

THE HARDY FERN FOUNDATION

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

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

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

The fern display gardens are at Bainbridge Island Library, Bainbridge Island, WA, Lakewold, Tacoma, Washington, Les Jardins de Metis, Quebec, Canada, Rotary Gardens, Janesville, WI, University of Northern Colorado, Greeley, Colorado, and Whitehall Historic Home and Garden, Louisville, KY.

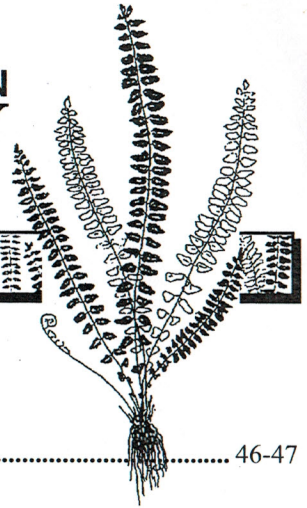
Hardy Fern Foundation members participate in a spore exchange, receive a quarterly newsletter and have first access to ferns as they are ready for distribution.

Cover Design by Willanna Bradner

**THE HARDY FERN FOUNDATION
QUARTERLY**

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The Spore Exchange Needs You!

Please send your spores to our Spore Exchange Director:

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

President's Message

With every key stroke I want you to know the restraint required to continue writing during a beautiful clear evening. A busy spring has left my garden in shambles and all that will help is time and diligence. I can see a tall spire of promising buds from a robust hawkweed threatening to burst into their yellow dandelion-like flowers. The base of foliage has remained safely hidden under a rhododendron. The bright and fresh green of lady fern, *Athyrium filix-femina*, is dotted throughout my landscape. Almost all are self sown (except for a few select cultivars) and are emerging mostly from the center of choice perennials and shrubs. Fireweed, young plantain, the sporadic clover and a particularly aggressive creeping buttercup are all desperately trying to grow and seed before I am finished writing. This all makes me want to ignore them and leave for vacation, but alas, no vacation is planned. I will have to settle for reading about other's trips. Fortunately, this issue is filled with some great accounts of some wonderful fern adventures. Alan Ogden recounts the latest BPS trip to the tropical island paradise of Réunion and Joan Gottlieb has the second installment of her interesting trip to New Zealand. I am sure this will help satisfy my desire to travel.

To follow up on a few events in the recent past, I would like to congratulate The Delaware Valley Fern and Wildflower Society for winning an award for their Irish fern display at the Philadelphia Flower and Garden Show. We also received word that the Georgia Perimeter Garden won an award for their fern display in the Southeastern Flower and Garden Show. Great job! Our display garden affiliate, Whitehall historic house and garden, in Louisville, KY celebrated their first annual Fern Festival on June 23 to great success. HFF founding member and current board member (and Quarterly editor) Sue Olsen gave a well received lecture based on her new book "Encyclopedia of Garden Ferns". To find out more about her book, read the review in this issue. Whitehall also dedicated their fern stumpery garden to Ralph Archer, a long time HFF member and supporter. A newly installed plaque commemorates his work on this beautiful garden and the support of the Hardy Fern Foundation in Mr. Archer's efforts. (Further details will be published in the fall Quarterly).

This brings us to the Hardy Fern Foundation's own Fern Fest held June 1st and 2nd. It was well attended and many ferns were sold. The highlight of the event was a shopping visit from Martha Stewart (yes, that Martha Stewart!) who purchased several excellent ferns and four copies of Sue's new book to share with her friends. Our speaker, Russ Graham, gave an informative lecture sharing his ex-

periences with growing many rare shade perennials. I took copious notes of his growing suggestions. When the sale ended on Saturday we were just shy of last year's record breaking sale. Sales were further boosted by a silent auction run by board member Pat Riehl. The highlight of the auction was two fern tables made by Pat Riehl and Pat Kennar that were spectacular creating much interest. Treasures like these are what make the Fern Fest such a special event. Thank you to all of the board members and volunteers who made it fun and successful, especially to Pat Kennar, Fern Fest Chairman, for spear heading this endeavor. Pat has generously given many hours in preparation and tirelessly helped on both days of the sale to make sure all went smoothly. Thank you Pat, we appreciate your help!

My best wishes go out to all of our members for regular rains and cool temperatures for the summer!

All the best,

Richie Steffen

The Uses of Botany

*There should be no monotony
In studying your botany.
It helps to train and spur the brain
Unless you haven't got any.*

*It teaches you – does botany
To know the plants and spot any.
And learn just why they live or die
In case you plant or pot any.*

*You learn from reading botany
Of woolly plants and cottony,
That grow on earth and what they're worth
And why some spots have not any.*

*You sketch the plants in botany.
You learn to chart and plot any,
Like corn or oats, you jot down notes
If you know how to jot any.*

*Your time, if you'll allot any
Will teach you how and what any
Odd plant or tree can do or be
And that's the use of botany!*

*Berton Braley
Science Newsletter
March 9, 1929*

Olsen, Sue. *Encyclopedia of Garden Ferns*, 2007, Portland, OR, Timber Press.

Reviewed by Joan Eiger Gottlieb, Pittsburgh PA.

From its lush illustrations to its useful appendices this is a voluptuous volume, equally appealing to the fern maven or the aspiring gardener. Its considerable heft is evidence of comprehensive content but its logical organization ensures easy, enjoyable use. The eye-catching dust cover, with a montage of the author's color photos, makes this a beautiful coffee table book. Perusing its glossy pages will result in a delightful addiction to its scientific reference value and to its entertaining style – a rare, refreshing combination.

Encyclopedia of Garden Ferns presents 960+ ferns, organized alphabetically – starting with *Acrostichum*, a semi-tropical genus, and ending with *Woodwardia*, whose species span north temperate to near tropical climes – a broad spectrum of choices for every nook and cranny of most of the world's gardens. Natives, exotics, and hybrids are included, as are some non-ferns (e.g. *Huperzia*, *Lycopodium*, *Selaginella*) for completeness, although most of these are more to be enjoyed in their natural habitats than attempted unsuccessfully in the garden. Olsen is very strong in her repeated warnings against transplanting from the wild. Some species are dependent on associations with soil fungi, e.g. the fern genus *Botrychium* and most lycopods. They will not thrive in typical garden soils. Newly revealed relationships from DNA sequencing are well covered in this book and may be somewhat disquieting to those who have not kept up with current classifications. Note Olsen's introductory remarks on *Equisetum* (horsetails) on p.251. This genus is apparently a genetically related sister to the ferns and is now grouped with them, forming a monophyletic, parallel group with the seed plants.

