austral (southern Hemisphere) genera of Osmundaceae, into an expanded definition of *Osmunda*.

Understanding this nomenclatural change, requires an understanding of the criteria used to define taxa (whether at family, genus, species, or any other rank). Most, but not all, systematists subscribe to the belief that the most useful classification, for the widest number of users (and especially the most useful classification for promoting research into evolutionary relationships), is one that has a phylogenetic (evolutionary) underpinning, based on using characters from as many sources as possible (morphology, anatomy, chromosome



Osmundastrum cinnamomeum - Photo courtesy of Sue Olsen

numbers, physiology, DNA sequence data). Associated with this belief is an emphasis on the criterion that any group (e.g., species, genera, family) recognized in a classification should be monophyletic, that is, all representatives of that group trace back to a single common ancestor, where all representatives are each others' closest relatives. In the case of *Osmunda*, as defined in the broad sense, this criterion suggests that *Osmunda cinnamomea* must be removed (and placed in another genus), in order to preserve the criterion of monophyly, a single origin for the *Osmunda*.

Inherent in this argument is an understanding that the practice of taxonomy, part of which is the development of man-made classifications, involves many subjective activities. Where we draw the lines between species, genera, and higher ranks, is not an exact science dictated by immutable laws of chemistry and physics. Although virtually all reputable biologists (and other scientists too) accept evolution to account for the diversity of life on planet Earth, there are no hard and fast rules for defining ranks in the nomenclatural hierarchy, also a man-made construct. So, in the example under discussion, some might see it as prudent, perhaps because of the morphological diversity they see within the group, to circumscribe *Osmunda* in a still narrower sense, to exclude the species known as *Osmunda claytoniana* (interrupted fern). This would be perfectly permissible, under the *International Code of Botanical Nomenclature*, the set of rules governing the adoption of names of taxa of all ranks of plants. The isolation of this species (having arisen towards the base of the radiation of the *Osmunda* clade; Fig. 1), from others in the evolutionary tree, might be reason enough to accept the removal of *O. claytoniana* from *Osmunda*; recognition of this relative isolation has already been made at subgeneric rank, by the coining of a name, *Osmunda* subg. *Claytosmunda*, by Yatabi et al., in 2005. If one desired, one could go still further, separating the group of species related to *O. vachellii* as a separate genus, or subgenus, and in fact, there is already a generic name coined for this, the genus *Plenasium* of Presl, in 1836 (as you might have guessed, Presl tended to divide genera more finely than some systematists do today, but that is also perfectly permissible, in our inexact and subjective discipline). Because *Osmunda regalis* is the type species (another nomenclatural requirement of the *Code*) of *Osmunda*, the generic name *Osmunda* will always stay with this species and any others considered to belong to the same genus, in whatever (subjective) sense the genus may be defined.

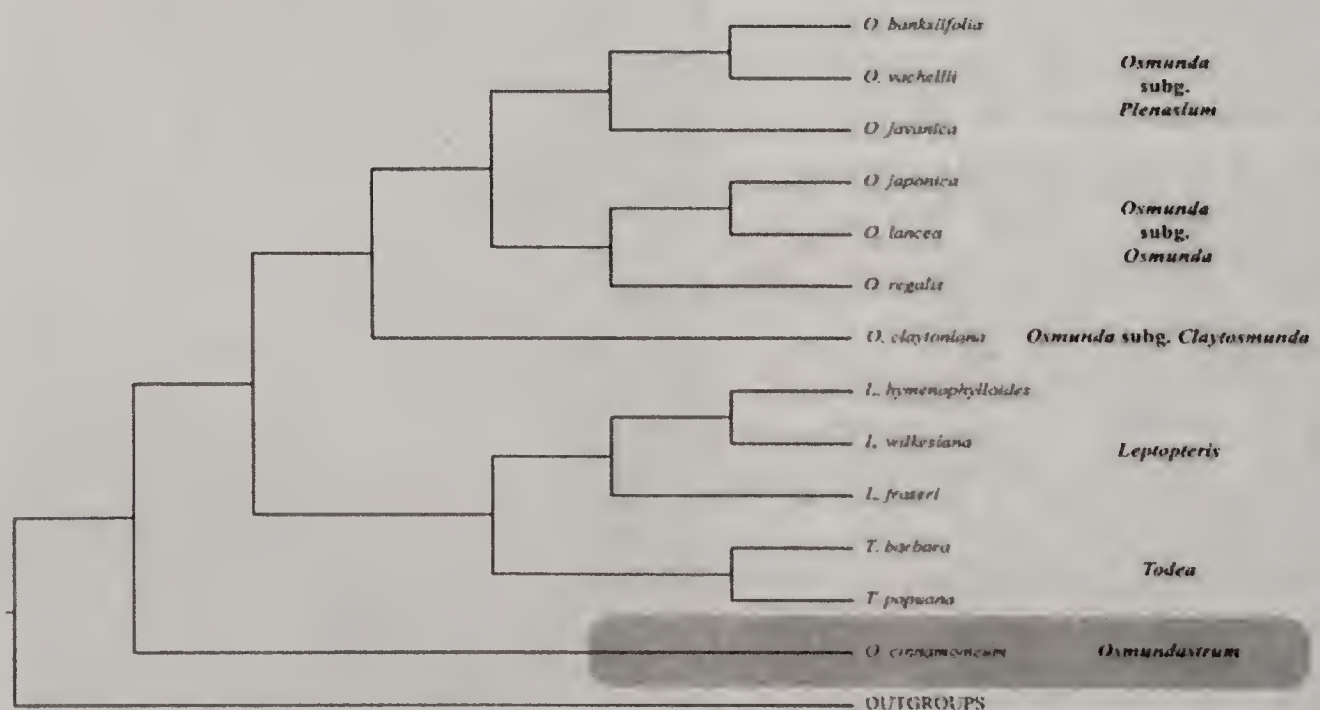


Figure 1. Evolutionary relationships in Osmundaceae based on seven plastid DNA sequences (redrawn from Metzgar et al., 2008)

Given the ramifications of this new phylogenetic evidence, it is likely that most systematists will choose to recognize *Osmundastrum*, a genus comprising only a single species, in order to preserve the continued use and unchanged circumscriptions of the only other two genera (*Todea* and *Leptopteris*) of the small, leptosporangiate family, Osmundaceae.

Literature:

Metzgar, J. S. , J. E. Skog, E. A. Zimmer, and K. M. Pryer. 2008. The paraphyly of *Osmunda* is confirmed by phylogenetic analyses of seven plastid loci.

Syst. Bot 33: 31--36.

Yatabe, Y., H. Nishida, and N. Murakami. 1999. Phylogeny of Osmundaceae inferred from *rbcL* nucleotide sequences and comparison to the fossil evidences.

J. Pl. Res. 112: 397--404.

Links for those wanting more information about topics mentioned in this article:

International Code of Botanical Nomenclature: <http://ibot.sav.sk/icbn/main.htm>

Tree of Life: <http://tolweb.org/Polypodiopsida/20615>

Arachniodes simplicior

East India holly fern, Variegated holly fern

James R. Horrocks - Salt Lake City, Utah

The genus name *Arachniodes* is translated "spider-like" or perhaps having the "display of a spider in a web", usually in reference to the appearance of *A. aristata* which is thought of as the type-species for the group. Another explanation has it that Carl Blume, a botanist, studied specimens of this genus wrapped in, of all things, cob webs. Species of *Arachniodes* have been assigned in the past to *Rumohra*, *Aspidium*, *Dryopteris*, *Polystichum*, and *Polystichopsis*. The species name "simplicior" is in reference to the fronds being less divided than those in *A. aristata*. Originally this fern was considered a variety of *A. aristata* with the name 'variegata' attached. It is still listed occasionally as *A. aristata* 'variegata'. In some of the literature, it is *A. simplicior* var. *variegata*, (see Mickel) which is quite descriptive of the lighter green to yellow-green band or stripe running down the midrib of each pinnae. This gives it a "strikingly reptilian" look, as one observer put it. One reference described the stripe as white but one wonders if he was looking at *Pteris argyraea* instead. It is never white.

The common name East India holly fern is a tad misleading as it is native to the woodlands of China and Japan. I personally prefer variegated holly fern, at least for those forms that are variegated, since some are not. It has been cultivated in England for many years and has escaped in South Carolina of the United States. This species is certainly similar in design to other members of this genus, but the elegant variegation sets it quite apart from the others. The larger *A. simplicior* 'Major' lacks the variegation and is close to *A. aristata* in overall appearance. 'Major' has also been confused with *Dryopteris formosana*, which certainly has an *Arachniodes* look to it. *A. simplicior* is hardy to zone 6 with some protection, having survived here in northern Utah for several



Arachniodes simplicior
Photo courtesy of Sue Olsen

years. The big drawbacks here are essentially four-fold: It is very slow in its growth habit, it doesn't begin to grow here until very late spring, even into June, it seems to require more humidity than available here during the summer months, and most of all, the new growth is highly susceptible to slug attacks.

