Early New Zealand

BOTANICAL ART

F. Bruce Sampson
This first-ever anthology of early botanical paintings and drawings of New Zealand native plants covers the period from Cook's first voyage in 1769 through to the publication of Cheeseman's *Illustrations* in 1914. By this time about half of the native ferns, conifers and flowering plants had been illustrated, although many of these were never published.

Bruce Sampson has researched the journals and diaries of explorers, botanists and early settlers — as well as many botanical publications — to present a book that is both rich in biographical detail and botanically informative. The botanists and artists whose work is discussed include such well-known figures as the Forsters, the Hookers, Kirk and Cheeseman, but also some lesser-known illustrators such as Martha King and Fanny Osborne, remarkable artists whose work has recently been "rediscovered". Some illustrations are from rare books and journals, which now fetch up to several thousand dollars at auctions.

The plates, some of which are reproduced here for the first time, demonstrate a range of printing techniques, including "nature printing" and chromolithography. They embody all the elegance, attention to fine detail and sensitive use of colour and shading that are features of the very best botanical illustration.
Early New Zealand BOTANICAL ART
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F. Bruce Sampson

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REED METHUEN
Also by Dr F. Bruce Sampson:

Plants — A Scanning Electron Microscope Survey
(with Dr John A. Troughton)
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INTRODUCTION

Prehistoric people drew animals long before plants. Game animals were, it is thought, first portrayed on the walls of caves in the belief that this would cast a spell on them and enable them to be more easily hunted. The shift from nomadic hunting, supplemented by gathering the fruits of wild species, to the cultivation of plants was associated with the formation of villages and the beginnings of civilisation some 10,000 years ago. Not long ago really, when one considers that humans had evolved more than two million years previously. The first plants illustrated were domesticated ones and they were used mostly in decorative and religious art. For example, maize or Indian corn (Zea mays), which was by far the most important food plant of the Americas, is frequently depicted in stone monuments of the Aztec and Maya cultures. Later, medicinal plants were illustrated in woodcuts printed in herbals, which were introduced in Europe about A.D. 1400.

In the late eighteenth and early nineteenth centuries, botanical art in Europe reached unsurpassed heights. The discovery of new plants in recently explored and exotic countries provided much of the stimulus for this work. Further impetus for classifying and illustrating plants and animals was provided by the publication in the mid-eighteenth century of Linnaeus’s binomial system, still used today. By this system, every plant or animal can be named using two words, the first being the genus to which it belongs and the second, the species that distinguishes it from other members of the genus. By the time the New Zealand Company was sending British settlers to New Zealand in the 1840s, botany had become very popular in Great Britain. Plants from many parts of the world were cultivated, and numerous books of plant paintings were published, some in serial form. A considerable number of botanical and horticultural periodicals, illustrated with coloured plates of flowers, had been initiated. Although most of the best-known botanical artists of the time were men, flower painting, like piano playing, was considered a very desirable accomplishment for a fashionable young lady. Many popular flower books of the nineteenth century were of a sentimental rather than a scientific nature. Pictures were not always very accurate, and sometimes the beauties of a particular plant were praised in “delightfully awful” verse. Botanical copybooks (containing plant outlines for the would-be artist to colour in) and treatises on flower painting were also in vogue. Flower painting remained popular in Europe throughout the nineteenth century but suffered something of an eclipse with the rise of photography.

Illustrations of New Zealand plants first appeared in print before the end of the eighteenth century. By 1914, when Thomas F. Cheeseman’s two-
volume *Illustrations of the New Zealand Flora* was published, some 1,000 species of native vascular plants (ferns and fern allies, conifers and flowering plants) had been illustrated in books or magazines. For several decades following the appearance of Cheeseman's *Illustrations*, photography was used almost exclusively to depict the New Zealand flora, as in the books of Leonard Cockayne. One of the most striking black-and-white photographic works to appear was William C. Davies' *New Zealand Native Plant Studies* (1956).

In the last twenty years there has been a resurgence of interest in New Zealand in botanical painting and drawing. Today there are a number of botanical artists and illustrators of a high calibre, the most notable of whom is Nancy M. Adams. Other fine botanical artists include Audrey Eagle, R. Bruce Irwin, G. Marie Taylor, Keith R. West and Hugh D. Wilson. Today, too, the drawings of Rei Hamon are in considerable demand. Rei Hamon is, it seems, the first professional artist of part-Maori descent to specialise in illustrating New Zealand vegetation. Many of his works are done imaginatively, from memory, and therefore the plants he illustrates are sometimes quite "idealised".

This book covers botanical illustrations of New Zealand plants from the time of James Cook's first voyage to New Zealand (1769-70) to the appearance of Cheeseman's *Illustrations* (1914). In general, only artists whose works have been published in books or periodicals are represented. Cheeseman's *Illustrations* seems a convenient cut-off point, in view of the time span before other books appeared and by virtue of the fact that by this time a considerable proportion of the flora had been illustrated. Many of these illustrations are, as Cheeseman noted, "beautifully executed plates . . . exquisite works of art". Furthermore, the books and journals in which they appeared are now valuable and scarce, most of them housed in the rare books sections of libraries. Recently, for example, a copy of Mrs Hetley's *The Native Flowers of New Zealand* was advertised for sale at $1,850. It therefore seems important to make available a selection of illustrations from these works, to comment on them and to give brief biographical details of the artists and botanists involved.

To the botanist or horticulturist, a painting or drawing of a plant should be sufficiently detailed (with, if necessary, diagnostic features shown in separate, enlarged illustrations) to enable identification to the level of species, or even subspecies or variety. Ideally, such an illustration should also have artistic merit. It should be pleasingly composed as well as seeming "alive". Of course, an illustration of a plant can have artistic but no botanical merit — Monet's famous impressionist paintings of waterlilies would be of little use to anyone wanting to identify the species of waterlily growing in those particular ponds! This book is devoted to illustrations that are reasonably accurate representations of New Zealand native plants. Most of them were meant to describe a plant visually in a way that photography, especially colour photography, does so well today. (An internationally outstanding
example of the use of colour photography in plant illustration is John T. Salmon’s *The Native Trees of New Zealand* (1980).

The illustrations demonstrate a wide range of talent, from examples of the work of some of the greatest botanical artists of their time, to enthusiastic settlers whose handling of colour, line, perspective or composition did not attain the highest standards. The plants chosen for reproduction have been selected to show some of the best examples of an artist’s work and to give a blend of common and less familiar plants. Only illustrations of ferns, conifers and flowering plants have been selected. Most examples are of flowering plants, and feature trees, shrubs, herbs and grasses, from coastal regions to alpine environments. (For reasons of design and economy, plates do not always fall in the relevant chapters.)

Where artists have been employed by prominent botanists who were not always illustrators themselves, I have given biographical details of the botanists as well. Two of New Zealand’s greatest early botanists, Thomas Cheeseman and Thomas Kirk, are therefore considered at some length. On the other hand, a number of prominent early botanists are omitted, or receive only passing mention, because they were not prominent botanical artists themselves, nor were they associated with botanical artists. Examples include Allan and Richard Cunningham, John Bidwill, Ernest Dieffenbach and William and Henry Travers.

New Zealand is used in the widest geographical sense to include plants that occur not only on offshore islands such as the Poor Knights and the Chathams but on subantarctic islands too, for example, Campbell and Auckland Islands.

The illustrations are reproduced as close to their original size as the format of this book allows. Unpublished illustrations are shown as close to original size as page size permits.
Parkinson, Banks and Solander

James Cook’s first great voyage of discovery (August 1768-July 1771) resulted in the first illustrations of New Zealand plants. These 207 watercolours by Sydney Parkinson, most of which were completed by other artists in England, for Parkinson died near the end of the voyage, are among the best illustrations ever made of New Zealand plants. The finest of them have the accuracy and immediacy of a high-quality colour photograph, yet few of them have been published.

A project has begun to publish the 200-year-old engravings made from most, but not all, of the finished watercolours of plants from Australia, New Zealand, Tonga, Brazil, Tierra del Fuego, Madeira and Java. This limited edition of Banks’ Flora Australis, which involves time-consuming hand colouring, is beyond the reach of most, as each set will sell for about $NZ 130,000.

The idea for a voyage to observe the June 1769 transit of the planet Venus across the sun, from a suitable island in the Pacific, came from the Royal Society of London. This transit is a comparatively rare event, and the next one would not take place until 1874. By accurately measuring the time interval between when the planet first obscured the sun and when it moved off, the distance of the earth from the sun could be calculated. King George III gave approval and financial support for the expedition, and the Navy Board purchased the Endeavour, a three-masted, 368-ton collier, 106 feet (32 metres) in length. It was renamed the Endeavour and was ideal for coastal exploration, being of shallow draught.

The vessel was chosen some weeks before its commander. There had been considerable debate as to who would be the most suitable, but finally James Cook (1728-79), a forty-year-old warrant officer, was selected. His skill as a navigator had been demonstrated in charts he had made of the coasts of Newfoundland and Labrador. He had also shown a strong interest in astronomy. The Endeavour was Cook’s first independent command, and he was given the rank of first lieutenant. Charles Green, who had been an assistant astronomer at Greenwich, was made astronomer for the voyage.

Although the transit of Venus was the ostensible reason for the voyage, another more important aim was given in “Additional secret instructions to Lieut. James Cook, commander of His Majesty’s Bark the Endeavour”. The
expedition was to search for the existence of a great southern continent and, if discovered,

you are to employ yourself diligently in exploring as great an extent of the coast as you can... observe the nature of the soil and the products thereof, the beasts and fowls that inhabit and frequent it, the fishes... minerals... You are likewise to observe the genius, temper, disposition and number of the natives if there be any... also with the consent of the natives to take possession of convenient situations in the country, in the name of the King of Great Britain.

The Royal Society gave approval for one of its youngest fellows, a very wealthy 25-year-old, Joseph Banks, to join the expedition in a private capacity at his own expense. Banks (1743-1820), who had developed an interest in natural history from studying riverside plants and insects at Eton, studied botany at Oxford. He brought with him the following staff of eight: Dr Daniel Carl Solander (1733-82), who was a talented naturalist at the British Museum, and who had been one of Linnaeus's most brilliant students; Herman Diedrich Spöring (ca. 1733-71), a Swedish friend of Solander, who had been his clerk at the British Museum. Spöring had studied medicine and natural history, and acted as clerk or secretary to Banks and Solander during the voyage; Sydney Parkinson (ca. 1745-71), who was employed as natural history artist; and Alexander Buchan (died 1769), an artist whose chief responsibility was to illustrate the landscape and peoples encountered on the voyage, as well as their weapons, boats and villages. The other four members of the group, who have usually been referred to as Banks's servants but who were also trained collectors, were two men from Lincolnshire, where Banks had an estate: Peter Briscoe, who had been with Banks in Newfoundland and Labrador, and James Roberts; and two negroes, Thomas Richmond and George Dorton, both of whom died early in the voyage. Beaglehole (1962) noted that it was the fashion to have negroes in one's service in London at the time.