Color photos, many of which are the best I have ever seen, accompany more than two thirds of the ferns featured in the volume, adding immensely to the usefulness of the ample descriptions. Remarkably, nearly all the photos were taken by the author, a true reflection of her discerning eye and expert camera work.

A unique and extremely useful section titled "Culture and Comments" is included with nearly every fern description. Here you will find invaluable tips for success with each species in your garden based on the author's extensive experience as a grower and owner of the oldest mail-order nursery (Foliage Gardens) for spore-grown, hardy ferns. The comments are interesting, often humorous vignettes – a natural magnet for the reader. For example, under *Asplenium trichomanes* (maidenhair spleenwort) Olsen writes, "Should all else fail, a tea of *A. trichomanes* (mixed with olive oil) was once reputed to cure baldness. (Drop a sprig or two into your husband's tea.) By all appearances it has not been successful." Sue Olsen's late husband Harry was handsomely bald. And, under *Matteuccia* (ostrich ferns) we read, "These are robust ferns for areas where there is ample room for their exuberant colonizing. Excess...progeny can always be dug and given away and will be remembered as the 'gifts that keep on giving.'" There is even a recipe for sautéed ostrich fern crosiers that ends, "Or as an alternative, how about a 'cream of crosier' soup

for the creative gourmet."

Olsen does not shy away from the more esoteric aspects of fern reproduction, explaining and noting those species that are apogamous (producing sporophytes directly from the tissues of tiny gametophyte plants without the typical union of egg and sperm.) Obviously these species are advantaged in dry habitats, and they are a bonanza to growers because the sporophytes are abundant and come up much more quickly in spore cultures. Olsen features many hybrids e.g. *Asplenium x alternifolium* (alternate-leaved spleenwort) and *A. ebenoides* (Scott's spleenwort) along with their promiscuous parents. She also gives the Greek or Latin derivations of fern names, e.g. "*Phegopteris* comes from the Greek *phegos*, beech, and *pteris*, fern, in reference to the plant's native ...(growth)... under beech trees." Then, she notes reassuringly, "In cultivation, these ferns are indifferent to the type of shade tree overstory."

Despite careful attention to the science behind her beloved ferns, Olsen is not a fan of nomenclatural changes. She admits to being a "lumper" as opposed to a "splitter," a state of mind to which most of us can subscribe as we struggle to absorb a cascade of name changes. However, many of these changes reflect scientific realities and give a truer picture of the lineages and genetic relationships of our favorite ferns such as *Cyathea*, which according to Dr. Alan R. Smith of Berkeley, is essentially a New World genus, so the endemic New Zealand silver tree fern (*C. dealbata* in the book) is assigned to the pantropical genus *Alsophila* and *C. medullaris* (black ponga) re-named *Sphaeropteris medullaris*. In addition *Trichomanes reniforme* has been placed back into *Cardiomanes* and *Diplazium pycnocarpon* (only recently moved out of *Athyrium*) is now assigned to *Homalosorus*. To complicate matters even more, not all of the experts agree with these changes.

Enthusiasm for ferns in the garden has increased exponentially in recent years, and not just as attractive foliage fronts for more colorful flowering plants. Anyone can be attracted to the bright, often gaudy colors of flowers. It takes a more educated, practiced eye to see equal beauty in the incredible architecture of a finely divided fern frond. And, as Olsen's abundant photos clearly show, ferns can be quite colorful in their own right.

Check out the "ruby stipes" of the lady fern cultivar *Athyrium filix-femina* subsp. *angustum* f. *rubellum* 'Lady in Red' (p.129). Admire the "subtle shades of lime and wine" on *A. otophorum* (eared lady fern – p.135) or the silvery sheen of the Japanese painted fern cultivar *A. niponicum* 'Silver Falls' (p.134). Young fronds of many ferns display rose or bronze hues as they uncoil. The best "rosies" are in *Adiantum*, *Blechnum* and *Doodia*. Also worth considering are the bright red emerging fronds as well as sori (p.210 and 228) on the aptly named *Dryopteris erythrosora*. With colorful possibilities like these a fern garden can be strikingly beautiful, endlessly interesting, and quite complete all by itself. For the angiosperm addicted, Olsen suggests companion flowers that augment the visual impact of ferns without overwhelming them – e.g. hellebores, hostas, heucheras, arisaemas, primroses, gaultherias and native wildflowers.

This book emphasizes that there is a fern for all garden niches. Woodland sites and soils are perfect for many of the *Dryopteris* and *Polystichum* species. Damp or poorly drained spots will accommodate *Matteuccia*, *Onoclea*, *Woodwardia* and *Osmunda*. Rock gardens and well-drained, gritty soils provide natural homes for many aspleniums. A shaded lime-

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Book Review *continued from pg. 49*

stone cobbles can burst forth with calciphiles like hart's tongue fern in its many forms and the inimitable walking fern with its attenuated fronds that root at the tips to "walk about" limestone ledges. Even desert ferns like *Cheilanthes* can be accommodated, according to Olsen, in soils that have excellent drainage. She recommends mixtures of volcanic rock, pumice, grit (chicken scratch) and cautions about the need to site such species for maximum protection from "winter wet." Living in the temperate rainforest that is Seattle, she knows whereof she speaks. And speak she does, with poetic phrasing like "...black-green foliage is readily recognizable and suggestive of early evening views of somber mountain lakes" – perfectly capturing the image of *Polystichum richardii* in brooding, New Zealand forests. Do not pass over the pages of lyrical fern portraits "...Through the Seasons" that are prologue for the book or "Ferns Through the Ages" – a historical survey highlighting the Victorian fern craze of the late 19th Century that "brought ferns to widespread public attention." There are practical sections on "Cultivating Ferns" and "Propagating Ferns," the latter dealing with vegetative (asexual) methods like divisions, bulbils, and tissue culture, but also featuring and emphasizing growing ferns from spores – Olsen's forte. It is rare that a professional horticulturist so willingly shares her "recipes" and secrets for success.