Description: The densely scaly rhizome is usually characterized as short-creeping although some consider it almost long-creeping in its habit. The rhizome is covered with the basal stubs of old fronds. The stipes can be quite long, over half the length of the entire frond, pale green to straw-colored, and rather scaly. The scales are black-brown, ciliate at the base, gradually tapering, and terminating in a filiform tip. The scales are eventually deciduous on both the stipe and the rachis. The leafy portions of the fronds at maturity are held stiffly erect, the pinnae splaying out in different directions, giving this fern an interesting and eye-catching look. The fronds appear at intervals and at different times during the growing season. The entire frond can be from 1 to 2 feet long, sometimes longer in very favorable locales, and is broadly ovate in outline, bipinnate for the most part, and evergreen with a stiff leathery feel. The lower-most pinnae display an elongated pinnate branch on the posterior side, which can be half the length of the pinnae themselves. On the anterior or upper side of the basal pinnae, the pinnule next to the frond midrib is extended to roughly twice the length of the other pinnules and can be pinnate itself in large specimens. The frond terminates at its upper portion with one long linear-lanceolate pinna, abruptly contracted at the tip. In many respects, the overall outline of the frond is most similar to *A. amabilis* (see Tagawa for comparison). There are 2 to 5 pairs of pinnae, gradually acuminate and attached with short stalks. The oblong-ovate pinnules display the hint of an auricle on the upper side. The hairless pinnules are spiny and toothed. The sori are midway between the midrib and the margin and are covered with crenulate orbicular-reniform indusia, very similar to *Dryopteris*, kidney-shaped but almost round. The fertile fronds are taller and a bit more contracted than the sterile ones.

Culture: This is a most attractive but slow-growing fern which appreciates a humus-rich neutral soil in the shade. In areas of low humidity, it languishes and eventually dies out. This species is rather late to break dormancy in the spring and, as has been mentioned, its tender new growth seems to attract slugs which can cause considerable damage. It should be given room to spread slowly in the garden. It certainly should not be considered invasive. Pot culture is possible, although the fronds are often too few and far apart in a single specimen. It also thrives in a large terrarium. Its attraction lies in the splaying out of the pinnae in all directions and the elegant and charming lighter-green stripe down the center of each pinnae in cultivated forms. Some wild specimens lack the variegation. In the woodland garden, *A. simplicior* certainly adds charm. Its appearance is very pleasing to the eye, even striking in its contrast with other subjects in the garden.

References:

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

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

Fern Growers Manual (Revised - 2001) Barbara Joe Hoshizaki and Robbin C. Moran, Timber Press, Portland

Ferns For American Gardens (1994) John Mickel, Macmillan Publishing Co., New York

Coloured Illustrations of the Japanese Pteridophyta (1975) Motozi Tagawa, Hoikusha Publishing Co., LTD. Osaka (pressed herbarium specimens)

Franz Bauer and John Smith~ The Eyes and Hands of William Hooker: The Significance of Their Work in *Genera Filicum*

Grahame Ware
British Columbia, Canada



In 1842, *Genera Filicum*, the most important work on ferns ever published, finally saw the light of day. This pteridological tome was authored by William Hooker in 1838 while at the University of Glasgow. *Genera Filicum* was printed on the letterpress of Glasgow University. It was handsomely produced in a ‘royal octo’ format. In the Preface, the date affixed was 1838. The four years it took to realization was done during a tumultuous time for English botany and Kew.

Franz (Francis) Bauer

Essentially, the politicians (the Treasury department) wanted to level Kew and the expense that went with it. However, due to the hard work of Lindley and the posthumous largesse of Joseph Banks and other wealthy and enlightened merchant class members, Kew was saved from the political myopia of the weaning conservative aristocrats. Despite all the things that were swirling around Kew at this point, *Genera Filicum* was a colossal success both scientifically and artistically. Moreover, during this time Professor Hooker moved from Scotland to Kew to take over the reigns of the Royal Botanical Gardens. This period also gave the Norwich native (and the future father of another notable botanist, Joseph Dalton Hooker) a chance to learn a thing or two (pteridologically speaking) before becoming the giant of fern phylogeny. His evolution to that status was most certainly aided by studying Karl Presl’s recently published work on ferns (1836). Paris and Barrington in a paper entitled “W.J. Hooker and the Classification of Ferns”¹ *Annals of the Missouri Botanical Garden* (Vol. 77, No. 2, p 230) provide an interesting perspective (which they attribute to Tryon).

“As a Glasgow professor, Hooker had endorsed Presl’s use of vegetative characters; as chief botanist at Kew, he relied almost entirely on characters of the fructification. Although Hooker never published an explicit justification of his revised approach to fern classification, it appears that convenience was a major factor in his decision.” (Tryon, 1952).

I would suggest- in regards to Hooker- that besides ‘convenience’ (and the pragmatic desire for widespread usability of a classification system) that this shift came as a result of what he learned from his curator of ferns, John Smith, and from careful contemplation of the drawings of his botanical draughtsman extraordinaire, Franz (Francis) Bauer.

¹ *Annals of the Missouri Botanical Garden* (Vol. 77, No. 2, p 230)

The resounding impact and staying power of *Genera Filicum* would have been impossible had it not been for the serious contributions of these two key people: Franz “Francis” Bauer, the Moravian/Bohemian/Austrian botanical illustrator who was a lifelong employee of Kew; and, John Smith, the Glaswegian plantsman who toiled for many decades in the employ of Kew. Principally, Smith knew all of the workings of the hothouses as he’d initially been employed at Kew as a stove boy making sure- amongst many other chores- that there was sufficient coal in the bins and that the hothouses were operating the way they should to protect the tender plants. Essentially, Hooker’s men were his eyes and his hands when it came to producing the most stunning scientific book on ferns ever to be published. They were bachelors who spent their lives working for Kew and for Hooker.

What makes the book so enthralling is that it has the writer’s excitement of publishing fern exotica (Hooker’s) coupled with an integrative quality of plantsman (Smith) and an extraordinary botanical illustrator (Bauer). Presl’s work on ferns, *Tentanium Pteridographiae*, published about the same time (1836), had no such sizzle or popular impact. It did forge a following though among professional taxonomists and for good reason. Clearly though, Hooker’s book took a big edge with its illustrations. Bauer’s illustrations brought colour, depth and minute detail- morphological minutiae- which were aided greatly with follow-on engraving by a young Glaswegian, Walter Fitch (with colour by George Graves).

Secondly, Presl was working and describing morphological details from his herbarium’s pressed plants. Not so with *Genera Filicum*. Smith had developed the best exotic fernery in the world from scratch. These facts would give the publication a descriptive advantage. By the time of publication, Kew had the finest and most diverse genera of ferns in the world. Hooker had live ferns from which to ‘draw on’ (I use the term literally and figuratively.) from the great fern nursery. More on the historical importance of live plants below.

Presl’s *Tentanium Pteridographiae* had just reached Hooker’s desk in Glasgow after the main body of *Genera Filicum* had been typeset. Whilst acknowledging Presl’s family arrangements, etc. in the Preface, Hooker cautions that he thinks that Presl has placed too much emphasis on the “*number and bundle of vessels in the stipes*” and “*the venation holds too prominent a place in the generic character*”. Hooker might well have reached this viewpoint in discussions with growers John Smith, Lindley and Robert Brown. As stated above by Paris and Barrington, Hooker swung his fundamental criteria from vegetative characters to fructification. In this arena he was blessed to have Bauer’s drawings upon which to review at any time and not just for those fleeting moments when they were happening. Bauer’s amazingly detailed snapshots provided a great and ready opportunity for Hooker to reference. Obviously he did just that. Hooker may have also been fascinated by the final page, Tab XII, in Presl’s *Tentanium* which shows some excellent drawings of fructifications of several species of ferns. One cannot be dismissive of Presl’s importance in our present understanding of ferns. David Barrington comes to his rescue and states, “*In fact, Presl’s attention to*



William Hooker by Thomas Maguire

vascular bundles and venation opened the way to modern fern classification. A single example; whether a petiole has two or more than two vascular bundles turns out to be a critical character, as tested by recent molecular work, for distinguishing the two largest groups of modern higher ferns. He may have been studying flat dead ferns, but boy could he observe and infer. (Despite this) Presl's lithographs are exquisite." (pers. comm.) More evidence of the value of Smith and Bauer in *Genera Filicum* comes from Hooker himself. Hooker constantly defers to Bauer throughout *Genera Filicum* when it comes to the seeming minutiae of fern morphology. We see this pattern in his notes on *Loxsonia* (Tab XV) when he states, "The admirable analysis by Mr. Bauer, in the accompanying figure, will illustrate the nature of fructification much better than can be done by words." (See illustration below). This is pretty strong stuff from a scientist who made his living off exact description! But then again we are talking here about Franz Bauer, a gifted man with enormous talent and, most importantly, an unstinting work ethic- a man who had spent his entire life perfecting his craft and who was never afraid to do a lot of hard work to develop and improve that talent. Although Hooker attempts to quibble with Bauer's representation of details from time to time throughout the *Genera Filicum*, he was never persistent and eventually he diplomatically demurs.