Sydney Parkinson  Many details of the short life of Sydney Parkinson are unknown. He was born in Edinburgh about 1745. His parents were Quakers, and when his father, a brewer, died leaving considerable debts,

his son Sydney was put to the business of a woollen-draper; but, taking a particular delight in drawing flowers, fruit, and other objects of natural history, he became so great [and] proficient in that stile [sic] of painting, as to attract the notice of the most celebrated botanists and connoisseurs in that study.

Thus wrote his elder brother, Stanfield, in the introduction to Parkinson's posthumously published Journal (1773, 1784).

Sydney Parkinson certainly received a good and broadly based education — a book list in his sketch book showed that he was familiar with the works of such writers as Homer, Virgil, Spenser, Chaucer, Pope and Dryden.
The quality of his art work is such as to suggest professional training by a skilled artist. The late Dr A. Lysaght has suggested Parkinson may have been a pupil of William de la Cour, a gifted Frenchman who ran the first publicly maintained school of drawing and design in Great Britain.

When Sydney Parkinson was about twenty, he moved with his mother to London, where, in 1765 and 1766, some of his flower paintings were exhibited. He was employed by another Quaker and Scotsman, James Lee, part-owner of the well-known Lee and Kennedy Vineyard Nursery in Hammersmith, to give drawing lessons to his teenage daughter, Ann, who later became an accomplished artist. Lee's *An Introduction to Botany* (first edition, 1760) was the first book in English to describe Linnaeus’s methods of classification. James Lee was a friend of Joseph Banks — in fact, his ward, Harriet Blaxster, became engaged to Banks shortly before the voyage began.

In 1767 Lee introduced Parkinson to Banks, who commissioned him to illustrate material he had collected in Newfoundland and Labrador in 1766, to copy some paintings, and to illustrate exotic birds and insects in his collection. Most of these illustrations are now in the British Museum.

Sydney Parkinson was well aware of the potential hazards when he accepted Banks's offer of employment as artist on Cook's voyage. "God knows I may never return", he wrote, and made his will a month before sailing.

**Joseph Banks**

Joseph Banks was born on 13 February 1743 (not 1744 as has sometimes been stated). He came from landed gentry in Lincolnshire, whose "seat was Revesby Abbey, not far from Boston; as the fens were drained its wealth increased, and intelligent management made its standing still greater" (Beaglehole, 1962). His great-grandfather, grandfather and father had all been members of parliament, but Joseph developed no interest in that type of politics. At the age of nine he went to Harrow and four years later, to Eton. Banks showed little interest in books during his early education, but at that time his interest in natural history was aroused. His doctor and friend, Sir Everard Home, wrote in 1822:

One fine summer evening he had bathed in the river as usual with other boys, but having stayed a long time in the water he found when he came to dress himself, that all his companions had gone; he was walking leisurely along a lane, the sides of which were richly enamelled with flowers; he stopped and looking round, involuntarily exclaimed, How beautiful! After some reflection, he said to himself, it is surely more natural that I should be taught to know all these productions of Nature, in preference to Greek or Latin... He began immediately to teach himself Botany.

Old ladies who collected herbs for apothecaries were paid sixpence for every piece of useful information they could give him, and to his delight he found in his mother's dressing room an old copy of *Gerard's Herbal*, which he brought back to Eton. The story goes that he was engrossed in this book
“when detected by his tutor for the first time, in the act of reading”. Joseph Banks became an avid collector and his large herbarium is now in the British Museum (Natural History).

Near the end of 1760 Banks went to Oxford, which “echoed with his armours”, according to an article in Town and Country Magazine. Banks had no interest in Greek, then so popular, and found to his horror that Dr Sibthorp, who occupied the chair of botany, had delivered only one lecture on his subject in thirty-five years. Sibthorp, fortunately, had no objections to the suggestion that a lecturer in botany be engaged at Banks’s expense. As there were no suitable people in Oxford, Sibthorp provided Joseph with a letter of introduction to his counterpart at Cambridge. Banks hired a horse and went to Cambridge to meet Professor Martyr, who recommended Israel Lyons, four years Banks’s senior. Lyons proved to be an excellent tutor in natural history, and Banks organised a small group of students at Oxford. Natural history became a respected subject at that university and Banks and Lyons became firm friends.

When Joseph Banks was eighteen his father died, leaving him a fortune to be inherited on his twenty-first birthday. His mother, Sarah Banks, sold the family’s London home in Westminster and moved with her daughter, Sarah Sophia, to a house in Chelsea. Sarah Sophia, who was a year younger than Joseph, never married and devoted her life to helping her brother in his work, and even after his marriage continued to live with him. The new house at Chelsea was close to the Chelsea Physic Garden, forerunner of Kew Gardens, and was not far from Lee and Kennedy’s Vineyard Nursery, where Banks met Parkinson.

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PLATE 1 Entelea arborescens (whau)

Sydney Parkinson made this painting from a specimen collected at Aoruna Bay. It was completed by F. F. Nodder in 1779. Whau has the lightest wood of all New Zealand trees and the Maoris utilised it for floats for their fishing nets. It occurs in the North Island and on Three Kings Islands, and in the north of the South Island (Nelson and Marlborough regions). The whau is a remarkably fast-growing plant, which is, however, easily damaged by heavy frosts. The soft, papery leaves are very large (up to twenty-five centimetres in length and breadth) and, among our native trees and shrubs, probably only the puka (Meryta sinclairii) has larger leaves.

Whau, or corkwood as it is sometimes called, is the only New Zealand member of the family Tiliaceae, which includes the European linden trees. The genus Entelea consists of only one New Zealand species. The white flowers have a rather crumpled appearance. The spiky fruits that develop from them open while still on the trees and release a large number of small, greyish seeds. It has been observed that the average life of an individual tree is only about ten years and that a single tree can produce a million seeds a year!

Courtesy of the Trustees of the British Museum (Natural History)
Plate 2  
*Elaeocarpus dentatus* (J. R. et G. Forst.) Vahl. (hinau)  
Sydney Parkinson
Joseph left Oxford at the age of twenty and divided his time between the Revesby estates, Chelsea, and a fine house he had purchased in New Burlington Street, London. It was at about this time that he met Daniel Solander. He spent much time fishing with the Earl of Sandwich, who, by the time of the first voyage, was First Lord of the Admiralty. Visits to the Chelsea Physic Garden (Society of Apothecaries Garden) gained Banks the friendship of its superintendent, Philip Miller, a fine botanist and author of Gardener’s Dictionary (first edition, 1724).

Banks was eager to study the plants and animals of relatively unexplored countries, and in April 1766 he left England as a passenger on H.M.S. Niger, bound for Newfoundland and Labrador. He was accompanied by a naval friend, Lieutenant Constantine Phipps, who became Lord Mulgrave. Joseph had become interested in Labrador through contacts his mother had made with a religious sect, the Moravian Brethren, founded in Bohemia. The Moravian Church had sent missionaries to Labrador to make contact with the Eskimos.

There had been considerable conflict between French and English fishermen along the coasts of Newfoundland and Labrador, so rich in cod, halibut, seals and walruses, and H.M.S. Niger was sent to do summer “peace-keeping” duty. By the time the Niger left St Johns, Newfoundland, late in October, Banks had amassed a large collection of biological specimens and had gathered much information about the Eskimos and Newfoundland Indians. The Niger spent six weeks in Lisbon, Portugal, on the way home. This gave Banks the opportunity to meet several leading Portuguese botanists, starting life-long friendships with them. In January 1767 the Niger reached England.

As Dr Lyseagh pointed out in her monumental book, Joseph Banks in Newfoundland and Labrador, 1766 (1971), Banks’s extensive and well-documented collections demonstrated his outstanding abilities as a naturalist.

PLATE 2 Elaeocarpus donnatus (hinau)

This specimen was collected in November 1769 at Mercury Bay on the Coromandel Peninsula. The hinau grows in forests throughout the North Island and in lowland forests in all but the southernmost regions of the South Island. Trees can grow up to twenty metres high, and the leaves are shorter and thicker and often less conspicuously toothed on adult trees than on juvenile ones. There are pits, known as domatia, on the underside of each leaf, situated where a lateral vein meets the midrib. Domatia occur on the leaves of a number of other New Zealand plants, but their function is unknown. The creamy-white, bell-like flowers have petals with frilly margins. Plum-like purplish fruits each contain a single seed.

Hinau is a member of the family Elaeocarpaceae, which is related to the Tiliaceae, to which the whau (PLATE 1) belongs. There are about ninety species of Elaeocarpus, most in tropical regions. A second New Zealand species, the pokaka, Elaeocarpus hookerianus, occurs in the North, South and Stewart Islands.

Courtesy of the Trustees of the British Museum (Natural History)
The journey gave him the experience to organise so superbly the biological work on Cook's first voyage. Characteristically for Banks, none of his work on the flora and fauna of Newfoundland and Labrador was published; this despite the fact that he had commissioned some outstanding illustrations of the plants by Georg Ehret (1708-70), who has been described as the dominant influence in botanical art in the middle years of the eighteenth century. Sydney Parkinson sketched and painted many insects, birds and fish from Banks's Newfoundland and Labrador collection, and a number of these are reproduced in Dr Lysaght's book. Lysaght also notes that Banks "was always exceedingly generous in lending other scientists his material and MSS, and many of his discoveries have been published by other men".

Daniel Carl Solander was born in Piteå, a remote town in northern Sweden, in February 1733. He was christened Daniel Solander, but later took his father's name Carl (or "Carlsson" — son of Carl) as his middle name, to avoid being confused with his uncle, with whom he stayed while at university. He spent his first seventeen years in this frontier town, with its difficult terrain and harsh climate, where winter can occupy nine months of the year. His father, who had been headmaster of the secondary school at Piteå, was well educated in natural science, mathematics, and the humanities, and well qualified to tutor his son for entry to the University of Uppsala. When Daniel Solander first entered Uppsala University in 1750, he studied law, languages and the humanities. After studying natural science with Linnaeus, his interests changed and he studied towards a Doctor of Medicine degree. Carl Linnaeus was so impressed with Solander that he asked him to be his eventual successor as professor of botany, and had plans too, it seems, that Daniel would marry his eldest daughter. In fact, Linnaeus's own son eventually succeeded him at Uppsala after Solander had turned the offer down.