The *Encyclopedia...* concludes with a series of eight appendices, including plant hardiness zone maps (the legend on the USDA map needs to be enlarged in a future printing), selections of favorite ferns by gardeners from Zones 4 to 11, a list of botanical gardens with exceptional fern collections, and a "Where to Buy Ferns" that will be equally useful to gardeners looking to start a fern collection or those who want to expand their holdings. There is a very adequate glossary and a selection of references for readers who thirst for even more fern immersion. The volume concludes with a complete index to the names of ferns (both common and scientific) included in the volume. All in all, *Encyclopedia of Garden Ferns* is clearly a work of excellence and expertise from a woman who has traveled the world in pursuit of its pteridological treasures. But, most of all, it is a work of love, coming right from the heart of someone who has an intuitive appreciation of this ancient group of plants – plants that are often misunderstood and definitely underused in the landscape. This book should not be allowed to sit idly on that coffee table – attractive in the décor as that might be. It should be read, savored, and referred to each time a new fern is discovered or an old favorite is remembered.

Adiantum capillus-veneris

James Horrocks
Salt Lake City

The species epithet 'capillus' translates "hair" and 'veneris' signifies Venus. The Venus-hair fern, also called Southern maidenhair in the Americas and "true" maidenhair in Great Britain, is certainly one of the most widely distributed maidenhairs. It ranges from the tropics to warm temperate areas and is most common in the latter. Associated mostly with limestone, it festoons cliffs and ledges near waterfalls, seeps, cataracts, and even in caves. In southern Utah, it is abundant in sandstone regions, growing in crevices of cliffs and

ledges and in soil among talus. In extreme northern "disjunct" sites it is associated with hot springs, although there is the persistent rumor of the legendary "hardy form". The author grew some from spore purported to be very cold-hardy and the plants have persisted for two years outside, planted up against the foundation of my home. During the winter, they were protected with six to eight inches of leaves and survived a very cold 2007 January where temperatures never got above freezing the entire month. Fronds began to emerge in mid-May and are still appearing as of late June.



In North America, the Venus-hair fern ranges across the southern states from North Carolina westward to Kentucky, Missouri and onward to California. Its northern range in the west is southwestern Colorado and southern Utah westward with disjunct colonies in the Black Hills of South Dakota, in box canyons near Ouray, Colorado, and in British Columbia. It is frequent in the Grand Canyon of Arizona and in Zion National Park in southern Utah. It is especially abundant in the Colorado River Basin of Utah.

The Venus-hair fern may be confused with some tropical species, especially *A. raddianum* and the larger *A. tenerum*. The shape of the sori are diagnostic in telling them apart. In *A. capillus-veneris*, the sori are typically elongated while in *A. raddianum* they are circular. Of interest, during the nineteenth century, there were many cultivars of *A. capillus-veneris* but most are now extinct. The few that remain and are worthy of mentioning are 'Fimbriatum' with fringed shaggy pinnules, 'Imbricatum' known as "Green Petticoats" with its overlapping pinnules, and 'Scintilla' with deeply shredded pinnules.

Description: The rhizome is described by most authors as short-creeping although Lellinger says it is long-creeping. Be that as it may, the grooved stipes are black, about one-third the length of the frond and spaced close together. Bronzy linear-lanceolate scales are present at the base of the stipes and are similar to those on the rhizome. The stipes are shiny and smooth. The rachis is slightly flexuous. Fronds are produced throughout the growing season and nearly all are fertile. Most of the fronds wilt with frost but a few of the shorter ones may persist as sub evergreen (Wherry). The fronds may be up to 12 inches in length and six to eight inches wide and are lanceolate to narrowly elliptic, bipinnate to tripinnate below. The pinnules are rhombic to fan-shaped with crenate margins if sterile. Fertile pinnules exhibit marginal sub lunulate to elongate false or inverse indusia and all pinnules are irregular and variable in outline. A curiously attractive aspect of the pinnules is the dark color of the stalk passing or radiating into the base of the foliage. The forked veins in the pinnules extend through to the tiny marginal teeth. The false indusia are greenish, turning brown with age.

Culture: Hardy to Zone 7 with protection, this attractive species needs moist, alkaline soil and porous limestone. It is short-lived in acidic soils. As has been mentioned, it suc-

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VISIT TO RÉUNION 19th. - 29th. OCTOBER 2006 by the British Pteridological Society.

Part 1

*Alan Ogden
Alvechurch, England*

Participants - Leaders Pat Acock and Paul Ripley. **Guide** - Edmond Grangaud.

Graham Ackers, Lesley Williams, Ian Bennalick, John Edginton, Alison and Elizabeth Evans, Michael Hayward, Jennifer Ide, Franz Katzner, Yvonne Golding, Bridget Laue, Paul Sharp, Alan Mellor, Klaus Mehltreter, Sue and Roger Norman, Alan Ogden, Martin Rickard.

Before we went.

“Where’s that?” was the usual response from my family and friends when I told them where we were going. Well, if you choose a spot about halfway between California and Hawaii then Réunion Island is exactly opposite on the other side of the Earth, in the Indian Ocean, between Madagascar and Mauritius.

The trip was organised by two of our members Patrick Acock and Paul Ripley. The suggestion to go there came, during one of their European trips, from Michel Boudrie, a French pteridologist who entranced them with tales of a tropic isle dripping with ferns.

Though the island is so far away it is a Département Français d’Outre-Mer and sends representatives to the French government. The language is French, the currency the familiar Euro and there are croissants for breakfast. The French have maintained this beautiful island as a well-kept secret from the rest of the world but now the news is beginning to spread.

Paul, who speaks French and Patrick, who doesn’t, visited Réunion in 2005 to reconnoitre and they were extremely fortunate to meet a fellow spirit, a local naturalist with a special interest in ferns, Edmond Grangaud who not only had produced a review of the literature on the identification of the ferns of Réunion (with some original keys) but also agreed to be our guide!

During the months and weeks prior to the trip we were tantalised by photographs of a ferny paradise, a translation of Edmond’s review by Paul and confusing (to me) sheets of instructions. It would be hot so we needed light clothing but it rained a lot so we needed waterproofs. It could be chilly up in the mountains so we needed a warm sweater and some of the trails were rough so we needed good boots.

Malaria was not a problem and there are few mosquitoes but they can carry chikungunya fever, a nasty disease from Africa which has been frightening off the tourists of late. As I was the only one to contract Lyme disease on the HFF/BPS trip to the Eastern United States it worried me too! The usual injections for hepatitis and typhoid are recommended.