As stated earlier, it is also clear that Bauer has been working with living plants (*dal vivo*) provided by the energetic John Smith. Hooker humbly integrates the hands-on comments of the Kew gardener/curator, John Smith, with an overall view to a greater understanding of the *Genera Filicum*. Hooker needed both of these men- the plantsman and the artist- to make this publication at this point in time the best there was. I would suggest that in the beginning of this trio, that they knew more of the actual differences in regards to ferns than did Hooker which is why he takes a back seat to them in *Genera Filicum*. Bauer and Smith were the chauffeurs as it were in the *Genera Filicum* vehicle.



Loxsonia Fig. XV

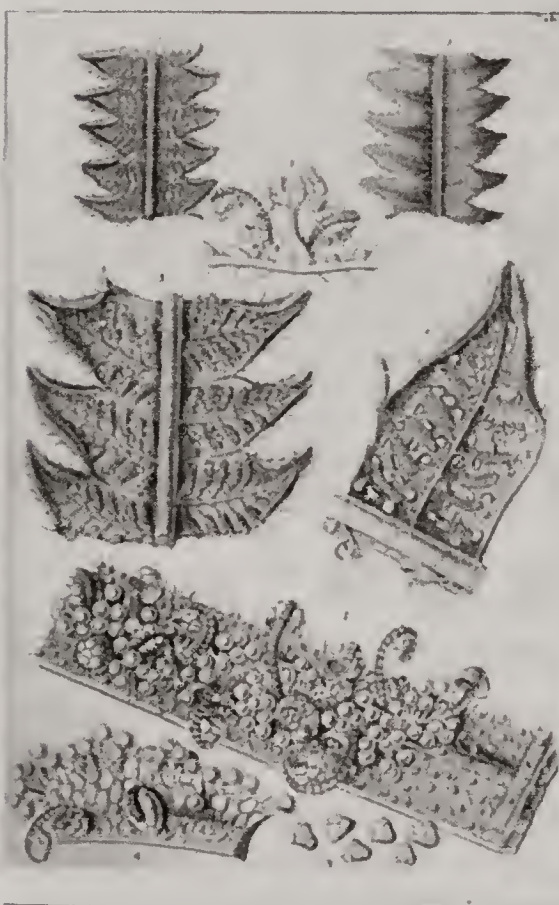
The *Genera Filicum* project had an arc that would project Hooker through the rest of his life and keep him fixed in the pteridological orb until his final days. Smith would continue to write on the subject (especially *Historia Filicum* 1875) but was not treated with the same respect or reverence as William Hooker. This is likely a case of classism. Despite this intellectual snub, Smith has been viewed kindly by more modern reviews. "Although Smith's generic classification was easily the most modern among the systems we compared, Smith was overshadowed by the persona and reputation of Hooker, and his work was largely ignored. Only in this century (20th C.) has Smith been recognized as a pioneer of modern pteridology." (Christensen, 1938; Tryon, 1952).

[Paris and Barrington p. 237]

The Humble Beginnings of Kew's Fernery

Kew's collection of exotic ferns started out in a 6' x 12' lean-to in 1822² and progressed past the crisis in 1838 to establish the greatest collection of ferns in the world with an unimaginably huge contribution from Nathaniel Wallich in India. Smith would have to quit curating Kew in 1862 because of failing eyesight but would go on to produce his own book of ferns in 1875, *Historia Filicum*, which would make another huge contribution to fern horticulture and their apparent taxonomic relationships. Clearly, Smith was the first great British fern plantsman with more than just a passing knowledge of fern taxonomy.³ Note that Smith already by 1838 had some definite opinions on what ferns were what and where they should be placed. Smith was not just a strong back with a strong constitution. Hooker's difference of opinion with Presl was often buttressed by the acute observations that accompanied Smith's observations in *Genera Filicum*. It also shows that Smith was well-versed in *botanese*. Note the comments by Hooker in regards to *Sphaerostephanos aspenioides*, "I adopt entirely the description of Mr. J. Smith." Smith was the author of the species after all! Hooker was not adverse to co-opting the work of his underling albeit with some grace and acknowledgment. Smith had old-fashioned loyalty to Hooker. Hooker was convolutedly condescending to Smith as the footnote below shows.

With *Sphaerostephanos*, Tab XXIV, (see below) in *Genera Filicum* we see below mind-boggling detail of the sporangia (fig. 5) and in figure 6 'a small portion of the glandular crest of the receptacle'. Thanks to Bauer, we are treated to botanical detail that eyes had never before feasted on .



² "In the year 1822 I found the collection of ferns at Kew extremely poor, especially as regards tropical species, very many of those introduced in previous years having been lost and very few new ones added. . . . The tender exotic species were more or less growing without any arrangement in different houses, and unnamed, their number amounting to about 40. In 1825 I arranged the tropical species in a group at the end of the then lean-to house . . . now included in the tropical fern house, the area they occupied being 6 ft. by 12 ft. These formed the nucleus of the now great collection. They were successively added to by importations of living plants, as also plants raised from spores obtained from herbarium specimens."

John Smith, *Historia Filicum*, 1875, Preface.

³ "My attention has been directed to this curious genus of Ferns by Mr. John Smith of the Royal Gardens at

Kew where he has for 18 years assisted Mr. Aiton in the practical management of that establishment and where he has availed himself of every opportunity which the valuable collection in these gardens has afforded him of improving his knowledge in botany. The Ferns have especially occupied his attention and I am indebted to him for many valuable remarks which have accompanied Mr Bauer's drawings."

William Hooker commenting on *Hypoderris*.

Franz Bauer- Master Botanical Draughtsman and Pioneering Palynologist

Many authors have referred to Francis Bauer as the first person designated in Great Britain as ‘*botanick artist to his Majesty*’⁴. Since 1790 he had done yeoman duty in his capacity as a prolific botanical illustrator for Banks principally and Kew in general. Before the epic tome on ferns with Hooker, he had done a magnificent job with Lindley on the Orchid family.⁵

It is indeed fortunate that Hooker was able to get some of Bauer’s finest work done on the ferns just before Bauer’s death. Bauer would not see the book published whilst he was alive. William Hooker would subsequently spend the better part of his life working on ferns. *Genera Filicum* was just the first pteridological publication for Hooker. Other books would subsequently cement his reputation as the leading pteridologist of his generation. His work on ferns, from a taxonomic point of view, culminated in *Species Filicum* (5 vols., 1846-1864). Hooker still used some of the Bauer/Fitch plates⁶ in the latter book as did Baker in Hooker’s posthumously published *Icones Plantarum Filicales*. The illustrations made by Bauer would be used as a reference to this very day. Today, we believe that with digital cameras and electron microscopes we have the luxury of the finest visual representations of plants. However, when we look at Bauer’s illustrations of ferns in *Genera Filicum* we are treated to something else, something that goes beyond mere physical recording. In this book, we are treated to a deeper dimension of ferns especially at arranging them on the page with marvelous views of the fructifications of ferns. We see lateral as well as overhead views of the fronds and transverse sections too. We see spores in various stages of development and dispersal and we see the spores magnified so that their morphology and their differences are delineated.

Little wonder then that in a review of palynological history (Hesse 2008), on the study of pollen, Franz Bauer is mentioned as one of the important figures.⁷ He did, in fact, discover the pollen tube as Robert Brown acknowledges (1828-33).

⁴ This is dubious however, as we note that in 1792 Nodder and Martyn’s book, “*Flora Rustica*”, states on the inside title page that Nodder is “Botanic Painter to His Majesty”. Must have been an intraregius spat.

⁵ “*Illustrations of Orchidaceous Plants 1830-1838*” Bauer, Franz with notes by Lindley, London

⁶ Fitch also contributed 500 more drawings for this book and his lithographs were reputedly drawn directly onto stone without preliminary sketches.

⁷ “*Pollen Terminology: An Illustrated Handbook*”, Michael Hesse et al Springer, 2008 p.12

⁸ The nucleus was the first organelle to be discovered, and was first described by Bauer in 1804.