Solander, gentle, good-natured, reserved, never married.

During the 1750s he made two botanical trips to Lapland and assisted Linnaeus in cataloguing several natural history collections. He was keen to go abroad, and when Linnaeus received a request to send a student to England to help establish his system of classification there, plans were made for Solander to go, with financial assistance from Sweden. He arrived in England in June 1760 and soon made the acquaintance of notable naturalists and horticulturists around London, including Philip Miller. He was soon sending plants to Linnaeus. For a time he was short of money and Linnaeus, assuming the role of parent after his father's death in 1760, sent funds.

Originally Daniel Solander had planned to return to Sweden within a year or two, but he liked life in England, with its wealth and interest in natural science. He turned down the offer of a chair of botany at St Petersburg (Leningrad) and, in September 1762, obtained the position he sought on the staff of the British Museum. From then until the start of the voyage he did much fruitful work.
Rauschenberg (1968) has shown that although Solander's publications were few, he was not lazy as has sometimes been suggested. He contributed to many publications of others, and was the first to describe and catalogue the natural history collections at the British Museum. He became a fellow of the Royal Society and was an active member until his death. By 1768 he had become a close friend of Joseph Banks. The two remained the best of friends, even in the cramped quarters of the Endeavour, and, as Banks later wrote, "we never had an exchange of words which even for a second became heated. We often disagreed with each other's opinion of many things, but these disputes ended, as they had started, good humouredly."

The voyage
To South America

The Endeavour left Plymouth on 26 August 1768, with a crew of ninety-seven (including twelve marines) and eleven civilians (Beaglehole, 1955). The civilians included Banks and his party, and the astronomer Charles Green and his servant, John Reynolds. John Reynolds has sometimes been described as one of Banks's artists, an error that Professor J. C. Beaglehole has noted. Perhaps there was confusion with the great portrait painter, Sir Joshua Reynolds, who, although not present on any of Cook's voyages, did a famous oil painting of Omai, a native of the Society Islands, who was brought to England on the Adventure by Furneaux. Joshua Reynolds also painted a famous portrait of Banks soon after the end of the first voyage.

The first port-of-call (12 September) was the Madeira Islands, situated about 800 kilometres off the coast of northwest Africa at the latitude of Casablanca. Banks and Solander moved ashore and stayed at the residence of the English Consul in Funchal, the main town. During the five-day stay they collected within three miles of the town, with the aid of guides and horses. Some 330 supposedly native plant species and sixty-nine introduced ones were collected, and Parkinson illustrated twenty-one of these species (Phyllis Edwards in D. J. Carr (ed.), Sydney Parkinson, 1983).

The Endeavour headed for South America and reached Rio de Janeiro, Brazil, then a Portuguese possession, on 13 November. The stay at Rio was a frustrating one. Although Britain was at peace with Portugal, the viceroy suspected the British might engage in smuggling. He even suggested to Cook that the Endeavour was not a bona fide vessel of the Royal Navy, despite the uniforms of Cook and his crew. He would not permit Banks and Solander to go ashore to collect plants, and when Cook managed to convince the viceroy that Banks and his party could not remain on board while the Endeavour was being repaired, he agreed to allow them on shore only under house arrest. Banks managed to have plants smuggled on board amid greens to feed the sheep and goats on the ship, and on one occasion he and some companions went ashore in the dead of the night and were back on board before news of the landing reached the viceroy. In spite of the difficulties, Banks managed to acquire 320 species of plants, thirty-seven of which Parkinson illustrated. The Endeavour left on 7 December and gave
the fortification at the approaches to Rio some target practice, for two shots were fired, one just missing the mainmast.

As the *Endeavour* sailed towards Tierra del Fuego, Christmas was celebrated, and Banks recorded that "all hands get abominably drunk so that at night there was scarce a sober man in the ship, wind thank god very moderate or the lord knows what would have become of us". On 13 January 1769 Banks and Solander went ashore at Tierra del Fuego and they soon collected 100 plants. The most prominent vegetation was a species of southern beech, *Nothofagus antarctica*, related to the New Zealand beeches, and a tall shrub, Winter's bark, *Drimys winteri*, a relative of the New Zealand horopito, *Pseudowintera* (PLATE 25).

Three days later Banks, Solander, and a party that included Monkhouse, the ship's surgeon, Green, the astronomer, and two sailors set off inland. This expedition was to result in the death from exposure of two men. By the time the *Endeavour* left Tierra del Fuego on 21 January, 148 different plants had been collected, nearly half of which were illustrated by Sydneý Parkinson. Cook recorded that the native Fuegians they met were "perhaps as miserable a set of people as are this day upon earth".

**Tahiti**

The *Endeavour* then headed for Tahiti ("Otaheite"), arriving on 13 April, seven weeks before the transit of Venus was due. No sooner had the ship anchored than, in the words of Banks, "we were surrounded by a large number of Canoes who traded very quietly and civilly, for beads chiefly [sic], in exchange for which they gave Cocoa nats Bread fruit both roasted and raw some small fish and apples." The *Endeavour* spent four idyllic months there, and the naturalists had plants in abundance to collect and describe. Banks had long before this regretted his hasty engagement to Harriet Blosset and was soon charmed by the Tahitian women. In the words of Wilfrid Blunt (in D. J. Carr (ed.), *Sydneý Parkinson*, 1983): "In a country where 'women's lib.' already flourished, he led a rich and uninhibited sex-life." Banks soon learnt to speak Tahitian, the only language he mastered other than English.

Four days after their arrival, the artist Alexander Buchan had an epileptic seizure and died. Banks noted somewhat peevishly in his *Journal*:

I sincerely regret him as an ingenious and good young man, but his loss to me is irreparable, my airy dreams of entertaining my friends [sic] in England with the scenes that I am to see here are vanished. No account of the figures and dresses of men can be satisfactory unless illustrated with figures: had providence spared him a month longer what an advantage would it have been to my undertaking.

Buchan's death meant that Sydneý Parkinson now had responsibility for landscape and figure painting as well as natural history subjects, which explains, in part, why so many of Parkinson's subsequent plant paintings were incomplete. This did not mean that such illustrations were of no use to Banks and Solander, for almost all of the incomplete illustrations had an
outline of the plant, with a small section carefully coloured and precise notes on any variations in form or colour. When these illustrations were completed by a team of skilled artists hired by Banks after the voyage, results were so similar that "it is not always possible... to be sure which artist was responsible for any particular unsigned painting" (Wilfrid Blunt in D. J. Carr (ed.), *Sydney Parkinson*, 1983). Fortunately for Parkinson, Banks and Solander's clerk, Herman Spöring, was a competent draughtsman and he was able to relieve Parkinson of some of the extra work that followed Buchan's death. Painting was not always easy in Tahiti, as the oft-quoted remark from Banks's *Journal* indicates: "The flies have been so troublesome ever since we have been ashore that we can scarce get any business done for them; they eat the painter's colours off the paper as fast as they are laid on."

Sydney Parkinson made 114 drawings and paintings and fourteen sketches of plants of the Society Islands (Fosberg and Sacher in D. J. Carr (ed.), *Sydney Parkinson*, 1983), a remarkable achievement, for Parkinson had zoological drawings to execute as well as drawing the Tahitians, their homes, canoes, plantations and landscapes. In his spare time he wrote up his *Journal*, which gives an interesting account of the voyage. Small wonder that Sydney did not take time to indulge in "those sensual gratifications which are so easily obtained among the female parts of uncivilized nations" (Stanfield Parkinson in the preface to his brother's *Journal*).

The transit of Venus was observed under ideal conditions, and on 13 July the *Endeavour* left Tahiti, after several would-be deserters were rounded up. When 40° S latitude was reached without any signs of the great southern continent, Cook headed for New Zealand.

**New Zealand**

The North Island was sighted on 6 October 1769, and for the next six months, until 31 March 1770, the *Endeavour* remained in New Zealand waters, considerably longer than on Cook's second and third voyages. The *Endeavour* circumnavigated New Zealand and Cook made the first map of the entire country. I would refer the reader to A. C. and N. C. Begg's *James Cook and New Zealand* (1970) for a well-written and well-illustrated account of Cook's visits to New Zealand.

On 8 October the *Endeavour* anchored in Poverty Bay, close to where the city of Gisborne is now located. Banks and Solander went ashore that evening, and when the ship left on 11 October they had "not above 40 species of plants in our boxes". Plants were dried during the voyage between unbound sheets of Milton's *Paradise Lost*, which had been obtained from a London printer. Poverty Bay received its name "because it afforded us nothing we wanted" (Cook's *Journal*) in the way of water and food. The first efforts made there to establish friendly relations with the Maoris were partly successful. However, misunderstandings on both sides had led to the deaths of at least six Maoris, despite the presence of Tupai'a, one of two Tahitians Banks had persuaded Cook to take back to England, and who was able to converse quite readily with the Maoris.
Four of the illustrations Parkinson made of plants collected from Poverty Bay are reproduced in Dr E. J. Godley’s article in D. J. Catt (ed.), *Sydney Parkinson* (1983). Among the plants collected and painted were: rauhinu (*Cassinia leptophylla*), wild Irishman or rumaru-kuru (*Dicerandra somnifer*), kawakawa or pepper tree (*Macleaya excelsa*), ngaio (*Myrsine lactea*), and the bindweed, *Calyxysgia turgidora* (PLATE 3).

From Poverty Bay the *Endeavour* sailed south down the east coast of the North Island seeking a harbour, and when this was unsuccessful, headed north again at Cape Turnagain and anchored in Anaura Bay, north of Poverty Bay, on 20 October. That evening, and again the next day, Banks and Solander were out collecting. “We ranged all about the bay and were well repaid by finding many plants and shooting some most beautfull [sic] birds.” They visited several Maori houses “and saw a little of their customs, for they were not at all shy of shewing us anything we desired to see, nor did they on our account interrupt their meals the only employment we saw them engaged in.” The Maoris there were excellent gardeners, with perhaps 200 acres of sweet potatoes or kumara (*Ipomoea batatas*), yams and taro (*Colocasia esculenta*). Later in Mercury Bay they also saw gourds (*Lagenaria sicararia*) cultivated. These four plants are believed to have been brought to New Zealand by the Maoris. Ninety-eight species of plants were recorded in Anaura Bay (“Tegadu”). They included the whau tree, *Entelea arboreascens* (PLATE 1); pigeonwood, *Hedycarya arborea* (PLATE 23 shows Martha King’s illustration); tree fuchsia (*Fuchsia excorticata*), and a small herb, *Linum monogynum*, a relative of the European flax, a native of the Mediterranean region, from which linen is derived.