Geography.

The island is roughly oval in shape and measures about 42 by 30 miles. It was made by volcanic action and there are two mountainous areas, an old extinct volcano to the north which has formed three huge circular craters called cirques and an active volcano, Piton de la Fournaise, to the southeast which still erupts regularly.

There is a main road running round the coast like a rosary with towns and villages as beads at regular intervals and a road across the middle between the two mountain complexes. Many towns are named after saints (70% of the population are Catholic, 20% Hindu) with Saint Denis the capital with the airport in the north and Saint Pierre, where Edmond lives, which was to be our base in the south.

Getting there.

We all had to make our own way the Charles de Gaulle Airport near Paris. This is a huge complex which is designed according to some inscrutable Gallic system incomprehensible to the foreigner. Luckily we had allowed plenty of time and eventually the whole party got together in the right departure lounge. It was an overnight flight in a Boeing 777 and the seats were rather cramped. It was extremely bumpy over Africa and one of our party was sick. We had very little sleep and were glad to arrive safely at Roland Garros Airport near St. Denis to be greeted warmly by Paul and Patrick. All but one of us got our luggage too!

20th. October.

We piled into three rented vehicles and set off for the local university where we were welcomed into the botany department and treated to coffee and cakes. We were to have a talk by a German botanist working in Mexico, Klaus Mehltreter, who was a member of our group. It was a good lecture, beautifully illustrated but we were all a bit zonked out after the journey! Some later visited the herbarium while others looked at the unusual plants and birds in the grounds. Weaver birds building in bamboo thirty feet high seemed a strange combination. Our hosts bought us lunch in the refectory and then we set off on the 65 Km. trek to the hotel - to our surprise there were many miserable kilometres of traffic jams and when we arrived at St. Pierre after calling at the supermarket for provisions we found many roads were closed for Divali (Hindu Festival of Light)! This included the road to our hotel on the seafront and it all seemed too much to bear but somehow the drivers stayed calm.

Upon arrival it seemed like heaven to wash, shave, change and relax. We met Edmond by the pool for an introductory talk about the island and then went to dinner but the torment had not ended! It was karaoke night! In French.

Outside the hotel the Divali procession with bands and fireworks seemed to go on all night but we slept through it all.

21st. October - Les Makes, Cirque de Cilaos and Sentier de Découverte.

Breakfast was from a buffet bar with lots of tea and coffee and a wide assortment of fruit and foods to suit almost everyone. As a concession we didn’t set off till 8 am. There is a 4 hour time difference from the U.K but we didn’t seem to notice it - maybe the sleepless trip had some benefit. We travelled in convoy out of town and uphill on a very twisty road

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VISIT TO RÉUNION *continued from pg. 53*

with only a short stop at the boulangerie for a supply of French bread for our lunch. The roads are surprisingly good, mainly tarmac and we zigzagged between many small communities, including Les Makes, surrounded by fields of sugar cane and bananas. Many of the houses had tree ferns in the colourful gardens but mainly *Cyathea cooperi*, an introduced species which is invasive.

We drew up at a viewing point with car-park and picnic huts to look out on a sight which was breathtaking. Below us was a gigantic crater, surrounded by sheer cliffs with a break to the south. It was like a giant dog-basket lined with a rumpled green blanket which was forest covering the many steep sided valleys. On a few flat areas there were small dots which were buildings housing small communities who choose to live in this inaccessible place. This was the Cirque de Cilaos. Bracken was growing on the cliff edge - a reminder of home.

A short drive took us to the Sentier de Découverte - the Discovery Trail. Here we spent most of the day on a loop which took us through a damp mossy forest then onto higher ground which was drier. At the beginning Edmond showed us how to differentiate between the two common tree ferns, *Cyathea borbonica* and *C. excelsa*. An unfamiliar species was found every few metres. It was nice to see a climbing *Blechnum attenuatum* and *Asplenium daucifolium* with tiny leafy buds on the mature pinnae. We made the acquaintance of three elaphoglossums, epiphytic ferns and the similar *Antrophyum*, known as "Langue de boeuf" to the locals.

The menace of introduced plants was unforgettably demonstrated by the rampant growth of an ornamental ginger which has lovely red flowers but which lays down a carpet of plump rhizomes which stifle all other plants. Another plant of unpleasant habit was the strangler fig which first grows as an epiphyte but gradually envelops and stifles its host while becoming a giant tree.

Worries about mosquitoes disappeared; this forest had none and there seemed to be no other nasties to bite you. We crossed a rocky watercourse, dry now but evidence that it can rain heavily and we had our picnic lunch in a small glade by two giant *Pteris*, *pseudolonchitis* and *nevillei*. *Marattia fraxinea*, another spectacularly large fern grew close by.

One cannot absorb new species at such a rate - the only answer seemed to be to take lots of photographs, make notes and hope to sort them all out later. We all had a translated copy of Edmond's booklet which was invaluable.

We drove back down the twisty road before it grew dark. Dusk comes early at this latitude and we had to call at the supermarket for tomorrow's lunch. There was time for a bath and change of clothes, even a drink by the pool before dinner, a buffet of somewhat mysterious dishes eaten with rice or spaghetti.

22nd. October, Reserve Touristique de Mare Longue.

After a short briefing in the foyer by Edmond and Paul, we set off at 7:30 am. It was necessary to make these early starts as our hotel was by the sea and we had to traverse many kilometres of farms and villages before we got up to the natural areas in the uplands. We collected our bread, headed east this time and then turned inland onto a narrow road

which climbed up to a Nature Reserve which had a small area of original forest.

Beneath the trees the understory was almost all ferns mainly *Phymatosorus scolopendria* and *Nephrolepis biserrata* with some *Belvisia spicata*. Here we met a new feature of the volcanic habitat, deep cylindrical holes in the rock called barils which are formed when lava flows around forest trees. The tree rots away eventually to leave a vertical tube. These can be dangerous when covered by fallen branches and leaves.

Again the new species came thick and fast with many epiphytes including some small orchids. I was particularly impressed by *Ophioglossum pendulum* which dangled from several trees and here we made the acquaintance of the giant black and yellow spider *Nephila* which slings its web between two trunks. Klaus showed us how strong the web was by twanging the filaments like a guitar string.