⁸ For a more detailed discussion of this aspect of cytology and its development see Lindley’s “*An Introduction To Botany, Volume 1*” (1848) pp. 32-49. It was later described in more detail by Scottish botanist, Robert Brown in 1831 in a talk at the Linnean Society. Brown was studying orchids microscopically when he observed an opaque area, which he called the areola or nucleus, in the cells of the flower's outer

layer. He did not suggest a potential function but did give Bauer credit for alerting him to his studies and acting as a soundboard for what it might be.

Bauer's watercolours of pollen have only recently (2004) been reproduced in a facsimile by Kessler and Harley having lain dormant in the botanical library of the Natural History Museum (London) for nearly 200 years.

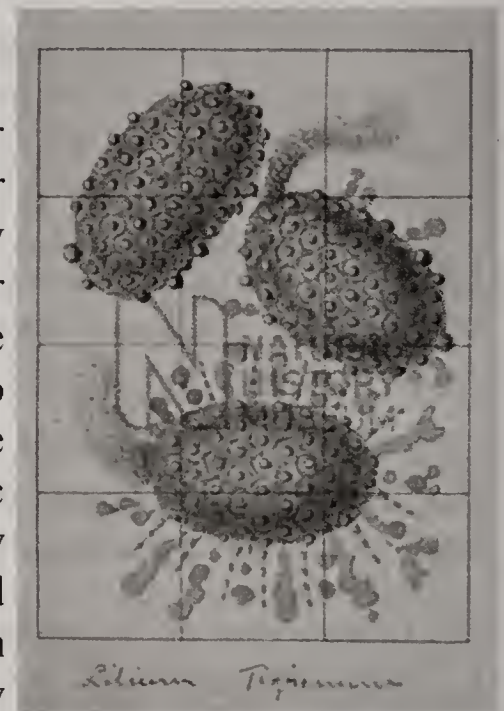
Unfortunately for Bauer, better microscopes arrived on the scene after he died at his home in Kew Green. After his death, they found not one but 16 microscopes that he used to ferret out details literally beyond the scope of most botanists. (See Endnotes for more details). At that point in history, there simply was nothing like his botanical artwork. His work was not just of scientific value but of artistic merit as well with Ehret and Redouté being his only historical mentors and, in a sense, rivals.

As for contemporaries, he had only one and that was his younger brother Ferdinand. Ferdinand Bauer had the good fortune to be the principal artist for *Flora Graeca* and also for the Flinders expedition to Australia. The results by Ferdinand Bauer are artistic triumphs to be sure and have been lionized 'down under' (New Holland). Exquisite as they are, they do not quite match the stunning exactitude of his older brother's magnificent, microscopic eye. But then again whose eyes/hands did?

Growing Up Drawing-

The Sketchy Background of the Bauer Brothers

Franz and younger brother Ferdinand seemed destined for greatness. Their father died young and was a court painter for the Duke of Liechtenstein but the strength of his legacy was as an engraver. Franz's and Ferdinand's older brother Josef was also an engraver. After their father's death, the boys were trained by his mother, Theresa (nee Hirsch), who nurtured their abilities and talent. Some sources say that she also died when the boys were young. When these tragic events unfolded, the boys' abilities were known. Thus they were adopted and taken care of by people who knew and loved not only their family but them as well. They had been groomed as artists whilst quite young. Subsequently, they were encouraged and nurtured by Dr. Norbert Boccius, the Prior of Feldsberg monastery, and a well known physician and botanist. The Bauer brothers soon found themselves on a career path as illustrators in the care of Boccius. He enlisted them on their first big illustrating project, the Codex Liechtenstein, on behalf of the Duke. All three (Josef was the eldest and quite good as well) worked over ten years on the Codex which illustrated 3100 plant species.



Lilium tigris pollen grains, page 38 from 'Drawings' by Franz Bauer depicting epidermis, hairs, pollen grains and Moustrosities. Courtesy Natural History

It survives at the Court of Liechtenstein in Vaduz. Several of the numerous pencil sketches are also preserved at the Naturhistorisches Museum in Wien. These early sketches show the first examples of the use of a colour code (in this case with fewer than 150 numbers) in their training. (photo page 66) Franz would continue to use this device for many more years.

On moving to Vienna about 1780, Franz and his brother Ferdinand Bauer (1760-1826) were introduced by Boccius to Baron Nikolaus Joseph von Jacquin (1727-1817), director of the Schonbrunn Imperial Gardens,. They improved their botanical techniques by working on Jacquin's *Icones plantarum rariorum* (1781-93). The three brothers studied at the Akademie der bildenden Kuenste in Vienna (Lack, 1996: p. 211). Later, Jacquin introduced them to John Sibthorp (1756-1796), Sherardian Professor at Oxford University, who had visited Vienna in 1784 to study the copy of Dioscorides preserved there (Lack and Mabberley, 1999).

Franz's first published drawing, at the age of thirteen, was of *Anemone pratensis* (unsigned) in a work by von Storck (1771). Baron Nikolaus von Jacquin's *Icones plantarum rariorum* (1781-93) publication was undoubtedly where their real botanical drafting skill was honed- under the watchful eye of one of the great botanists in Europe at the time. Franz Bauer began a European tour with his friend Joseph Franz von Jacquin, the son of the Baron in 1788. This took the pair to London where they visited Ferdinand then working for Sibthorp on *Flora Graeca* at Oxford. They were told that they should visit the library and herbarium of Sir Joseph Banks. When Banks saw Franz's botanical work and heard of his background and training, he wanted him to start working for him immediately and dangled the juicy sum of £300/annum. Banks wanted Franz Bauer to draw all of newly discovered plants that were flooding in from all over the world but especially those from the Indian subcontinent. Banks had not had a really good artist in his employ since the tragic death in 1771 of the young Quaker Scot, Sydney Parkinson, on the Cook voyage.

The Lineage of the Microscopic Eye of Francis Bauer

The serious under representation of Franz Bauer's accomplishments have undergone a serious remedy recently by German scholar, H. Walter Lack. First and foremost he has recently published, "An annotated catalogue of the printed illustrations by Franz Bauer (1758-1840)". It details all of Franz Bauer's prolific production. More recently, Lack has published "A Garden for Eternity: The Codex Liechtenstein" (2008) which details the Bauer brothers work (including the eldest, Josef) in the project that they worked on as teenagers/young adults.

Ever since the development of the microscope by Hooke (1635-1703) and Leeuwenhock (1632-1723), films and layers of the collective eye had been peeled off to reveal greater depth, texture and understanding of structure. Thus armed, scientists such as Malpighi and Grew were able to plumb the depth of structure and determine that the core sexuality in plants lay with pollen (Malpighi 1672 and 1679 and Grew 1682). This discovery paved the way for the breakthrough on the fact of the sexuality of plants made by Camerarius in 1694 that there must be both sexes present in plants for reproduction. The rise of scientific understanding has always been accompanied by the visual. As Agnes Arbor pointed out, the unfettered objectivity of the visual often trumps the textual (1937). The ground had shifted from the text-partial to the visual-partial some centuries earlier with the publication of Otto Brunfels *Herbarum Vivae Eicones* published between 1530 -39 in Strasberg, Germany. This is when we see the text-only, physic herbals recede in importance. The iconography of the medieval herbals was schematic and largely homological. Brunfels stated in his book that his work had new plants for a new audience and that they were truthful images drawn from live plants.



Yosemite Valley

Photo courtesy of
Sue Olsen

Pellaea mucronata
subsp. *californica*
(syn. *P. compacta*)

Photo courtesy of Graham Ackers



Adiantum caudatum
Schwartz Garden

Photo courtesy of
Richie Steffen

The Bauers' color code
(from before 1775);
archive of Royal
Botanic Garden,
Madrid, Spain.





Yosemite Valley

Photo courtesy of
John Acock



Asplenium bulbiferum
Lotusland

Photo courtesy of
Graham Ackers



Bommeria hispida
Schwartz Garden

Photo courtesy of Sue Olsen



*Cheilanthes
gracillimum*
Kern Canyon

Photo courtesy of
Graham Ackers

After Brunfels' publication, humanists wanted this kind of book with its attention to detail and colour. In a sense, this new sensibility heralded the Renaissance. Thus, artists working in this area had to strive for detail and truthful representation. Obviously, Bauer embraced this ideological sensibility passionately and had Smith to thank for the opportunity. The impact of the desire and the perceived need to have illustrations of high quality to augment the botanical gardens (starting in Italy at Padua and Bologna) was such that a studio attached to the garden library became a necessary structure. (Tomasi, "Gardens of Knowledge"). One can see the importance of *dal vivo* (live plants) in this configuration and why it always trumps herbarium-partial texts.