Three days later, on 23 October, the *Endeavour* had moved to a more sheltered anchorage at Tolaga Bay, a little to the south of Anaura Bay. Six days were spent there and, with only a day’s bad weather, the naturalists were able to spend five days on shore. Sydney Parkinson was very impressed with Tolaga Bay.

The country about the bay is agreeable beyond description and, with proper cultivation, might be rendered a kind of second Paradise. The hills are covered with beautiful flowering shrubs, intermingled with a great number of tall and stately palms, which fill the air with a most grateful fragrant perfume. We saw the tree which produces the cabbage which are well boiled [young leaves around the central growing point of the nikau palm, *Rhapis excelsa*]. We also found some trees yielded a fine transparent gum [not the gum of *kauri*, *Agathis australis*, which does not occur this far south and which was not collected on the voyage], and between the hills we discovered some fruitful valleys that are adapted either to cultivation or pasture.

Among the plants Parkinson illustrated from Tolaga Bay were the putiria (*Vitex lucens*); kohekohe, *Dysoxylum spectabile* (PLATE 30 shows Mrs Featon’s illustration); wineberry (*Aristotelia serrata*); pate (*Scheflera digitata*); kohuhu (*Pittosporum tomentosum*); akeake (*Dodonaea viscosa*); a rara (*Mohosodes fulgens*); a geranium (*Geranium microphyllum*) (PLATE 6) and a wiry bush (*Medinilla buckleyi* complexa) (PLATE 4). Another plant growing
on the cliffs around Tolaga Bay was the kaka beak, *Chionthus puniceus*,
which today occurs naturally only near Lake Waikaremoana (Given, 1981).
Sydney Parkinson made a splendid painting of it (reproduced in Begg and
Begg, 1970). Cook was able to collect an abundance of New Zealand celery,
*Apinu australi*, which Parkinson had illustrated from a collection made in
Poverty Bay, and scurvy grass, *Lepidium oleraceum*, which Parkinson painted
when it was collected in Mercury Bay a few days later. These were mixed
with soup and oatmeal for the crew's breakfast, to prevent scurvy. Engravings
made from Parkinson's illustrations of these two plants are reproduced in
an article by Oliver (1951) on botanical discovery in New Zealand.

On 29 October the *Endeavour* sailed from Tolaga Bay, around East
Cape into the Bay of Plenty, and then into Mercury Bay on the Coromandel
Peninsula on 3 November. There the *Endeavour* remained for eleven days.
A number of new plants were found and illustrated, for example, the
ekowhai, *Sophora microphylla* (a different species is shown in PLATE 13);
passion fruit (*Passiflora tetrandra*, formerly *Tetrapashaea tetrandra*), the
matata, *Rhabdosiamus solandri*, the species name of which commemorates
Daniel Solander (see PLATE 24 for Martha King's illustration) and hinau,
*Elaeocarpus dentatus* (PLATE 2). Mercury Bay ("Opuragi") provided a safe
harbour and the Maoris there were excellent fishermen, who supplied the
ship with a month's supply for salting. Mercury Bay received its name
because it was there that the transit of the planet Mercury across the sun
was observed in a cloudless sky on 9 November. Cook's stay there had its
tragic moment when Gore, one of the lieutenants, shot and killed a Maori
who had sold him a dogskin cloak and then stolen it back. James Cook
admitted he could not approve of Gore's actions "because I thought the
punishment a little too severe for the Crime".

On 20 November the *Endeavour* anchored in the Hauraki Gulf near
the Thames River. Banks and Solander spent that day and part of the next
with Cook and Tupaia, exploring the river in the pinnace and long boat.
They saw the mangrove swamps give way to great forests of kahikatea or
white pine (*Podocarpus dacrydioides*) (*Daucrycarpus dacrydioides*), and Banks
considered this "the finest timber my Eyes ever beheld". Each tree "carried
its thickness so truly up to the very top that I dare venture to affirm that
the top where the lowest branch took its rise was not a foot less in diameter
than where we measured, which was about 8 feet from the ground."

The *Endeavour* then sailed to the Bay of Islands, arriving on 29
November. The naturalists were ashore five of the six days spent near Motu
Arehia Island, but by then they had collected so many of the coastal plants
of the North Island that there were few novelties. They found, on Okorawa
Peninsula, extensive gardens of sweet potato and yams (*Dioscorea spp.*), and
some paper mulberry trees (*Morus papyrifera*). This species was imported
when the Maoris came to New Zealand and, wrote Banks,
They left the Bay of Islands on 5 December, rounded North Cape and on Christmas Eve sighted the Three Kings Islands. Again Christmas was celebrated: “Our Goose pye was eat with great approbation and in the Evening all hands were as Drunk as our forefathers used to be upon the like occasion”, so that the next day “all heads achd with yesterdays debauch”. 

The *Endeavour* proceeded south down the west coast of the North Island and was for many days battered by exceptionally strong winds. On 13 January 1770 a peaked mountain was sighted due east of the *Endeavour* and Cook named it Egmont after the Earl of Egmont, who for three years (1763-6) was First Lord of the Admiralty. No stops were made during this cruise down the west coast of the North Island. Cook was anxious to find a harbour suitable for caring the ship (turning it on its side) for repairs, and on 15 January found an ideal site, Ships Cove, Queen Charlotte Sound, on the north coast of the South Island. Next morning the ship was careened, and work began scrubbing and recaulking, with some 100 Maoris observing.

PLATE 3 *Calystegia turgidivorm* (bindweed)

There are five species of *Calystegia* in New Zealand. *Calystegia turgidivorm* is found on the Three Kings Islands, North, South, Stewart and the Chatham Islands. It also occurs in South America. The white-to-pink petals are fused into a trumpet shape. At the base of each flower, and enclosing it at the bud stage, can be seen two green floral bracts. These are characteristic of the genus, which comprises about ten species.

Sydney Parkinson made the painting while the *Endeavour* was in Poverty Bay in October 1769. It was completed by J. F. Miller in 1773.

*Courtesy of the Trustees of the British Museum (Natural History)*

PLATE 4 *Muehlenbeckia complexa* (tororaro or pohuehue)

PLATES 4 to 7 are engravings made from Sydney Parkinson’s illustrations. His original watercolour of this plant was completed in 1775 by John Cleveley. The specimen was collected at Tolaga Bay in October 1769. Tororaro is a member of the Polygonaceae, a family that includes docks, sorrels and rhubarb. There are about twenty species of *Muehlenbeckia*, which occur in Australasia and South America, five of them are found in New Zealand. This species grows in dryish places as a tangled bush or low climber in coastal, lowland and lower montane forests, especially on their margins, as well as in open and rocky places. The small leaves have blades from a half to two centimetres long and are of variable shape, often with several leaf forms on the one plant, as the illustration shows. There are separate male and female flowers on different plants.

The plant illustrated is a female one, with flowers and fruits. A male flower, detached from a male plant, is shown at lower right. *Muehlenbeckia* flowers are very distinctive. Five perianth parts (not clearly differentiated into separate sepals and petals) are fused into a basal cup, which surrounds the stamens in male flowers and the ovary in female flowers. On top of the ovary of each female flower are three finely stigmas. As the fruit ripens in the centre of a female flower, the translucent, white perianth becomes fleshy. The fruit is a shiny black, triangular nut.

*Courtesy of the Director, National Museums, Wellington*
Plate 3

Calystegia sepium (Forst. f.) R. Br. ex Hook. f.
(bindweed)

Sydney Parkinson
Muehlenbeckia complexa (A. Cunn.) Meissn.
(tororaro or pohuehue)

Engraving from Parkinson's painting
Plate 5

Selliera radicans Cav.

Engraving from Parkinson’s painting
Plate 6

*Geranium microphyllum* Hook. f. Engraving from Parkinson’s painting
Food (fish, birds and scurvy grass) was plentiful, and twenty-two days were spent there — the longest stay at one place in New Zealand. Banks and his party were ashore on nineteen of these days and recorded about 220 plants. Some of these were novelties to them, and Sydney Parkinson illustrated the wild Spaniard, *Aciphylla squarrosa*, the common, large-leaved lowland coprosma or kanono, *Coprosma australis* (*Coprosma grandifolia*); and the southern rata, *Metrosideros umbellata*. Parkinson's illustration of the small coastal herb *Selliera radicans* (PLATE 5) was also made in Queen Charlotte Sound.

On 6 February the *Endeavour* left Queen Charlotte Sound, passed through Cook Strait and headed north to complete the circumnavigation of the North Island. Cook then circumnavigated the South Island, beginning in the northeast, and reached Admiralty Bay west of Queen Charlotte Sound on 26 March. To the frustration of Joseph Banks, no visits ashore were made during this circumnavigation, but a few days were spent provisioning the ship. Banks and Solander, after climbing a nearby hill, found three new plants, one of which was the daisy *Colmisia gracilenta*. The *Endeavour* left New Zealand on 31 March 1770. Of the 175 days spent in New Zealand waters, only fifty-five days were spent at anchor.

Banks and Solander's collection of around 360 plant species was the first made of New Zealand plants. As Dr Godley has pointed out (in D. J. Carr (ed.), *Sydney Parkinson*, 1983), their collection was a comprehensive one of coastal and lowland plants of northern New Zealand, made possible by "the happy chance of a visit during the spring and summer".

**PLATE 5  *Selliera radicans***

This creeping herb, which grows on damp sand flats, coastal muds and in rocky places within the reach of salt spray, was painted by Parkinson in Queen Charlotte Sound. The painting was finished by F. P. Nodder in 1782. The leaves are fleshy and the lop-sided (zygomorphic) flowers have white petals with light blue or pink stripes. *Selliera radicans* occurs in the North and South Islands and on Stewart Island, as well as in Tasmania, southeast Australia and Chile. It is a member of the predominantly Australian family Goodeniaceae.

*Courtesy of the Director, National Museum, Wellington*

**PLATE 6  *Geranium microphyllum***

This engraving was made from a watercolour Sydney Parkinson painted at Tolaga Bay in October 1779. *Geranium microphyllum* is found in lowland to montane grassland throughout the North and South Islands, Stewart Island, and the Auckland and Campbell Islands. A description of this species was not published until 1844, after J.D. Hooker had visited the Auckland Islands. *Geranium* is a large cosmopolitan genus of about 400 species, five of which occur naturally in New Zealand. *Geranium microphyllum* is a small plant with straggling stems. The illustration shows flower buds, flowers and immature fruits. The petals are white, as in this specimen, or pinkish.