I was impressed by the number of epiphytes, many filmy ferns and the sheer diversity of the ferns here. In particular the huge fronds of *Asplenium affine*, the linear sori of *Antrophyum immersum* and the jointed rachis of *Arthropteris orientalis* var. *subbiaurita*.

We returned to the car park for lunch which included paté en croute - we were getting more ambitious! There were many ferns around the car park to keep us entertained, the familiar *Adiantum hispidulum*, in among the grass *Lycopodiella cernua* and by the wall *Diplazium proliferum*.

A short drive up the road took us to a new site with *Cyathea borbonica* then a walk on the Mare Longue footpath. We saw many huge marattias growing in gloomy woodland and a *Trichomanes giganteum* which is much bigger than our *T. speciosum*. Walking here was very difficult with many fallen trees and barils. By the road side outside the forest we found a *Blechnum tabulare* with a small trunk.

After a short drive to the coast we visited the Littoral de St. Phillipe. It was pleasant to see the rollers breaking on the low cliffs and we walked through a grove of *Pandanus utilis* trees to see *Selaginella salaziana*, *Ctenitis maritima* and *Acrostichum aureum*. The native endemic *Pandanus* trees, grown for their fibrous leaves, were new to me with their prop roots and strange fruit. We had a group photograph taken in their shade.

We drove back westward into the setting sun for the obligatory bath, change and drink by the pool. There was no time for sight-seeing around St. Pierre which perhaps did not matter too much as my guidebook said the only real tourist attraction was the cemetery!

23rd. October, The volcano, Piton de la Fournaise.

We set off inland from our base past an unusual roundabout which was planted with ferns including several tree ferns! Steadily gaining altitude we stopped briefly at a viewing point "Nez de Boeuf" to gaze down on the Rivière des Remparts, another breathtaking view from 2,070 m. We found several ferns by the roadside, *Asplenium aethiopicum* and the familiar *A. adiantum-nigrum*, *Ctenitis cycloclamys* and a *Cyathea cooperi* which was quickly removed by Edmond.

We crossed a huge flat plain, quite barren and composed of lapilli and next came to an ejection crater like the barrel of a huge gun with even here a few ferns surviving in crevices. A short drive from here brought a surprise, a car park like a shopping centre - Volca-

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VISIT TO RÉUNION *continued from pg. 55*



Alan Ogden on
the rim of the
crater.

nos R Us! There was a film crew with a helicopter and even a coffee shop and toilets but very few people in evidence. Here we split into two parties, the volcano tour or the valley and forest to the North.

By the shop was another viewing point down into a huge U-shaped crater, the Enclos Fouqué where, far below we could see a stream of tiny walkers making their way to the smoking cone of the volcano in the distance, a 3 to 5 hour walk.

The Sentier du Volcan begins with the descent from the cliff at Pas de Bellecombe by a narrow path cut into the cliff in places and down 527 irregular steps to the crater floor. The path across the solidified lava is marked with spots of white paint as it is possible to be enveloped in clouds unexpectedly. The surface was clearly once liquid and is described as looking like solidified cake-mix. The sun was beating down but even in this hostile environment there were a few ferns in the crevices!

The walk passes a scoria cone which resembled an ant-lion's trap and later a cavern in the lava known as Chapelle de Rosemont. I gave up before this as my knees were hurting but all the other members of our group got to the crater of boiling lava in the centre of the cone.

My slow climb up the cliff path gave me a chance to examine the ferns where water seeped out in several places, including a familiar looking *Asplenium* and a small *Elaphoglossum*. I met some other members with leg problems at the local hotel - the unexpected Gite du Volcan which serves excellent coffee. The vegetation at this height is very strange, we were above the rain clouds and in hot sun but in crevices grew *Blechnum tabulare* - another surprise!

We all met up again at the huge car-park and set off back to base about 5:30 pm. There were some splendid scenic effects with the clouds and setting sun. We collected supplies from the supermarket and fell into the now familiar routine at the hotel.



*Blechnum
tabulare.*


Photo by Alan
Ogden.



Adiantum capillus-veneris **continued from pg. 51**

ceeds fairly well planted up against a cement foundation, especially if it is sandwiched between the foundation and porous limestone or sandstone slabs. It is particularly attractive with cyrtomiums and is at its best in the shade. Easily grown from spores, this species lends itself to experimentation.

**THE HARDY FERN FOUNDATION
QUARTERLY**



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New Zealand Fern Foray, Part 2

Joan Eiger Gottlieb
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Reminder “E” = endemic

DECEMBER 7 – Rotorua

Ignoring the tacky, touristy aspects of **Rotorua**, there is much of interest in this town, lying as it does along the **Taupo Volcanic Zone**. It is on the edge of Lake Rotorua, close to the Bay of Plenty, and centrally located in an area of intense geothermal activity - a miniature version of Yellowstone National Park. One gradually adjusts to the persistent smell of rotten eggs (hydrogen sulfide). A morning walk among REDWOODS imported from California and other exotic trees in **Whakarewarewa Forest** revealed many of our favorite NZ ferns thriving under the exotic canopy - even *Tmesipteris elongata* on a large silver fern and a third fork fern *T. tannensis* (E) on *Dicksonia*. The latter was amply fertile, with pointy-tipped sporangia unique to this species. Lush stands of *Pteridium esculentum* and *Blechnum novae-zelandiae* literally choked a swampy area and a grove of *Dicksonia* lined the far edges of the wetland. Dr. Smith reminded us that ferns underwent an evolutionary “explosion” that paralleled angiosperm ascendancy during the Cenozoic era. As a result, there is a greater diversity of ferns today (about 10,000-12,000 species) than in more ancient times. Modern ferns are not mere vestiges of a primitive, disappearing group. They are a dynamic assemblage of well-adapted, diversifying, and evolving species and groups – welcome thoughts for “fernatics,” and a challenge for all to help maintain our natural habitats.