In order to arrive at Bauer, the artistic baton had to come from someone and that person was Georg Ehret. Ehret's apprenticeship under the seasoned botanical eye of Nathaniel Grew took his ability to such a level that even Linnaeus was overwhelmed by the details and tried to get him to tone it down. Later in his life, in correspondence, Linnaeus tried to take credit for the delicious detail in his drawings. Grew would have none of it and allegedly 'called him' on it. ⁹As the Swiss scholar Karin Nickelsen states, "So, the botanist not only had to teach his draughtsman how to design a scientifically usable drawing, he also had to give him an introduction to botanical theory. Even Ehret, who, as a gardener, would have been more familiar with plants and their organs than most academic artists, had to improve his knowledge in this respect. Among other things, Grew explained to Ehret the details of flower morphology, which was to gain enormous taxonomic relevance once Linnaeus's sexual system became established."

⁹ However, Linnaeus was also not completely satisfied with Ehret's work when he met him two years later, in 1735, on George Clifford's estate in the Netherlands. Johann Beckmann, a contemporary of Linnaeus, described the collaboration between draughtsman and botanist in the (published) notes of his Swedish Journey. "[Linnaeus] talked Clifford into engaging Ehret to paint the flowers required for the Hortus Cliffortianus. He did so, but initially did not want the stamina, pistils and other small details to be included, since he thought they would spoil the look of the drawings; in the meantime, however, he let himself be persuaded, and then he liked the work so much that he even wanted the tiniest and most unnecessary details to be noted down."

Karin Nickelsen, "Draughtsmen, Botanists and Nature: Constructing Eighteenth-Century Botanical Illustrations" History and Philosophy of Science, University of Bern 2005

Undoubtedly, before Ehret and his apprenticeships with Grew and Linnaeus, artists like Dürer would set a standard (especially with water colour) that would take centuries for the rest of the 'technicians' to attain. Thus we see a parallel situation of development in both Ehret and Bauer. Both had to be botanical draughtsmen and technicians of sacred



Night Blowing Cactus *Cereus grandiflorus* from *Plantae Selectae* by G.D. Ehret. 1772. This end of career illustration demonstrates Ehret's talents as a botanical draughtsman and gave Redouté something to shoot for. Francis Bauer was obviously in the same league as Ehret. Note the precise presentation of morphology.

morphological detail to attain the heights that they did. Their taskmasters were both present and past. Of course, none of this fine work would have been possible without the microscope and the pioneering work of Robert Hooke.

In 1665, Robert Hooke published *Micrographia* in which revelatory details, such as the stinging spines of this nettle above, were seen for the first time. With the development of the microscope scientists could finally see intricate structures with accuracy. Science began to probe deeper into morphology and these physical realities became the paramount quest for botanical science.



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Summary

Henry Noltie writing a review of Walter Lack's book on Franz Bauer, "The Painted Record of Nature. H. W. Lack. Vienna: Naturhistorisches Museum Wien. 2008."¹⁰ says, "The vast majority of the resulting botanical drawings were never published – many were unfinished, and subsequent trimming and re-annotation mean that chronology and sources of the plants depicted are often impossible to establish. Though Bauer had little formal education he was regarded by Banks and Home as a scientific equal, and he was elected FRS in 1820. Bauer published several papers and three 'books', though two of the latter (on *Erica* and *Strelitzia*) have no text – the drawings themselves '*intended to answer itself any question a botanist can wish to ask*'. Some of the drawings show important processes such as pollen germination, and others correctly interpret complex structures such as the staminal and stigmatic structures of *Asclepiadaceae*, the interpretation and clarity of depiction implying a clear understanding of theory. His work on rust fungi and plant pathology was also pioneering but, because most of these drawings were not published- either with or without explanatory text- they failed to (officially) contribute to scientific knowledge." Thus, not just for fern lovers but plant lovers of every stripe, Franz Bauer was a bright and powerful light in British horticulture. His contributions transcended his time and his adopted country. *Genera Filicum* is a work that everyone can return to and sit in awe of its illustrator and the amazing contribution that he made silently yet stealthily. Bauer's art is what gave this publication (and others as well) such staying power not just the fact that it was written in English or by the most powerful man in British botany as other writers have suggested. However, the collective work of *Genera Filicum* stands the test of time according to Paris and Barrington. They state: "*Having evaluated the contentions of Hooker's critics, we are in a position to ask whether they judged his works fairly. On the whole, we conclude that they did not: critical analysis of Hooker's work demonstrates that he had a reasonably advanced perception of natural relationships relative to most of his contemporaries. His system cannot fairly be called regressive just because of his broad genus concept.*"

Bauer's artistic contribution would have been much more muted had it not been strengthened by John Smith's expertise as a grower, observer and collaborator. It was fortunate that the first great pteridological horticulturist rolled up his sleeves and leaned

¹⁰ Edinburgh Journal of Botany, 2009

into what seems, in retrospect, an impossible chore. Smith was no doubt aided by the tailwinds of idealism created by Banks, Lindley, James Smith, William Roscoe and so many others of that enlightened neo-merchant class. John Smith was an indispensable and timely colleague for William Hooker as well as for Franz Bauer.

It seems fitting then that as testimonial to the respect that Smith had for Bauer, he purchased his desk at auction in November 1841 after Bauer's death in December 1840. Alex George, Australian botanist and historian, recounts the records of the Economic Botany Museum- item 186 Meyer auctions November 1841- being 'A



Portable Desk made of wood from New South Wales'. Although there's no official record of its sale in the auction, it must have been purchased by John Smith because it is he who is listed as donor after his passing on 14 February, 1888. Smith, in turn, bequeathed the desk to Joseph Hooker, William's son and Director of Kew from 1865–8. Joseph Hooker then placed it in the Museum where it sits in storage to this day. A silver plate attached to the desk reads as follows:

THIS DESK was Manufactured by a Convict
AT SYDNEY IN NEW SOUTH WALES
INTIRELY OF THE NATIVE WOODS OF THAT COUNTRY and brought from
thence and Presented to me BY MY BROTHER FERDINAND BAUER 1805.¹¹

The desk was an important thing for Bauer, a cherished gift from his brother Ferdinand. The silver plate attests to that. It seems that Bauer, Smith and Hooker were also a family of brothers dedicated to the love of ferns and plants as well. They were constantly working to improve not just our understanding of them scientifically but also their elemental importance and their beauty. Their creativity resulted in *Genera Filicum*, an inheritance that we can all admire.

¹¹ George, Alex ASBS Newsletter, June 2006 p. 9

Biblio and Endnotes

Bauer, Franz, "Delineations of Exotick Plants in the Royal Garden at Kew" 1796 was Bauer's first Banks/Kew creation. It consisted of three volumes totaling 30 plates of Heathers. It was intended to be an ongoing project but fizzled.

Bauer, Franz, "The Orchid Paintings of Franz Bauer" Stewart, J./Stearn, W. 1998 Timber Press. A recent look at his art.

Bauer, Franz, "Illustrations of Orchidaceous Plants, 1830-1838" with notes by Lindley. This is the primary text that the above book uses. The paintings were executed from his own sketches made between 1794-1807 and are "exquisite" according to Lindley himself who really is the father of modern orchidology. Bauer's first fern drawings were done whilst working for von Jacquin. His first fern drawing in England was for Robert Brown and was of *Woodsia*. It was published years later in the 11th Vol. of The Linnean Transactions.

Bauer's scientific writings are listed below and constitute what some believe was at least an equal if not an even more important contribution than his botanical draughtsmanship. In his obituary of *The Gentleman's Magazine*, Vol. 172, pp. 107-109, the president of the Linnean Society said, "*This admirable series of drawings (illustrative of the grain, germination, growth and development of wheat, and the diseases of that and other Cerealia) constitutes perhaps the most splendid and important monuments of Mr. Bauer's extraordinary skills as an artist and skill as in microscopic investigation.*" January 1842. Incidentally, the sale of Bauer's drawings and sketches was handled by Christies and Manson on November 1, 1841. The King of Hanover (the last one as it turned out) bought many valuable lots including the scientifically important ones of wheat, etc. for £27. 6 s. He must have done it on advice as he was totally blind. He would eventually donate them to the British Museum. Roses and Camellia sketches and drawings were also bought in good bids by others. Even one of his microscopes fetched £17 17s. His estate was engorged after the auction and his will bequeathed a goodly amount to his longtime and loyal housekeeper such that she was able to buy a house of her own.

Bauer, Franz, "Vibrio Tritici, an account" 1823, in *Philosophical Transactions*.

Bauer, Franz, "*Strelitzia Depicta*" 1818 shows details of pollen and its shape that was of high scientific and economic value. It also aided horticulturists with points on how to grow them more capably.

Bauer, Franz, "Microscopical Observations on the Red Snow" *Quarterly Journal of Royal Institution* 7th Vol. 1820.