*Courtesy of the Director, National Museum, Wellington*
Unless a species was in flower, or bore fruit that indicated a relationship with another plant that was flowering, it could not be identified; there were at that time no criteria for classifying plants on the basis of vegetative material alone. Nearly two-thirds of the 360 species were illustrated by Sydney Parkinson. Most illustrations were incomplete, but all but a few contained sufficient detail for them to be completed by other artists.

The return voyage

James Cook would have liked to return to England by crossing the Pacific at high southern latitudes towards Cape Horn, to prove or disprove the existence of the southern continent at these latitudes, but it was nearing winter and the hardships and dangers such a voyage would have entailed prevented this. Cook therefore decided to return via New Holland (Australia) and the East Indies (Indonesia).

It took nearly three weeks to reach Australia. For five months the Endeavour sailed up the east coast of Australia. The most important botanical collections were made at Botany Bay, near what is now Sydney. While off the Queensland coast, the Endeavour struck part of the Great Barrier Reef and the voyage almost ended in disaster (11 June 1770). As subsequent examination revealed, the ship was badly holed, but the leak was more or less plugged by "fothering" when the Endeavour had floated free from the reef. The procedure used was to mix oakum (loose fibre obtained by un-twisting old rope) and wool, chopped small and stick it loosely [sic] by handfuls all over the sail and throw over it sheep's dung or other fibres. Horse dung for this purpose is the best. The sail thus prepared is hauled under the Ships bottom by ropes and if the place of the leak is uncertain it must be hauled from one part of her bottom to another untill the place is found where it takes effect; while the sail is under the Ship the oakum etc is washed off and part of it carried along with the water into the leak and in part stops up the hole.

On 17 June the ship was run ashore and repaired, near the present town of Cooktown. It was seen that several pieces of fothering had plugged holes in the ship and that, fortunately, a hole "as large as a man's fist" was plugged by a piece of coral, which had remained when the Endeavour broke away from the reef. The delay enabled further collecting and the first clear view of a kangaroo.

During the Australian part of the voyage, plants were collected at eleven localities in New South Wales and Queensland. Parkinson made 412 sketches of plants and from these Banks had 362 finished paintings made. Fifty of these are reproduced in Sydney Parkinson (1983). Parkinson's industry drew the comment from Banks in his Journal, as the Endeavour sailed up the Australian coast (12 May 1770): "In 14 days just, one draughtsman has made 94 sketch drawings, so quick a hand has he acquired by use." Parkinson sometimes spent all night drawing. His illustrations were carefully supervised by Banks and Solander. Banks wrote: "we sat till dark by the great table with our draughtsman opposite and showed him in what way to make his drawings, and ourselves made rapid descriptions of all the
details of natural history while our specimens were still fresh." Joseph Banks laid great stress on scientific accuracy in his artists' work. Despite the accuracy of his botanical illustrations, Parkinson sometimes "romanticised" the scenes he sketched. This is demonstrated, for example, in two sketches of the same scene in the Bay of Islands, New Zealand, reproduced in Lysaght's (1979) article. The one by Spöring is factual but Parkinson's is, as Lysaght noted, romanticised and less accurate. It was therefore Spöring's sketch that Banks chose to have copied.

The Endeavour reached the tip of Australia on 21 August and New Guinea on 3 September. Cook then headed for the port of Batavia (now Jakarta). The ship, after the emergency repairs in Queensland, needed attention — it was leaking at the rate of up to a foot an hour — and Batavia had the facilities to enable thorough repairs to be made to the Endeavour. These took three months and the renovation was a highly skilled one.

When the Endeavour reached Batavia, the occupants of the ship were healthy, apart from a few suffering mildly from scurvy. Batavia was, as Stearn expressed it (in D. J. Carr (ed.), Sydney Parkinson, 1983), "that deadly stinking pestilential place". Canals intersecting the town served as dumping grounds for refuse "chiefly [sic] formed from human ordure" (Banks). Malaria and dysentery were rife, and only one man from the Endeavour escaped contracting one or both of these diseases. The exception was the sailmaker, and Cook wrote, "what was still more extraordinary" he was "generally more or less drunk every day". Despite ill health, Banks and Solander did collect some plants in Java, and Parkinson made seventy-two sketches. On 26 December 1770 the Endeavour left Batavia. "We came in here with as healthy a ships company as need [go] to sea and after a stay of not quite 3 Months lift [sic] it in the condition of an Hospital ship." Seven had died there, including William Monkhouse, the surgeon, and the two Tahitians, Tupaia and Taiata. Between Batavia and the next port-of-call, the Cape of Good Hope, a further twenty-four men died. Among the dead were Green, the astronomer, Spöring (25 January) and Sydney Parkinson (26 January 1771). Banks, in a tribute to Parkinson, wrote after the voyage: "S. Parkinson certainly behaved to me, during the whole of the long voyage, uncommonly well, and with unbounded industry made for me a much larger number of drawings than ever I expected." Three more died after the ship had reached the Cape of Good Hope on 14 March.

After a stay of a month, the Endeavour set sail for England and on 12 July anchored off Deal, when Banks disembarked. Overall, about 1,300 new plant species were collected during the voyage. The quantity of biological material collected far exceeded any previously brought to Europe. The voyage of the Endeavour was, to quote Stearn (in D. J. Carr (ed.), 1968), "the first organized and thoroughly equipped voyage of biological exploration" thanks to "the enthusiastic and unexpected participation of a wealthy young amateur, Joseph Banks." The plants collected were well selected and accompanied by detailed, accurate descriptions. Duplicate
specimens of New Zealand plants collected by Banks and Solander are now in the collections of the Auckland Institute and Museum and the National Museum, Wellington. Sydney Parkinson made 952 drawings of plants on the voyage. He made 295 drawings of animals and about 100 drawings of landscapes, people, their houses and activities, canoes and tattoo designs. Incidentally, both Parkinson and Banks had been tattooed on the arm while in Tahiti.

**The fate of the botanical illustrations**

Of Parkinson’s 925 plant illustrations, 676 were unfinished. At first he had been able to complete his botanical paintings, but by the time he reached New Zealand, he could not find time to finish each drawing. Soon after his return to London, Banks engaged a team of artists, at his own expense, to finish the paintings, botanical and otherwise. These artists did not simply complete each painting that Parkinson had begun; rather they copied Parkinson’s incomplete illustration on to a fresh sheet of paper and then completed it. One can compare, at the British Museum (Natural History), London, Parkinson’s incomplete illustrations with the finished versions.

The artists who were responsible for completing most of the botanical paintings were James and John Frederick Miller, John Cleveley jun. and Frederick Polydore Nodder. As I have commented, they followed Parkinson’s style closely, and one cannot always tell without examining signatures which artist completed which painting, or even which paintings Parkinson completed himself. James and John Frederick Miller were sons of Johann Sebastian Müller (1715-ca. 1790), a distinguished German artist and engraver, who was an admirer of Linnaeus and particularly interested in botanical illustration. He anglicised the family name when he moved to England. John Cleveley junior added the “jun.” to his name because his father, who had the same name, painted nautical subjects. These three artists so impressed Banks that he engaged them to accompany him on Cook’s second voyage. When this plan did not eventuate, they accompanied him to Iceland in 1772. Frederick Polydore Nodder (who died about 1800) illustrated a number of botanical works and by 1788 was referred to as “botanical painter to her Majesty.”

Of the signed illustrations of New Zealand plants that were completed by the above artists, most were by Frederick Nodder. James and John Frederick Miller completed a number too, and John Cleveley jun. finished four of them. Another artist, Thomas Burgis, finished a single New Zealand plant illustration. It should be noted that all twenty-four drawings of New Zealand ferns, most of which were finished by J. E. Miller, are uncoloured, unlike all other New Zealand plant illustrations.

One hundred and forty-six of the completed watercolours of plants are shown, reduced in size, in *Sydney Parkinson* (D. J. Cart (ed.), 1983). Most are reproduced in colour, and twenty of these illustrations are of New Zealand plants.
Banks had engravings of the finished Parkinson illustrations made on copper plates. His intention was to publish the botanical results of the *Endeavour* voyage in a series of fourteen or more volumes, with text to accompany the illustrations. Solander had made his descriptions of each plant on oblong pieces of paper during the voyage and these were filed in small boxes, now known as “Solander cases”. The descriptions were neatly copied after the voyage into folio volumes and marked ready for printing. Joseph Banks employed eighteen different engravers to make the set of about 740 engravings. It has not been possible to determine whether the engravings, which have strong lines and lack the delicacy of many French engravings (compare PLATES 4 to 7 with PLATES 9 to 12) were to have been hand coloured after printing.

Joseph Banks, who was made a baronet in 1781, was a man of many activities and had been away on his expedition to Iceland during the last half of 1772. It was not until November 1784 that he was able to state that only two months’ work was needed before publication. The copperplate engravings alone had cost him £7,000, a huge sum then. Trial proofs were made but publication did not evenuate. The New Zealand portion, entitled *Primitiae Floras Novae-Zelandiae*, contained descriptions of 343 species, illustrated by over 200 plates. Even the title page had been prepared. Had the manuscript been published, we would now be using Banks’s and Solander’s names for many New Zealand plants. A number of later botanists did, however, use some of the names suggested by Banks and Solander. There are typescript copies of *Primitiae Floras Novae-Zelandiae* in the Auckland Institute and Museum and in the National Museum, Wellington.

In the 1890s several sets of proofs of the engravings were received by the New Zealand Government from the British Museum. They included 182 New Zealand plants and several hundred from elsewhere. These sets are now at the Auckland Institute and Museum, the National Museum and the Alexander Turnbull Library, Wellington. In 1973 a limited edition of thirty of the botanical engravings, including some of New Zealand plants, was published (Blunt and Steam, 1973).

**Banks’ Florilegium**

All but a few of the 743 copperplate engravings have survived to the present day, despite air-raid damage to the British Museum in September 1940. These 738 plates are being published in eighteen volumes by Alecto Historical Editions, London, in association with the British Museum (Natural History). The edition is limited to 100, and each set will sell for about £NZ 130,000. The Alexander Turnbull Library, Wellington, has purchased a set and the first volumes, illustrating Australian plants, have been received.

In Banks’s time the engravings would probably have been printed with black ink and perhaps sold in uncoloured and hand-coloured versions. Alecto Historical Editions have used the *à la poupée* technique of colour printing from copper plates, developed by a Dutchman in the seventeenth century. Each copper plate is chromium plated to harden it so that it will not become
worn during the printing. The various coloured pigments are worked into the incised lines of the engraving with a lubricated piece of cloth (*poupee*). Then the smooth, unengraved part of the plate is wiped clean. The colours of the pigments that are rubbed into the plate are carefully chosen to match the colours of each finished watercolour. Up to fifteen different colours are used for each plate. The pigments chosen are those that were used in the eighteenth century, and these are mixed with boiled linseed oil. It can take three hours or more to ink up each plate and to remove excess ink from non-engraved regions. Heavy-weight, acid-free paper is then lightly dampened and placed on top of the copper plate. This is run through a press, the rollers of which press the ink onto the paper from the grooves in the plate. Only one print can be made from each inking, which explains why each set of prints is so costly. The finished plates are very impressive indeed. They are, however, a step removed from the watercolours, which give a more accurate and life-like picture of each plant.