Adjacent to the Rotorua thermal field there is a Maori village with an historic Anglican Church across a central plaza from a Maori Meeting House. The juxtaposition of buildings sacred to the two cultures that shaped modern NZ is striking, as are the fading inscriptions on the above-ground burial crypts. The gift shop sold vases carved from tree fern trunks. A late morning tour of **Te Whaka**, the Maori-controlled geyser basin area, was introduced by a tall, energetic Maori guide. His name was hard to pronounce so he told the women to call him “Handsome” and the men to call him “Sir.” He discussed the “haka” (war dance), the symbolic sculpture work on the outer beams of the “gathering (meeting) house” and the nuances of Maori language and culture. As a finale, “Handsome” stripped leaves of NZ “flax” (*Phormium tenax* – a tough *Agave*-like native) and twirled the strong fibers into a useful twine.

A “haere mai” or kiwi house contained captive birds in a dark, fairly natural setting behind glass. On the way to the geysers we passed a studio in which a skilled Maori craftsman was at work on a large, wooden carving. *Histiopteris incisa* grew outside the studio. *Lycopodium volubile* and *Lycopodiella cernua* (new for the trip) were scattered over sandy ground under shrubby *Leptospermum*. Clumps of *Huperzia varia* hung from tree ferns as we approached the 150 acre thermal field. Mandatory stops at “Leaping Frog Mud Pool” (204°F, 95°C) and Pohutu geyser (30,000 years old and largest in the southern hemisphere) allowed us to contemplate events of the geological past while Pohutu burped water into the air, working up to its 80’(25m) hourly show.

In the city park, where we had lunch, red mats of *Azolla (rubra) filiculoides* were noted in a sunny wetland. In the evening we were treated to a buffet dinner complete with Maori entertainers doing Polynesian-like songs, dances and traditional tongue displays that were originally developed to intimidate enemies. A member of our group “volunteered” for one of the skits and received enthusiastic applause. She definitely had the “moves”.

DECEMBER 8 – To New Plymouth via Pureora Forest

Heading west out of Rotorua a large dam and hydroelectric plant (a common sight in NZ) was noted at the Whakara River. At **Pureora Forest Park** a logging road led to a trailhead in lowland forest. This part of the park, south of Rt. 30, was saved by dedicated conservationists and contains mature stands of podocarps like totara (*Podocarpus totara*), rimu (*Dacrydium cupressinum*), matai (*Prumnopitys taxifolia*) and miro (*P. ferruginea*). Matai and miro have bark that flakes in a hammer mark pattern, exposing fresh, red scars. *Trichomanes venosum* and *Tmesipteris elongata* were on *Dicksonia* trunks. “Skirts” of dead fronds and crowns of relatively short, narrow leaves characterize this tree fern genus. *D. squarrosa* (E) has a more untidy, spreading crown and buds on its trunk often generate a multiple “head.” It is stoloniferous, so young plants often surround mature specimens. *D. fibrosa* (E) has a dense, more erect crown and is more tolerant of exposed, sunny locations. We were reminded that *Dicksonia* fronds have hairs and marginal sori while those of *Alsophila* (often assigned, along with *Sphaeropteris*, to the New World genus *Cyathea*) have hairs plus scales and sori that are sub-marginal. It takes a while to develop good field images of the tree ferns, important because it is frequently difficult to examine the fronds close-up or to find fertile material.



Blechnum colensoi. Photo by Milton Gottlieb.

New for the trip were *Pellaea rotundifolia* (Pteridaceae) (E), with its round, button-like pinnae, and *Blechnum colensoi* (E), a distinctive species with broad, sterile pinnae and slender fertile fronds – a beautiful, strongly dimorphic fern of shady, damp woods. Several filmies were found, including a new one for the trip – *Hymenophyllum ferrugineum*, easily recognized by stellate hairs that cover every surface (most hymenophyllums are glabrous). There were beautiful specimens of both *Leptopteris hymenophylloides* and *L. superba* (Osmundaceae). The soft, fuzzy feel of the “superba” fronds was a tactile sensa-

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tion. The “forest primeval” ambiance of this area was breathtaking and we paused to watch a pair of skittish, endemic, yellow-crowned parakeets. Soon it was time to push on to the southwest and new adventures in and around the coastal city of **New Plymouth** at the base of **Mt. Taranaki National Park**. Before dinner there was time to stroll along the Coastal Walkway and enjoy the volcanic coast of the Tasman Sea. A kinetic sculpture – the Wind Wand – by New Zealand born artist Len Lye gyrates in the breeze at the downtown shoreline. As a perfect cap to the day, we had a dinner featuring local foods and NZ wines.

DECEMBER 9 – Mt. Taranaki and Pukekura Park, New Plymouth

At almost 8,800' (2,700m) volcanic **Mt. Taranaki (Mt. Egmont)** is the most imposing feature of New Zealand's North Island's west coast, although its snow-capped peak is often hidden by clouds. The volcanic zone has been a National Park since 1901. Its last eruption occurred in 1775.

At about 3,000' (914m) on the north side of Taranaki there is a “Visitor Centre” and restaurant – a dry, warm place to have lunch and enjoy a view of the coast. *Brachyglottis kirkii* shrubs spread abundant, white, aster-type flowers into the swirling mist. Setting off on the **Connett Loop Track**, just below the Centre, we were quickly enveloped in a cloud forest. Gnarled and somewhat misshapen trees braved the wind and cold, including smooth-barked kamahi (*Weinmannia racemosa* – Cunoniaceae). Its seed starts life as an epiphyte on or near the base of a tree fern trunk, but roots soon grow down into the soil and branched, spreading trunks grow up, eventually reaching 80'(25m). This often obliterates the original host, but sometimes merely surrounds it – an interesting association, generally not to the benefit of the fern. The trail was very wet and waterproof footwear was mandatory for comfort. Taranaki receives 23' (7m) of rain a year; it is the wettest place in NZ. Nearby New Plymouth gets 8'(2.5m) per year.

Asplenium lyallii (E) was the first new fern seen. It is a calciphile, generally found in cool, somewhat limey areas. A new filmy here – *Hymenophyllum pulcherrimum* (E), has distinctive, wrinkled-looking pinnae. Fertile specimens of *Tmesipteris tannensis* were among the best we had seen. There had to be a new species of *Blechnum*, and, in fact, there were two – *Blechnum vulcanicum*, hanging from an open bank along the trail, basal pinnae downward pointing, strongly dimorphic, the fronds sturdy and hairy, and then - *B. procerum* (E) – leathery, also dimorphic, sterile leaves with only a few (5-6) pinna pairs. A new (for the trip) grammitid, *Grammitis billardierei* was identified. Two tree ferns were noted. *Alsophila (Cyathea) colensoi* (E), the creeping tree fern, has a prostrate trunk, seldom more than 3'(1m) high but quite fertile, its sori lacking indusia. *A. (Cyathea) smithii* (E) is a medium-size tree fern to 25'(8m) with shallow, bowl-shaped indusia surrounding the bases of mature sori.