Bauer, Franz, "On The Ergot of Rye" *Linnean Transactions* 1841. Adding to the work of Munchausen, who identified it as a fungus in 1764, this was from work that he did between 1805-09 on the source of ergotism. Ergot of rye is the source of LSD.

Franz Bauer's own words on his process of microscopic translation was shared with all readers of the book *The Micrographia* which appeared in 1837 and was edited by Goring and Pritchard. Bauer illuminates us on his methods and provides a few simplified drawings (on p. 235) to explain his process in the Appendix, pp. 221- 227. What his essay masquerading as a letter shows is the great precision of his mind. It is well worth reading for any future researchers on the subject. As Pritchard says in the introduction, "*Bauer has made more correct drawings of microscopic objects than any other person in England*" and his essay will be "*perused with much interest.*"

George, Alex *Australian Systematic Botany Society Newsletter*, June 2006 p.9. A more detailed account of the "traveling desk" is linked here at the end. It was made of *Eucalyptus* and *Casuarina*. One of two cabinet making convicts was its creator.
<http://www.shnh.org/Newsletters/NL86.pdf>

Gest, H. Gest recently provided evidence that Hooke was the real discoverer of microbes not Leeuwenhoek (*ASM News / Volume 70, Number 6, 2004*). See link to pdf here: <http://vsites.unb.br/ib/cel/microbiologia/intromicro/descoberta.pdf> for a detailed discussion.

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Lack, H.W. "A Garden For Eternity: Codex Lichtenstein" Benteli Verlag, 2001. This is an amazing account of the Bauer brothers first great illustration project that captured 3100 plants. Over a 30 year period, it was done in 14 volumes. Over 1/2 of the water-colour drawings are the work of Franz and his brother Ferdinand.

Martyn, T. and Nodder, F., *Flora Rustica* 1791-95. Frederick Polydore Nodder (fl. 1777-1800), Botanic Painter to Queen Charlotte, self-published this series. He also made illustrations for Erasmus Darwin's "Botanic Garden" as well as a number of delicate little plates for T. Martyn's *Flora Rustica*. Martyn was a professor of botany at Cambridge.

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Woodwardia sp.
Genera Filicum

California Ferning Part 3

6 October – Yosemite National Park

Paul Ripley

Leaving Sutter Creek we drove through attractive, deeply folded country, straw-coloured grass dotted with contrastingly dark green trees, gradually climbing into the Sierra Nevada of Western California.

Soon we were in pine forests, burnt in places, and stopped to admire the view above the Yosemite valley. Taking advantage of this break we found *Pellaea mucronata*, *P. andromedifolia*, *Pentagramma triangularis* somewhat dried out, *Aspidotis densa*, a UFS (Unidentified Fried Selaginella, possibly *S. hansenii*), *Cheilanthes gracillima* and a second *Cheilanthes* that we thought was *C. covillei* but which was later identified for us by David Schwartz as *C. intertexta*.



The Yosemite Valley is a dramatic valley lined with vertical cliffs carved out by glacial action. El Capitan is one such vertical face, a classic challenge to rock climbers, and the aptly-named Half Dome is its most famous landmark. We made a brief stop to see the Bridal Veil waterfall before lunching at the Visitor Centre. We saw dried-up *Cystopteris fragilis* near the falls and commonly elsewhere.

HFF/BPS California ferners at Yosemite National Park, Oct. 2010

On wall - Pat Acock, Dan Yansura, Middle row - Alan Ogden, John Acock, Richie Steffen, Bryan Smith, Gill Smith, Graham Ackers, Jane Whiteley, Paul Ripley, Kent Kratz, Paige Woodward, Pat Kennar, Rose Marie Schieber, Jack Schieber, John Scott, Front row - Martin Rickard, Naud Burnett, Wim Burnett, Kathryn Crosby, Sue Olsen, Pat Riehl.

The party split up, some taking the tourist bus for a tour of the valley, others, including myself, taking a short trail to the Vernal Falls. Here we found bracken (*Pteridium aquilinum*), *Cystopteris fragilis* – always shrivelled up, *Dryopteris arguta*, *Woodwardia fimbriata*, *Polystichum imbricans* – difficult in this habitat to distinguish morphologically from *P. munitum* – *Adiantum aleuticum*, *Athyrium filix-femina*, *Polypodium californicum*, *Polypodium hesperium*, *Pellaea mucronata*, *Aspidotis densa*, *Cheilanthes intertexta* and to our delight, *Woodsia scopulina*. In spite of the lack of water, the Vernal Falls were dramatic, with rock spray creating a permanent but ever-changing rainbow. Our billet for the night was the Yosemite View Lodge with the Merced River tumbling over rocks below our terrace.

7 October – Kings Canyon & Sequoia National Parks

John Scott

The time during our long bus ride was occupied by two slide presentations – Ferns of Juan Fernández Island off Chile by Dan Yansura and Ferns of Australia by Martin Rickard. We arrived at the park about noon and proceeded to the two largest trees in the world, the General Grant tree and then the General Sherman tree, both giant sequoias. I had been here twice before so the visit was not as awe-inspiring as it was to first-timers.

The general effect of being among these giant redwoods is a feeling of being in a great cathedral. *Sequoiadendron giganteum* are the biggest trees in the world, as opposed to the coast redwoods, *Sequoia sempervirens*, which are the tallest trees. The most exciting moment for some was the sighting of a black bear. The ferns of the understorey consisted of *Athyrium filix-femina* and *Pteridium aquilinum* var. *pubescens*.



King's Canyon National Park
Photo courtesy of John Acock

8 October – Kern Canyon - Richie Steffen

We left the small city of Visalia where we had lodged overnight and headed toward Kern Canyon. Located in the southern part of the Sequoia National Forest, it is the home of several xeric ferns. Just outside the small town of Springville we met David Schwartz, a local fellow fern enthusiast who specialises in dry land species. Entering the mountains we passed shrubby oak forest interspersed with grassland. Our first roadside stop was along rocky and grassy slopes dotted with boulders. Tucked at the base of a particularly large granite boulder were several plants of *Pentagramma pallida*, our first sighting of this small difficult-to-cultivate fern. Similar in size to the much more common *Pentagramma triangularis*, it differs in having a pale creamy white underside to the fronds. As with most of the xeric ferns seen during this trip the fronds were held in tight bundles, nicely exposing the characteristic coloring of the underside of the foliage. There were also scattered plants of *Pellaea andromedifolia* with its characteristic deep reddish purple dry foliage and a few patches of a *Selaginella*, perhaps *S. bigelovii*.



Dan Yansura, Kern Canyon
Photo courtesy of Sue Olsen

As we continued up the canyon road we made a brief stop to see a lone colony of *Equisetum arvense* growing along the edge of the road surrounded by a forest of oaks and conifers. Travelling along the twisted road the remaining trip passed through the typical dry Californian landscape. Our main stop for the day was at the Johnsondale Bridge, which spans the River Kern. After a quick lunch we prepared for a short hike along the river looking for native xeric delights. Once we crossed the bridge David provided us with a lesson on native ferns. Outcropping boulders were home to the ubiquitous *Pentagramma triangularis* along with three different species of *Cheilanthes*. The most common of these interesting rock dwellers was *C. gracillima*, (photo page 67), a charming delicate frame with fine slender fronds. Nearby was our first sighting of *C. covillei*, with characteristic white scales on the undersides of the frond, with the allotetraploid between the two, *C. intertexta* situated nearby. A trail led along the river below, and the rocky parched path provided plenty of habitats for all three species, allowing everyone the chance to try their hand at identification. Further down the trail we were able to see two of the native pellaes, *Pellaea andromedifolia* and *P. mucronata*.

Gathered back on the bus, we proceeded to our next stop, a small park along the river with a trail that led up a mountainside to a limestone outcrop. A small group decided to scale the mountain to see a choice small fern only found on limestone, *Argyrochosma jonesii*. We set off at a quick pace; the high and thin mountain air left us breathless near the top, but the fantastic views over the valley more than made up for the effort. Once on the ridge we trekked over to the limestone formations. The crumbling sharp layers of stone made excellent homes for a handful of *A. jonesii*, the tightly curled fronds filling the cracks in the rock. *Pellaea andromedifolia* grew in scattered patches nearby, equally defiant of the harsh environment. The remaining group searched along the riverside, finding either *Equisetum variegatum* or *E. laevigatum*. Their other discoveries included a few leaping lizards and two handsomely striped crawfish that skilfully eluded capture.

As the sun hung low in the sky we reached our final fern stop of the day, a roadside pullout called the Upper Rich Bar Day Use Area. There was little to see in the roadside park, but across the street were several hundred plants of *Pellaea andromedifolia*. The characteristic deep red-purple crispy fronds dotted a bluff, with a few patches of xeric selaginellas along the top. The dry gravelly soil littered with loose rocks proved hard to scale to any degree, but with a little effort everyone could find ferns for a closer look. As the sun set we boarded the bus and left for our hotel in Bakersfield.