Why was the botany of Cook's first voyage not published?

A number of reasons have been advanced, but the full truth will probably never be known. There is no doubt that the sudden death of Solander, aged forty-nine, in London on 13 May 1782 slowed down the plans for publication. After Cook's voyage and the trip to Iceland with Banks, Daniel Solander had a very busy life. He continued to work at the British Museum and in 1773 was promoted to keeper, with an annual salary of £100 and an £8 allowance "for coal and candles" (Rauschenberg, 1968). He helped Joseph Banks with his work, and this included cataloguing the plants at the Royal Gardens, Kew. He was employed too by the Duchess of Portland to work on her natural history collections. He identified material for many others, including Dr John Fothergill, an eminent physician and naturalist who had been involved in the publication of a second edition of Sydney Parkinson's *Journal* (see Beaglehole, 1962, for details).

There is no doubt that Banks too led a very busy life and had many projects in hand. Banks had, by the way, broken off his engagement to Harriet Blosser soon after his return to England. He made her a substantial payment by way of an apology, and this was recorded in, above all things, the foreword to the 1810 edition of James Lee's *Introduction to the Science of Botany* by Lee's son. Miss Blosser married a clergyman and was "blessed with a numerous and lovely family". Banks became involved with the unknown Miss B..., which led to the birth of an illegitimate child. Then, in March 1779, aged thirty-six, he married Dorothy Huggessen, fifteen years his junior and possessor of "sixty thousand pounds". They had no children.

Banks became a close friend of George III and in 1773, after his return from Iceland, was appointed special advisor and director of the Royal Gardens at Kew, a task that he was involved with for the rest of his long life. In 1778 he was elected president of the Royal Society, a post he held for over forty years and which occupied much of his time. One of Banks's
greatest contributions to science was the way in which he promoted scientific research and encouraged talented young naturalists, making his vast library and collections freely available to them. By 1785 the botany of Cook’s first voyage was almost ready for publication. An explanation of why it was never published has been suggested by Professor J. C. Beaglehole (1962):

One is compelled, rather to one’s surprise, rather against one’s will, to the conviction that Banks did not publish because he had lost interest. He had lost interest because of the very nature of his mind; and his mind was never, in relation to science, truly ‘professional’. He was a Gentleman, and a Amateur.

Perhaps this is true, but it does seem strange that, after persevering with publication plans for so long and being so close to finishing the work, he should lose interest.

It is true too that in some ways there was no need for Banks to publish his material, for his home at 32 Soho Square was always open for serious students to inspect manuscripts and illustrations. This, of course, was of little help to overseas naturalists, and in 1771 Linnaeus himself wrote urging “the publication of these new acquisitions, that the learned world may not be deprived of them”. Perhaps Banks, who published so little, had an aversion to committing himself to print. As time passed, many of the botanical results of the voyage had been published in piecemeal fashion by others. As far back as 1776, publication of the Forsters’ Characteres Generum Plantarum, in which they had substituted their own botanical names for some plants they collected on the second voyage and which had also been collected on the first voyage, had rendered invalid these manuscript names of Solander and Banks.

Yet another reason has been advanced. The American War of Independence and the subsequent fall-off in demand for the type of long wool that Banks exported from his Lincolnshire estates had sharply reduced his income. With apparently no assistance from the Crown towards publication costs, Banks may have considered that he had spent more than enough on the project as it was.
PLATE 7  *Carnichaelia aligera* (native broom)

The specimen illustrated was collected from Mercury Bay, Coromandel Peninsula. Banks and Solander also collected *Carnichaelia* from Poverty Bay, Amaura Bay and Tolaga Bay and described all collections in their unpublished manuscript as *Genista compressa*. Then, in 1825, the taxonomist Robert Brown described these collections, as well as a specimen the Forsters collected from Dusky Sound (which George Forster had named as *Lotus arborescens* in his *Prodromus*), as a single species, *Carnichaelia australis*. It is now recognised that several different species were in fact included in Brown's *Carnichaelia australis*. The specimen Parkinson illustrated from Mercury Bay would now be classified as *Carnichaelia aligera*. However, the New Zealand species of *Carnichaelia* are currently being revised and it may well be that the name of the plant Parkinson painted may change again.

There are about forty species of *Carnichaelia*, a member of the pea family (Leguminosae or Papilionaceae), and all but one occur in the New Zealand region. The other species occurs only on Lord Howe Island. *C. aligera* is an erect shrub or tree up to ten metres high. The flattened green branchlets, which have lost their leaves in the flowering and fruiting specimen shown at right, function as leaves.

The watercolour from which the engraving was made shows that the flowers are a deep purple colour and that the fruits at upper right are a dark brown. When most of the fruit wall falls to the ground, the bright orange seeds remain attached to the plant, supported by a thin rim of fruit wall tissue (centre right).

*Courtesy of the Director, National Museum, Wellington*

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PLATE 8  *Elytranthe tetrapetala* (*Poraxilla tetrapetala*) (mistletoe)

*Elytranthe tetrapetala* is a bushy shrub about a metre in height, which grows parasitically on trees. It is a semi-parasite, for although its roots draw food materials from the stem of the host, its own green leaves manufacture food too. This species of mistletoe is restricted to the North and South Islands of New Zealand. In the north it grows mainly on the tawheowheo, *Quintinia serrata*, and in the south on mountain beech, *Nothofagus solandri* variety *cliffortioides*. The red flowers form a striking contrast to the dark green foliage between October and January.

As George Forster's painting indicates, there are four pollen-bearing stamens inside the red perianth, and in the centre of the flower, a style with a terminal stigma on which pollen is deposited. Dissected flower parts are shown, uncoloured, in the illustration. There are three other species of the *Elytranthe* group in New Zealand. All are endemic and belong to the family Loranthaceae. George Forster's painting is of a specimen of *Elytranthe* (then known as *Loranthus*) that was collected at Queen Charlotte Sound on 22 November 1773.

*Courtesy of the Trustees of the British Museum (Natural History)*
Plate 7

*Carmichaelia aligera* Simpson. (broom)

Engraving from Parkinson’s painting
Johann and George Forster

After the success of the first voyage, Cook's proposal for a second expedition had the support of the King and the Admiralty. Although the first voyage had shown it was unlikely that a great southern continent (Terra australis incognita) existed, there were uncharted seas in high southern latitudes to be explored before its existence could be completely disproved. There were also further discoveries to be made in the central Pacific and South Atlantic Oceans. The Lords of the Admiralty readily accepted James Cook's plan for a circumnavigation of the globe from west to east at high southern latitudes, using Queen Charlotte Sound, New Zealand, as an advance base. Two Whirly colliers, from the same shipyard as the Endeavour, were chosen and renamed Resolution (462 tons) and Adventure (340 tons). Cook, promoted to commander, was to lead the voyage on the Resolution, and Tobias Furneaux (1735-81), who had served with Captain Samuel Willis on his 1766-8 circumnavigation, was made commander of the Adventure.

The second voyage began on 13 July 1772 from Plymouth Sound, exactly a year after the Endeavour reached the Thames at the end of the first voyage. In the intervening year Joseph Banks, enjoying being famous, had made plans to take part in the second voyage, along with a retinue of fifteen scientists, artists, secretaries and servants. To accommodate them all, he asked the Admiralty to provide extra space on the Resolution, with the result that the great cabin was raised in height and a superstructure, complete with roundhouse, was erected on deck. This made the collier so top heavy and unseaworthy that the Resolution had to be restored to her original state. Banks was furious and, according to a midshipman, John Elliot, he "swore and stamp'd upon the Warfe, like a Mad Man," and withdrew with his entourage from the voyage. Instead, he chartered a 190-ton brig and with his party, including Solander, set forth on an expedition to Iceland.

At short notice a 42-year-old German, Johann Reinhold Forster (1729-98), was approached on behalf of the Earl of Sandwich, First Lord of the Admiralty, and readily accepted the post of naturalist on the voyage. His condition that his seventeen-year-old eldest son, Johann George Adam, commonly known as George (1754-94), accompany him as assistant naturalist and draughtsman was met, and the generous sum of £4,000 was
granted. Johann Forster had, in fact, previously let Banks know he was keen to accompany him on the voyage, at a time when the latter was inundated with such requests.

It is only in recent years that the contribution the Forsters made to knowledge through their participation in the second voyage has been generally recognised and appreciated. Johann Forster was an outstanding scholar, prodigiously well read, courageous and of strong physique, but a man who was his own worst enemy — suspicious, stubborn, difficult, tactless and quarrelsome, frequently in debt and forever borrowing money from friends and being sought by bailiffs. This chapter can do little justice to such a complex pair as Johann and George Forster, and I would draw the reader's attention to Dr Michael Hoare's brilliant biography, *The Tactless Philosopher: Johann Reinhold Forster (1729-98)* (1975) and to *The Resolution Journal of Johann Reinhold Forster 1772-75*, edited by Hoare (1982). This journal, hitherto unpublished, gives considerable insight into the Forsters and their work on the voyage. Most of the first volume is devoted to a very valuable introduction by Dr Hoare, and the following summary of the Forsters' lives draws heavily on Dr Hoare's writings.

**Before the voyage**

Johann Reinhold Forster was born in Dirschau (Tczew) in Poland, thirty kilometres south of Danzig (Gdańsk), on 22 October 1729. A great-great-grandfather, George Forster, a Yorkshireman, had settled in the region in the 1640s and his descendents were proud of their British ancestry. Johann showed an early aptitude for languages and, it is said, became proficient in seventeen of them. When fifteen years old, he entered a famous institute in Berlin, the Joachimsthal-Gymnasium, and studied a variety of subjects ranging from classics, theology and languages to ethnology, cosmology and ancient geography. In 1748 he enrolled in the theological faculty at Friedrichs University, Halle. Forster concentrated on studying classical and Oriental languages, but is known to have received some tuition in natural history. He developed an interest in the methods of Linnaeus. By 1751, probably prompted by an ailing father, Johann had returned to Dirschau as a curate in the Reformed Church. In 1754 he married a cousin, Justina, who seems to have been an ideal wife. J. R. Forster was ordained and became a parish priest in Nassenhuben near Danzig in 1753. He remained there until 1765, by which time the Forsters had seven children (an eighth died at birth).