Other plants of aesthetic or botanical interest in the cloud forest included a white-flowered primrose, several lichens, and amazing bryophytes like umbrella moss (*Hypnodendron* sp.) and old man's beard moss (*Weymouthia* sp.). Everything in the forest was saturated, dripping water from every surface, an incarnation of Longfellow's poem *Evangeline* – “This is the forest primeval. The murmuring pines and the hemlocks, bearded with moss, and in garments green, indistinct in the twilight, stand like druids of old...” Substitute

kamahi and ferns for pines and hemlocks and you have the “goblin forest” image, described so well in books like John Dawson's and Rob Lucas' *Nature Guide to the New Zealand Forest*.³

And that was just our morning adventure! After lunch we returned to New Plymouth and spent the afternoon at **Pukekura Park**, home to a popular cricket stadium. Although the ferns here are mostly planted, both outdoors and in a conservatory called **The Fernery**, the naturalized setting and sheer diversity of the collection presented an opportunity to pick up some additional native and naturalized species. The first was *Todea barbara* (Osmundaceae) – now rare in New Zealand. It is a large *Osmunda* relative with short, woody trunks and leathery fronds. Naked sporangia completely cover parts of the lower pinnae near the rachis. There was excitement at finding the third endemic GENUS, *Loxoma cunninghamii* (Loxomataceae). *Loxoma* is a sizable, broadly deltate fern, easily identified by the unusual, tubular indusia that enclose sporangia and project outward, like narrow thimbles, from the pinnule margins.

Diplazium australe (Woodsiaceae), like *Deparia petersenii* seen earlier, has sori paired back to back along veins, here in a tighter, herringbone pattern. *Adiantum raddianum*, a naturalized species and *A. formosum*, a large, highly divided maidenhair that is rare in the wild in NZ, formed spreading colonies. *Pteris cretica*, another naturalized fern is important in the horticultural trade. A final first timer was *Asplenium obtusatum*, a glossy, coastal spleenwort distinguished by fleshy fronds and round-tipped pinnae. In the wild it is resistant to salt spray and often perches on sea cliffs. **The Fernery**, open since 1928, consists of a series of three glass-roofed houses set into an excavated hillside. Growing areas are thus below ground and are entered through low, interconnected, cave-like corridors whose damp soil and dripping rock walls are prolific fern nurseries. Packed with NZ ferns and seasonal flowers, tended lovingly by staff and volunteers, this is a plant-friendly, photogenic setting.

DECEMBER 10 – Papaitonga Scenic Reserve and Wellington

Heading south from New Plymouth, Rt. 3 skirts Taranaki National Park (great mountain views), and then hugs the Tasman coast most of the way to the capital city of Wellington. A mid-afternoon stop was welcomed near Otaki at the **Papaitonga Scenic Reserve**. A trail with boardwalks wound through wetlands and a regenerating forest. While the birders forged ahead, the ferners lagged behind to reacquaint ourselves with NZ species that were now familiar “fronds,” including the best specimens of *Arthropteris tenella* (Tectariaceae), a tree climber with scalloped, stalked pinnae bearing marginal, round sori, and *Diplazium australe* (Woodsiaceae), our first sighting of this large, elegant fern in the wild.

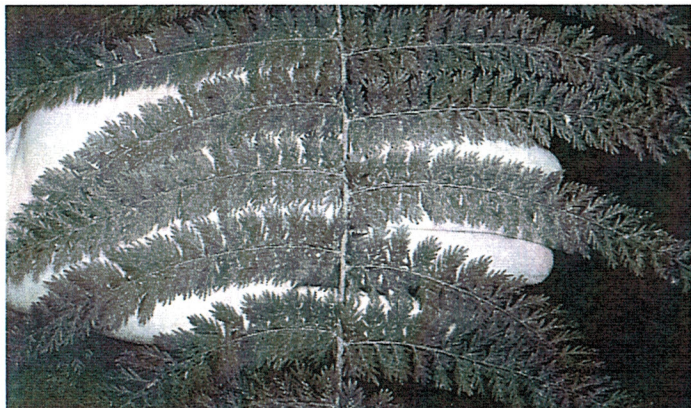
DECEMBER 11 – Wellington and the Karori Wildlife Sanctuary

From our base camp at the Hutt Valley Holiday Park (north of Wellington) we drove to the top of **Mt. Victoria**, 643'(196m) in hilly Wellington for appealing, panoramic views in the early morning. En route we saw the beautiful harbor around which Wellington is curled. It was created by valley flooding in 1430. Here the Inter-Island Ferry and the faster Link Ferry connect travelers to the South Island across the Cook Straits. Wellington lies on a fault line and experiences frequent tremors and earthquakes. There are raised beaches

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nearby, evidence that NZ is still rising from the sea. After a quick coach tour of the downtown area, the rest of the morning was ours to enjoy. We had lunch under a huge, see-through, metallic sphere of cutout silver fern pinnae suspended between the art museum and shops across Gallery Square near Victoria Street. Talk about apropos art and symbolism; this country takes its ferns seriously.



Fertile
Leptopteris
Photo by
Milton
Gottlieb.

The **Karori Wildlife Sanctuary**, west of the city, is enclosed within a predator-resistant fence that stretches for 5.3 miles (8.6km). In the absence of non-native, pest mammals, rare birds like the kaka (a large, brown parrot), stitchbird, saddleback, and threatened, flightless species like the spotted kiwi and weka are making a comeback. Special feeders attract these birds, making them easy to spot. There is a “weta hotel” at a 19th century gold mine site where these nocturnal, wingless insects can sleep safely during the day. A research area behind a wall provides a safe haven for the only “wild” tuatara lizards on the mainland. Stoat and possum traps are strategically placed, and a special wetland was created at the upper end of the reserve specifically for the brown teal – one of the world’s rarest ducks.