9 October – David Schwartz’s Garden,

Bakersfield & Huntington, San Marino

Bryan & Gill Smith

Today began with a real treat – David Schwartz’s garden in Bakersfield. After seeing many desiccated ferns the day before, it was a pleasure to see David’s rock and scree front garden resplendent with green xerophytes of all shapes and sizes. All the more amazing was that, despite fronting the road, the garden remained unvandalised and no one had pinched his plants. Indeed, David actively encourages youngsters to appreciate his garden provided they stick to the paths. It is impossible to detail all his ferns – we were given a list of over 160 species, so suffice it to say they included an



Schwartz Garden
Photo courtesy of Sue Olsen

abundance of *Cheilanthes*, pellaesas, pityrogrammas, mildellas and notholaenas. David’s favourite was *Actiniopteris semiflabellata*. Ours included *Bommeria hispida*, (photo page 67), a lovely stand of *Lygodium japonicum* growing up the outside of the house and a very pretty, small *Pityrogramma calomelanos* var. *austroamericana*. Around the back of David’s house we found more familiar *Dryopteris*, *Polystichum* and *Woodwardia* in normal soil – once we had circumnavigated the inviting outdoor pool. It was also good to see that David liked fern memorabilia – from the ferny welcome sign on the front drive to pictures on the walls, a ferny carpet in the lounge and ferny tea-light holders on the patio. At the end of the visit, Martin Rickard presented David with the BPS Special Publications on *Polystichum* cultivars and Victorian books as a thank-you, commenting that David had aged well – a Mr Swartz having produced an early-1800s fern book! We left vowing to try to create a small xerophytic fern area in our own garden. We continued a further 120 miles on our journey to San Marino to visit the Huntington, a private non-profit collections-based research and educational institution



Conservatory Huntington Botanical Garden
Photo courtesy of John Acock

founded by Henry E. Huntington in 1919. This impressive 207-acre estate includes a library containing a Gutenberg Bible and several editions of Darwin's *Origin of Species*, an art gallery with numerous original Joshua Reynolds and Gainsboroughs – and 120 acres of botanic gardens. Unfortunately, due to a mix-up, we did not have a guided tour of the gardens so we all went our separate ways to explore. Pat Acock and a couple of others did, however, later meet the guide and were rewarded with a behind-the-scenes tour of the fern greenhouses. We gather this included

seeing several *Lecanopteris*, *Elaphoglossum crinitum*, *E. decoratum*, *Microsorium thailandicum*, *Polypodium pyrrolepis*, *P. bombycinum* and *Pecluma pectinata*. In the gardens, we saw part of Barbara Joe Hoshizaki's fern collection, which she had donated to the Huntington several years before. Unfortunately, this did not do justice to her ferns as many were mislabelled or yet to become established. However, in the gardens and glasshouses, we did see good stands of *Blechnum appendiculatum*, a nice clipped hedge of *Equisetum hyemale*, a *Lecanopteris* (ant-fern), and an interesting time-line display of pteridophytes in one of the greenhouses. Did you know that dinosaurs became extinct 65 million years ago, between the development of lemnaephyllums 80 million years ago and platyceriums 50 million years ago? We concluded our day in nearby Arcadia.

10 October – Los Angeles Arboretum & Lotusland

Sue Olsen

We breakfasted at Rod's Grill a diner from 1950's Americana Route 66 days before heading to the Los Angeles County Arboretum. Denia Mandt, spore exchange director for the AFS, joined us as we were greeted by Jim Henrich who briefed us on the history of the county parks system and specifically the LA Arboretum. Time was short but we enjoyed a display of tropical ferns in the company of orchids in their conservatory as well as the fern collection in their shade house. The *Blechnum occidentale* with vivid accents of red new growth were especially attractive.

The highlight of the day's botanical/horticultural immersion, however, was Lotusland, a Santa Barbara garden that turned out to be one of the favorites of many participants. It was developed and donated as a non-profit educational institution by Madame Ganna Walska (whose fifth husband (of six!) was the great uncle of Alan Ogden's wife Valerie). She strongly promoted the use of plants en masse. We had been divided into two tour groups, the speedy ones and the lingerers, who turned out to be indistinguishable from one another. Both in turn toured the mass plantings of cycads, cactus, etc. and all went well until we converged in the fern garden. At this point cameras



Asplenium australasicum
Photo courtesy of Sue Olsen

and discussions prevailed and groups dissolved! Small, almost horizontal, plants of *Polystichum munitum* stood modestly shoulder to shoulder under impressive tree fern canopies including *Cibotium schiedei*, a Mexican contribution to the garden. I was especially impressed by a nearby statuesque specimen of *Asplenium australasicum* with its definitive keel marking the midrib of this brilliant green five-footer. Familiar ferns such as *Rumohra adiantiformis*, *Woodwardia radicans* and assorted adiantums joined with the unfamiliar, including *Nephrolepis exaltata* 'Tesselata', *Blechnum moorei*, *Asplenium surrogatum*, *Arthropteris tenella*, *Microlepia strigosa* 'Mcfadden', looking from a distance deceptively like *Athyrium filix-femina* 'Frizelliae', and the healthiest plant I have ever seen of *Asplenium goudeyi*. All were presented in excellent condition and accompanied by begonias and other modestly flowering ornamentals making the garden one of the most attractive and best maintained that we visited.



Lotusland Fountain
Photo courtesy of John Acock

Our motel was just a block back from the beautiful beach, giving us a brief opportunity for a quick walk on the sand before heading to the elegant hillside home – complete with a striking spore-grown *Cyathea medullaris* and a huge hanging *Platycterium* – of Dan's sister and brother-in-law, Sharon and Jim Westby. They graciously hosted us for a splendid evening of delicious food, great wine and relaxed socialising, surrounded by the comfort of a warm fire. It was a most welcome finish to a delightful day.

11 October – La Purisima Mission

Jack Schieber

This was a quiet day in 'Lake Wobegon' for us as we were mainly travelling. On the way to breakfast, *Dicksonia antarctica*, *Cyathea cooperi* and *Dryopteris arguta* were seen on the street sides. Later in the day we saw bracken near the roadside for a count of four species and nothing new.

The road map indicated that for part of the journey north we were on a 'scenic route'. For miles we saw only brown hills with oak-forested tops, which would seem to make a lie of the map. But there is a beauty in any natural landscape. To break the long journey we stopped at La Purisima Mission State Historic Park, where we had a guided tour. This Franciscan Mission was set up in 1787, one of 21 Spanish Missions set up from San Diego to just above San Francisco with the aim of encouraging immigrants from Spain and Mexico. After working for ten years the settlers were to be given the land as their own. The goal was never reached and the Missions declined. In 1843 La Purisima was sold to private owners and was eventually abandoned to weather and time. After a hundred years it was rebuilt, and for the last 68



Asilomer Beach - left to right, Pat Acock, John Acock and Richie Steffen
Photo courtesy of Sue Olsen

years it has been a state park. Another long drive found us just on time for our reservation at the Fishwife Restaurant close to the ocean and we then retired to the nearby Asilomar Conference Centre close to Monterey.

12 October – Half Moon Bay Nursery

Bryan & Gill Smith

Not being far from Monterey, we managed a short detour to drive along Cannery Row, of John Steinbeck fame, passing some very expensive sea-front houses, one with *Polystichum munitum* in the garden. Continuing 80 miles north along Highway 1, we turned off on a windy road to Pescadero for lunch, and spotted stands of *Polystichum munitum*, *Athyrium filix-femina* and *Pteridium aquilinum* along the roadside.

After lunch, we drove a further 20 miles to Half Moon Bay Nursery, which, among other plants, had a good selection of ferns reasonably common in the US trade. Fortunately, Dan and Patricia had warned the owners of our impending visit, so there was a good selection of ferns. These included various familiar *Adiantum*, *Dryopteris*, *Selaginella*, *Pteris*, *Polystichum* and *Cyrtomium* etc. The more unusual included *Polypodium californicum* 'Sarah Lyman', *Doryopteris pilosa* 'Gemmifera' and *Pteris quadriaurita* 'Flame'. Also, where else could you get a small trunked *Cyathea australis* for under £7? Growing out of the gutter of the fern greenhouse we saw a small plant of *Polypodium glycyrrhiza* and much larger plants of *P. scolieri*, which the owners could have profitably sold in the nursery. Normally California gets no rain from July to November, but the owner warned us of an impending storm the next day, which did duly arrive.