During these twelve years, Forster devoted much of his time to scholarship and correspondence. He spent most of an inheritance from his father on one of his greatest passions, books. Johann took a keen interest in his parishioners, especially the peasants, but as his secular interests grew, his sermons became last-minute efforts and he often fell asleep in the pulpit during services. His interest in natural history was rekindled by the keen interest his son George (born in Nassenhuben, 26 November 1754) took
in the plants and animals of the district. During the Seven Years War (1756-63), when the Hochzeit-Nassenhuben parish was periodically occupied by Russian troops, Forster spared no effort to protect the rights and property of his parishioners, and his courage and dedication earned the Russians' respect.

After the war Johann's career altered radically. In March 1765 he left with George for Russia and was appointed Catherine the Great's commissioner to the Volga. Earlier, in 1764, he had made his disappointment known to the Russian Resident in Danzig, when he was overlooked for an unfilled position as German pastor for a Reformed Church at Archangelsk, Russia. When Catherine the Great, a German, took over the throne of Russia from her husband, Czar Peter, in 1762, she had encouraged, with promises of various concessions, the migration of Germans to the Volga region. Thousands made the journey, but rumours filtered back of the poor conditions and treatment the settlers were subjected to. Catherine appointed Forster to report (favourably!) on the Volga colonies to dispel the rumours. The Forsters went from St Petersburg (Leningrad) to the Volga. Johann made meteorological observations and maps during their travels, using instruments supplied to them by the St Petersburg Academy of Sciences. George, only ten years old, collected and identified plants. (Their observations on the natural history of the Volga region were published in England in 1767.) Johann Forster's report would not have pleased Catherine, for it was highly critical of the Russian administration of the region. He did not receive the salary promised, and, after some months in St Petersburg, the Forsters returned to their family in mid-1766. In the interim, Johann had been forced to resign his position in Nassenhuben because of his absence.

Leaving the rest of the family behind once more, Johann and George set off for England to seek their fortune there. They arrived in London, almost penniless, in October 1766. For a time they stayed with a boyhood friend of Johann's, Karl Woide, a leading scholar of the Coptic language. They sold artefacts from their Russian travels to obtain some funds. J. R. Forster made some useful contacts by attending meetings of the Royal Society of London and the Society of Antiquaries, and presented a series of papers in Latin on a wide variety of topics. He earned a reputation as an impressive scholar, knowledgeable in antiquities and even agriculture and animal husbandry. He met Dr Solander, then working as an assistant at the British Museum. George, though only twelve, translated into English and edited a book by the Russian Lomonosov: *A Chronological Abridgement of the Russian History* (London, 1767). Then, in May 1767, to the great relief of Woide, who had been giving considerable financial support, Forster obtained the position of tutor in modern languages and natural history at Warrington Academy. This institution was renowned for its liberal, non-conformist teaching and modern curriculum. Forster replaced the great Joseph Priestley, a tutor in classics and literature, who had been able, while at Warrington, to conduct his experiments in chemistry and physics. For
a few months that summer Forster and Priestly were together at Warrington. The rest of the Forster family left Danzig and George escorted them from London to Warrington. George became a student at the academy in the following year. The manuscripts of Forster’s Warrington lectures are now in Berlin and, in Michael Hoare’s words, “There was . . . nothing in any English and few European educational institutions to compare with the scope, depth and critical approach of Forster’s lectures in mineralogy and natural history.”

Problems developed for Forster at Warrington Academy. He had become unpopular with the secretary of the academy for using “violent disciplinary measures” against one of the pupils, and the academy was receiving complaints from Warrington tradesmen about unpaid debts of Forster’s. He left the academy in June 1769, then taught languages at Boteler Grammar School, Warrington, for a year. During this time, Johann and George Forster worked on translating into English the travels of Kalm (North America), Loeffling (Spain and South America) and Osbeck (Asia). The translated versions appeared before the second voyage and made the Forsters well known to the general public. In November 1770 Forster left Warrington for London, renting a house next door to Woide. Employment he had hoped for did not materialise. The two Forsters continued with their translations and attended meetings of the Society of Antiquaries and the Royal Society (J. R. Forster was elected a fellow of the Royal Society of London in February 1772). In 1771 Johann Forster joined the staff of The Critical Review, a periodical specialising in reviews of foreign books, and with 500 roubles, a fraction of the sum promised, finally arriving from the Russian Government, the family eked out an existence. J. R. Forster’s translation from the French of Bougainville’s A Voyage round the world . . . 1766, 1767, 1768 and 1769, with some 500 pages of text, appeared in 1772 and received a glowing review in The Critical Review — the possibility exists that Forster wrote the review himself.

By the time of the second voyage, Johann Forster had established himself as “one of the best-read, most discerning and leading naturalists in Britain” (M. E. Hoare). He had, through correspondence, established contact with Linnaeus, the father of modern biological taxonomy. Yet in 1961 the famous Cook scholar, the late Professor J. C. Beaglehole (in The Journals of Captain James Cook, vol. II, Introduction) had written:

For ocean voyaging no man was ever by physical or mental constitution less fitted . . . there is nothing that can make him other than one of the Admiralty’s vast mistakes. From first to last on the voyage, and afterwards, he was an incubus. One hesitates, in fact, to lay out his characteristics, lest the portrait should seem simply caricature. Dogmatic, humourless, suspicious, pretentious, contentious, censorious, demanding, rheumatic, he was a problem from any angle.
Other scientists on the *Resolution* were William Wales, astronomer, who became one of J. R. Forster's greatest critics, and his assistant, George Gilpin. Another astronomer, William Bayly, was on the *Adventure*. William Anderson, surgeon's mate on the *Resolution*, was a keen naturalist who served as chief surgeon and naturalist on Cook's third voyage. This voyage will not be dealt with here, for the time spent in New Zealand was brief, collections made were small and, it seems, no detailed illustrations were made of any plants.

The first leg of the voyage was to Cape Town, with stops at Madeira — for provisions, including "a large supply of wine" — and the Cape Verde Islands. The *Resolution* and *Adventure* remained at Cape Town for three weeks. The Forsters lived ashore and their "whole time was taken up in the pursuits of Natural history" (Cook's *Journal*). J. R. Forster soon realised that if the huge flora and fauna of the Cape region was any indication, lies and George would be hard put to cope with describing the plants and animals they would encounter on the rest of the voyage. Fortunately, Anders Sparrman (1748-1820), a young Swedish naturalist who had studied under Linnaeus at the University of Uppsala, had recently arrived in Cape Town. The Swedish Government had sent him there, at the request of Linnaeus, to undertake botanical exploration.

It was soon obvious to the Forsters that this friendly, quiet, somewhat naive man was an excellent botanist. Johann therefore offered him the position of scientific assistant, at a salary of £50 a year, plus expenses. Sparrman thought about it overnight and accepted the next morning. Forster then had, not without effort, to persuade James Cook to grant Sparrman a passage. He was uncomfortably accommodated in the steerage, with the Forsters' large collection of books. Anders Sparrman proved a valuable assistant, who remained in friendly contact with the Forsters throughout their lives. He was not, as has sometimes been stated, hired to make up for the Forsters' botanical deficiencies.

The ships left Cape Town on 22 November 1772 and headed south, spending four months in Antarctic waters. They made the first known voyage beyond the Antarctic Circle, searching for southern landmasses. It was a nightmarish journey at times, with damp, cold cabins and fogs, gales, pack-ice and icebergs to contend with. In early February the two ships were separated during a gale and did not meet again until an agreed rendezvous in Queen Charlotte Sound, New Zealand.

The *Resolution* anchored in Dusky Sound on 27 March 1773 and spent some six weeks there. Repairs were made to the ship and supplies were replenished. The Forsters, Sparrman, and Johann's servant, Ernest Scholient (a "feeble man", Cook states in his journal), spent their time collecting. The "division of labour" among the three biologists during the voyage was summarised in a dedication to George in J. R. Forster's book *Exhibitioan hisoriae naturalis inserviens, quo termini et delineationes ad annum, piscium,
insectorum et plantarum adumbrationes intelligendas et concinnandas, secundum methodum systematis Linnaeani continentur (Halle, 1788):

In sketching plants in particular we used as an assistant our good friend Sparrman: it was your [George’s] task to put his work in order, and at the same time describe the plants. It was my particular province to examine more closely these efforts here and there, and to correct them in a very few places, to describe all the animals.

J. R. Forster also set himself the task

to investigate closely the habits, rites, ceremonies, religious beliefs, way of life, clothing, agriculture, commerce, arts, weapons, modes of warfare, political organisation, and the language of the peoples we met, and also I had to take note of the daily changes in the atmosphere, the winds, increase and decrease in temperature and whatever was worth noting.

J. R. Forster painted a vivid word picture of life at Dusky Bay:

I saw with one glance of the Eye an Observatory erected, & filled with the most accurate & excellent Instruments & Men observing & the celestial bodies & calculating their Motions & deducting the inferences for ascertaining the Latitude & Longitude of our abode. I saw a vast number of plants & Animals examined & scientifically described. The polite Arts had not disdained to live on this solitary spot, which was so much left to itself before our arrival. The canvas was gradually animated with the most romantic scenery of this Country, & nature seemed amazed to see her productions imitated by the Son of Apollon. In a lower sphere, more than 70 plants & Animals, were exactly represented by a young Artist in his Novicade. Here on the brow the Anvil resounded with the strokes of the Hammer. The fresh water river was another animated Scene of business: a brewery provided a salutary & palatable potion from the decoction of spruce [rimu, Dacrydium cupressinum] & New Zealand Tea [ma-nuka, Leptospermum scoparium] mixed with the Essence of Malt & Molasses for our Ships-Company. The cooper & his Man repaired casks, & several people were employed in washing, & dressing fish for our dinner. In the offing there is a boat full of men employed in catching fish, for our entertainment, some hawled fishpots with several crayfish in: here two Sawyers were employed in cutting planks, others split & carried firewood, yet others candled & paged the Ship & several hands were busy in new setting and overhauling the rigging. In short the whole seemed a most complete scene of business. The brow on the larboard side of the Ship, which a few days ago was an impenetrable forest, is now clear and airy, & contains an Observatory, a forge, a green hut for the woodcutters & a pen for our Sheep; & more than an acre of ground is cleared of the woods, a thing which 500 natives of New Zealand could not have brought about with their stone-hatchets in more than 3 months; whereas only a few of our hands had been employed, & this not even constantly.