After our bags were self-searched (for smuggled rodents?) we entered through a gate in the fence and set off on a hilly trail around the reservoir that supplied water to Wellington in the early 20th Century. Along the trail were most of the ferns we knew, even the less common species like *Blechnum procerum*, *Diplazium australe* and *Ctenopteris heterophylla*. New for the trip was *Pellaea falcata*, along with its look-alike sibling, *P. rotundifolia*. The former has longer, pointed, smooth-edged pinnae, but there is some uncertainty about relationships among the NZ pellaes (ditto for our North American species). Also new was *Lastreopsis velutina* (along with sisters *L. glabella* and *L. hispida*, first seen at Kerikeri). As the name implies, there is a velvety feel to the frond and, as with all members of the genus, the basiscopic pinnules of the basal pinnae are greatly exaggerated. We stopped to observe aerophores and orange, stellate hairs on the tree fern *Alsophila smithii*, dark-centered indusia on *Polystichum richardii*, and the crinkly-winged stipes and pinnae of drought-resistant *Hymenophyllum flexuosum* (E). The predator fence ap-

peared to be extremely effective as evidenced by the rapid regeneration of the forest inside the reserve, by the species diversity (we saw about 35 species of ferns), and by all the birds (both seen and heard) – a nice conservation success.

DECEMBER 11 – Otari -Wilton’s Bush

At the northwestern edge of Wellington, on Wilton Road lies **Otari -Wilton’s Bush**, a superb place for our final survey of the North Island. Even the welcoming entry sign had an assortment of ferns at its base. This is a combination forest reserve (thanks to Job Wilton, a local farmer who fenced it off from livestock in 1860) and native plant garden (with land designated by the NZ government and the Wellington Council). The 250 acre (100ha) forest is made up of original and secondary growth conifers such as kauri, rimu, totara, matai and miro, with a notable 400 year old rimu on site. Broadleaf flowering trees include kohekohe (*Dysoxylum spectabile*, Meliaceae), rewarewa (*Knightsia excelsa*, Proteaceae), tawa (*Beilschmiedia tawa*, Lauraceae – a dominant tree at Otari), mahoe (*Melicytus ramiflorus*, Violaceae), pigeonwood (*Hedycarya arborea*, Monimiaceae), celery pine (*Phyllocladus trichomanoides*, Podocarpaceae), whose “leaves” are actually flat branchlets (phyllodes), and lancewood (*Pseudopanax ferox* – Araliaceae). Young lancewood is striking, with very long, lance-shaped, downward pointing leaves bearing sharp, protruding, hooked spikes, the whole looking like a collapsed parasol. This armed, juvenile growth habit may have evolved as a defense against browsing moas or as an environmental adaptation to Ice Age cold – perhaps both. At maturity (above the browse line) the tree branches and its leaves become short, wide, upwardly angled and only slightly toothed – quite a transition.

The garden area, just inside the car park is 12 acres (5ha) and boasts 1,200 taxa of native plants from all parts of NZ, including its offshore islands. They were raised from seed or cuttings collected in the wild, including many that are rare. Surplus plants are returned to natural areas as part of a recovery program. This “native” botanical garden concept was created in 1926 by the eminent botanist Leonard Cockayne. An alpine garden section had a representative sampling of high elevation species that included alpine gems like the tough-looking *Pachystegia* (Marlborough rock daisy), *Libertia*, a bronze-leaved iris, a mound shrub called pygmy “pine” (*Helicarpus* -Podocarpaceae) – reputedly the smallest conifer in the world, and *Blechnum penna-marina*, NZ’s smallest and most cold-tolerant species of *Blechnum*.

We were joined at Otari by John Dawson, author of *Nature Guide to the New Zealand Forests*³. He pointed out several “divaricating” shrubs – another moa thwarting or cold adaptation – found in over 60 species of woody plants, e.g., *Coprosma*. These plants have miniscule leaves and tightly intertwined, wide-angled branches. The terminal branches are often leafless and dead looking, confusing browsers and forming a protective umbrella for leafy shoots below. A dead rimu was completely encircled by the “pseudo-trunk” of a northern rata (*Metrosideros robusta*), which probably started life as an epiphyte on a branch of the tree, then grew roots that fused together around its host. Northern rata can also sprout from seed on the ground and grow into a small tree, much like red-flowered pohutukawa (*M. excelsa*) – the “NZ Christmas Tree”.

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Other forest plants of interest were kakabeak (*Clianthus puniceus*, Papilionaceae), a shrub with large, brilliant-red flowers resembling the beaks of native kaka parrots, *Corokia buddleioides* (Escalloniaceae), a densely branched shrub with smooth leaves that are white-haired below, *Muehlenbeckia australis* (Polygonaceae), a common twining plant producing lots of small, white flowers and thin, weedy leaves, *Phormium tenax* (Agavaceae) of many varieties, and *Pennantia baylisiana* (Icacinaceae), a small tree with large, leathery leaves, propagated from the last wild specimen known. There was much more in this rich collection, but a delicious barbecue meal awaited us at the lower picnic ground. It was the culminating dinner for our “ferntastic” foray and an opportunity to have invited guests Patrick Brownsey and John Dawson sign copies of their respective books.^{1,3} While we ate, a pair of eastern rosella parakeets lit up the darkening sky with their bright red faces and necks.

DECEMBER 12 – Te Papa in Wellington

A special treat on the last morning of our workshop was a behind-the-scenes tour of the herbarium at **Te Papa** – the natural history museum in Wellington. Our host, Dr. Patrick Brownsey,¹ assembled a fascinating assortment of historic fern specimens, illustrations, and many exquisite, historic books. Included was a pressed silver fern from James Cook’s first voyage in 1769. Some uncovered, later collections had been pressed between pages from Milton’s *Paradise Lost*.

Research efforts at the herbarium are ongoing and extensive. Leon Perrie discussed work on hybridization in NZ aspleniums including *A. bulbiferum*. Dr. Brownsey and colleagues are nearing completion of “*New Zealand Ferns – An Interactive Key*” which will be available on line, linked from Te Papa’s web site www.tepapa.govt.nz. After offering our appreciation to the staff at Te Papa, we prepared to disperse – some of us to other parts of NZ and others girding for the l-o-n-g trip home.

For this trip summary I received useful information from Jan Nachlinger and Janice Forbis. Very special gratitude is reserved for our imperturbable, patient leader, Dr. Alan R. Smith, who generously reviewed, corrected, and improved the text, with special attention to the new DNA data that have redrawn many taxonomic lineages and groupings.⁴

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