Continuing the 20 miles to Pacifica, passing some *Equisetum telmateia* on the roadside, we stopped off briefly at our hotel before heading back to Dan's and Patricia's house for cheese and wine. This gave us another chance to see round the garden but, more importantly, provided a perfect opportunity for Martin and Graham, on the group's behalf, to thank Sue, Dan and Patricia for organising such a tremendous trip, and to give them tokens of our well-deserved appreciation. We gave Sue a magnificent framed fern print by Niki Simpson, and Dan and Patricia a Highgrove fern plate and two BPS Special Publications.

We finished the evening with a group meal in Pacifica, joined at the last minute by Alec and Linda Greening, Judith Jones and Vanca Lumsden.

Conclusion

Pat Acock

We learnt so much from the people we met, who were so generous in sharing their time and gardens with us. Many of us are picking up a great deal of expertise and knowledge through the privilege of travelling in the days of cheap air flights. I am ever conscious that the average age of the active members of the British Pteridological Society is becoming higher and it is to be hoped that the skills and knowledge gained on these forays can be handed on to the next generation of pteridologists.

We thank Sue Olsen, Dan Yansura and Patricia Tanttilla for their meticulous planning and hard work, which resulted in such an interesting tour. It had attracted a diverse and amenable group who enjoyed each other's company and learnt so much from each other about ferns and Californian ecology and culture.

The Winter That Was



Winter 2009-2010 struck with cold, often record setting, throughout the world, from blizzards and long, long lasting snow in the Eastern US, to a devastating sudden December temperature plunge in the west and record cold, described by friends as brutal, in the UK and Europe. This is the first in a series of comments on the toll it took on assorted plant life. We have other articles and comments coming and would love to hear from the rest of you.

Russ Graham, Salem, Oregon
May 30, 2010

A "problem" is separating MY experience with potted material versus "in ground" and identifying what I have observed elsewhere and or "heard" about, etc. (I am finally "learning" to make some of those distinctions and ask questions etc. in order to better understand just what "happens"...))

YES, it was a real 'Breakfast Winter', way too many plants turned to either Toast or Mush. Plus, we have been fortunate so far with all the cool weather since the freeze. My guess is that a few HOT days will show us still more damaged plants! The reality of micro-climates is very evident as plants in various parts of the same garden let alone gardens separated by a few miles have VERY different survival rates...

I have heard of thousands of dollars worth of roses dumped because the grafts (not fully established) did NOT survive, HUGE piles of composting materials at various nurseries, fields being "plowed" under as well.

So, the Toast list (all in the ground) includes: Hebes, NZ Flax, Eucs of many kinds, some Ceanothus, more grasses than I would have expected, Kniphofias and Agapanthus and Dierama (the last three might better be on the mush list). Some of these might return from the roots but only time will tell and some species/selections are fine.

I have not been a fan of zonal denial and Tropicolisimo, so I do not have much first hand experience with all those other "tender" plants that others have coveted.

Now the MUSH list (mostly in pots, but not only in pots for Arisaema for instance) includes: Daffodils (YES!), Hellebores, Trillium (by the 100's here and from Port Townsend to Medford as well, including some amazing specimen plants...), generally anything in the Toast list is Mush if in pots, Cyclamen (but not all), Arisaema in the ground as well as pots but mostly the LARGE "bulbs", as tiny offsets are fine in the ground right beside mushy adults AND it varies by species..., Epimedium (also varies by species) and *Osmunda regalis* in pots that are more Toast than Mush but dead never the less, Eucomis in both pots and ground disappeared BUT others had them survive just fine, Euphorbia - variegated selection (amazing as I can't kill Euphorbia when I want to).

As to ferns in general, they seem to be fine. *Adiantum venustum* was essentially evergreen. *Arachnoides* looks rough but seems to be fine. *Blechnum chilense* appears to be alive and *B. watsii* (I think that is right, both are from Richie in 08) is even better. *Polystichum setiferum* 'Plumoso-multilobum' starts that were rooting ALL died. *P. polyblepharum* remained evergreen even in pots. A selection of *Cyrtomium* used extensively in CA landscapes appears to have "bit it", in the ground a year+.

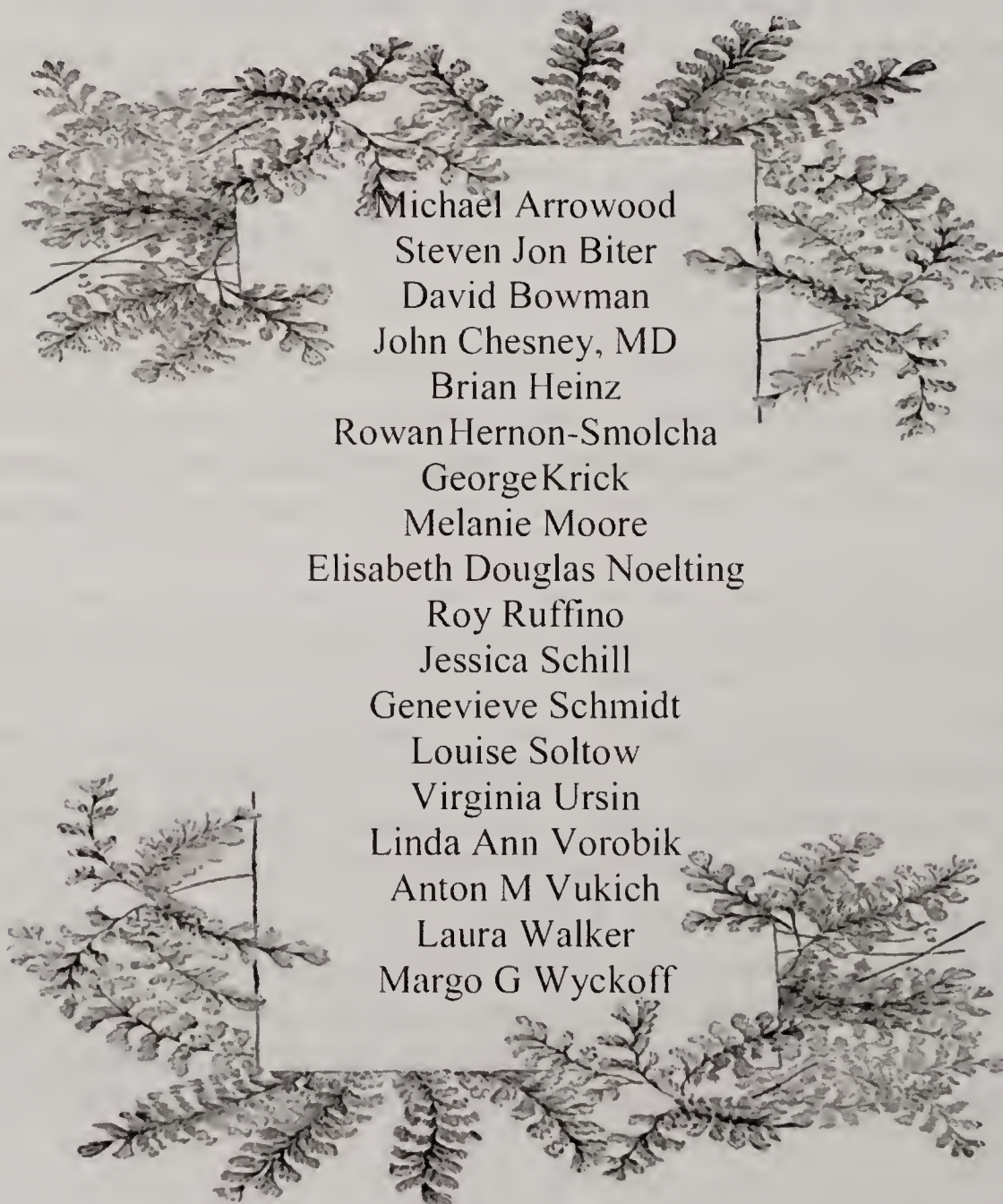
June 19 -

Still cool and wet. No new news, generally the ferns that lived all look great. *Woodwardia fimbriata* made it, which has NOT been the case many times in the past...

P. s. divisilobum appears to be unscathed.

Many perennials are emerging at weird timings but most at least survived. However, many have not been tested with heat yet and I am sure some that appear challenged will succumb if we get a sudden hot spell.

Welcome New Members



Michael Arrowood
Steven Jon Biter
David Bowman
John Chesney, MD
Brian Heinz
Rowan HERNON-Smolcha
George Krick
Melanie Moore
Elisabeth Douglas Noelting
Roy Ruffino
Jessica Schill
Genevieve Schmidt
Louise Soltow
Virginia Ursin
Linda Ann Vorobik
Anton M Vukich
Laura Walker
Margo G Wyckoff

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submissions to:*

Sue Olsen
2003 128th Ave SE
Bellevue, WA 98005
foliageg@juno.com

Editor:
Sue Olsen

Graphics:
Willanna Bradner
(cover design)
Michelle Bundy
(inside design)

Webmistress:
Michelle Bundy

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