Bird life in Dusky Sound was abundant, and many different species were shot, described and painted. The Forsters’ contribution to New Zealand ornithology was considerable. As A. C. and N. C. Begg have pointed out (in *Dusky Bay*, 1975), studies of New Zealand birds on the first voyage were trivial by comparison. Thirty-eight new species from Dusky and Queen Charlotte Sounds were described by the two Forsters, and George illustrated thirty-five of them. Some of his paintings of New Zealand birds and fish are reproduced in colour in the Beggs’ books (1970, 1975).
It was too late in the season to obtain many plants in flower. J. R. Forster found himself (28 March 1773)
quite tantalized with the sight of innumerable plants & Trees, all new ones, none of which had flowers at this Season & the fruits either were quite unripe or already gone; so that my collection fell short of my Expectation. Tired with disappointment, the continual rain & the bad walking between wet trees, that rained a double portion upon me from their soaked foliage, & between rotten felled trees & heaps of moss, where I frequently fell in with my legs up to my knees & above, I returned on board.

There were, though, some plants in flower in Dusky Bay at the time, including the autumn-flowering orchid, *Eurinia autumnalis*, the manuka, *Leptospermum scoparium*, *Olearia obovata*, an attractive shrub restricted to the Fiordland region; and the pate, *Schefflera digitata*, all of which were described and illustrated. The Forsters met the sandfly for the first time, and having developed no immunity, suffered far more than New Zealanders today. Johann recorded, "my hands are now so much swelled from the Stings of the Sandfly, that I can hardly hold the pen, & have great pain in them, & can pull my Jacket with difficulty off".

One day (23 April) Anders Sparman and some of the officers climbed a peak behind Cascade Cove and Sparman returned with a subalpine herb in flower, which he named *Forsteria (sedifolia)* after "my fellow botanist", George Forster. The Forsters were the first to describe the broad-leaved cabbage tree, *Cordyline indivisa*. Johann Forster recorded finding flowers (as well as fruit) on 7 May in Dusky Sound, which seems strange, as the normal flowering time is from December to January. The Forsters were also the first to publish a description of the climbing supplejack or karoeao, which, like many New Zealand plants, had been described earlier in Solander and Banks's unpublished manuscript. The Forsters named the plant *Ripogonum scandens*, *Ripogonum* meaning plant shoots with kneed joints, and *scandens* meaning climbing. The description in J. R. Forster's *Journal* is: "A kind of climbing plant called the supple Jack by our Sailors, on account of its pliancy, bears red berries, something similar to cherries, & runs up the highest trees, climbs over to another, & after having made its way over many of them, it often comes again down & strikes fresh roots."

On 11 May 1773 the *Resolution* left Dusky Bay, headed north, and on 18 May entered Queen Charlotte Sound, where the *Adventure* had been waiting for six weeks. Famineaux had hoped to spend the winter there but Cook directed him to prepare for a winter cruise in the central Pacific. The *Resolution* remained in the Marlborough Sounds for three weeks. During this time the Forsters and Sparman found new species of birds to describe, a new bat (the New Zealand long-tailed bat, *Chalinolobus tuberculatus*) and a number of plants, including a snowberry shrub, *Gaultheria antipoda*; wild Spaniard or speargrass, *Atriphylla squarrosa*; an eyebright, *Euphrasia cucumis*; Cook’s scurry grass, *Lepidium oleraceum*; and the pennywort, *Hydrocotyle moschata*. Sydney Parkinson had sketched these six plants on the first voyage, but the Forsters published the first descriptions.
Winter voyage  

From June until October 1773, the two ships sailed through the central Pacific Ocean, from Piccairn Island in the east to Tahiti, Tonga and back to New Zealand. Soon after the coast was sighted, a storm separated the ships for two days. They were reunited off Cape Palliser, near Wellington. Then another storm drove the Adventure far out to sea. The Resolution anchored near the entrance to Wellington Harbour but did not enter it, and the next day reached Queen Charlotte Sound once more and arrived at Ship Cove on 3 November 1773.

New Zealand again  

The naturalists now found a number of plants in flower for the first time, including flax (Phormium tenax) and wild spaniard (Aciphylla squarrosa). They found too the rengarenga or rock lily, Arthropodium cirratum, now so popular in cultivation. Some orchids were also flowering, and one of them "of a very singular structure & making absolutely a new genus" was named Thelymitra longifolia, a name still valid. George Forster painted it, and it had been sketched by Parkinson (as Serapis regularis, a name George Forster used in his Florulae Insularum Australium Prodromus (1786), despite having used Thelymitra for it in Characters Generum Plantarum (1776)). Again, three weeks were spent in the sounds, and after two weeks there Johann Forster noted, "I have not yet got 30 new plants; & but few animals, so that my Expectations were not quite answered in coming here in the beginning of Spring. The Season is not much advanced, whether owing to a cold winter, or whether this is the annual constant state of the Climate, I cannot determine."

Despite the three-week stay in Queen Charlotte Sound, the Adventure did not join the Resolution and it was feared it might have been destroyed in the storm. Cook left a note buried for Furneaux in case the Adventure did eventually reach the rendezvous, and on 25 November 1773 the Resolution set off for another summer in Antarctic waters. As fate would have it, the Adventure arrived in Ship Cove five days after the departure of the Resolution. Furneaux and his crew remained in Queen Charlotte Sound until 23 December. During their stay, ten of the crew, on a trip in the cutter to "gather wild greens for the Ship's Company", met some Maoris, and apparently one of them stole something from the boat (while the crew were dining on the beach) and was shot at and killed. The Maoris attacked the sailors, most of whom had left their weapons on the boat. The sailors were all killed and roasted for food! Furneaux headed south in the Adventure and explored southern waters, reaching 61° S off Cape Horn. Provisions became short and the ship headed for Cape Town (19 March 1774), where it remained for a month before sailing for England, arriving on 14 July 1774.

The Resolution's 1774 cruise  

The summer of 1773-4 was spent in Antarctic regions, with the Resolution reaching further south (71° 16') than any person had been. Then, with Cook himself ill, the Resolution went north and reached Easter Island in March, after nearly five months at sea. J. R. Forster sacrificed his dog to
provide mear and broth for James Cook. On Eater Island William Hodges, R. A. (1744-97), who had been appointed landscape and figure painter on the Resolution, painted his superb oil "Monuments of Easter Island". Murray-Oliver (1969) has described Hodges as "perhaps the most gifted and interesting of Cook's artists" and this painting, like several others by Hodges that are reproduced in Murray-Oliver's book, is, to my mind, quite modern in its style. It has been suggested that George Forster may have received informal tuition from Hodges and that this is reflected in an improvement in Forster's work during the voyage.

The Resolution then sailed to Tonga and the New Hebrides, which were charted in detail. On the way south again to New Zealand, Cook discovered both New Caledonia and Norfolk Island. This was an important cruise, but one in which Johann Forster was, at times, at loggerheads with the officers. On one occasion in the New Hebrides, when he was loudly chastising a native whom he considered had cheated him, Forster ignored Lt. Charles Clerke's command to stop, so Clerke threatened to order a sentry to shoot him.

Final New Zealand visit

Again, Cook headed for Ship Cove, Queen Charlotte Sound, and anchored on 19 October 1774. Repairs were made during a stay of just over three weeks. The Forsters and Sparrman collected some plants, but "New plants are not more to be gotten in any plenty... & as it is the third time already, that we are here in this same harbour; nor can we expect many new plants, having searched for them very closely before." The Resolution left Queen Charlotte Sound on 11 November and headed east along the mid-50s in latitude to examine this unmapped region, reaching South America on 18 December. Christmas was spent on Tierra del Fuego. Cook then went into southern waters again and discovered South Georgia and the South Sandwich group. On 21 March 1775 they reached Cape Town, where Sparrman disembarked. Five weeks were spent there while the ship was refitted and recaulked, and the Resolution reached Spithead, England, on 30 July 1775. They had been away for just over three years and Cook had achieved his objectives — proving there was no southern continent (although he suggested there was probably land in Antarctica below the ice) and more or less completing the exploration of the South Pacific.

Botanical results of the voyage

Overall, according to J. R. Forster, 260 new plants and 200 new animals had been discovered; some 785 different plants had been collected and thousands of herbarium specimens had been made, as several duplicate sets were prepared; 119 different plants were collected in New Zealand. Thomas Cheeseman has stated: "their collections were by no means so large as might have been expected, considering what a productive locality Dusky Sound has proved to be in later years." It had not been a good time of year to find flowers and mature fruits and there would have been little advantage
for the Forsters to collect sterile specimens, in those days particularly, because of the near impossibility of classifying them. Cheeseman, while noting that the only other locality the Forsters visited was Queen Charlotte Sound, already explored by Banks and Solander, commented that “a much longer period was spent in harbour and on shore than during the previous voyage, and the collections ought to have been quite as extensive. Instead of this, they were much smaller.” However, as J. R. Forster noted in the preface to *Characters Generum Plantarum* (1776):

It must be remembered that we landed in New Zealand in the late autumn of the year 1773 and stayed there throughout the winter and a second time in early spring at a very cold time when there were few species flowering. A third time in early spring we made a very short stay there.

No one could accuse them of laziness, and, as J. R. Forster’s *Journal* records, they often had to work when in ill health. Johann noted that sometimes they worked all night before the specimens perished and that he kept awake by plunging himself to the waist in a barrel of sea water!

**Botanical Illustrations**

George Forster’s botanical illustrations do not, understandably, compare with those of Sydney Parkinson in quality or quantity. He was not a trained artist, though most certainly a “competent draughtsman”, who was, as his father termed it, “in his Noviciate”. George Forster put more time and effort into illustrating birds and fish than plants; after all, only about a quarter of the voyage was spent anchored near land. Although George was responsible for most of the biological illustrating, he did receive some help from his father, for the latter recorded in his *Journal* (24 April 1773): “I remained on board, in order to draw the young and delicate plants... before they might be spoiled.” Dr P. Whitehead (*Bulletin of the British Museum (Natural History) Historical Series*, 1978), when comparing several pencil drawings of fish and mammals, apparently by Johann Forster, with some by George, noted that “His father’s drawings are careful, even hesitant, as befits a scientific man; by contrast, the best of George’s are accurate but vigorous and assertive, as if presaging the scale on which his future literary talents would roam.”

Within a year of his return to London, J. R. Forster was in debt again, mostly, it seems, because of lavish spending on books and periodicals. He therefore accepted in August 1776 an offer of £420 from Joseph Banks for George’s botanical drawings. This was a generous sum, for the elegant residence that Forster rented for a time in St Pancras, London, was £60 a year, quite an extravagant amount then. The 301 drawings Banks acquired are now in the Department of Botany, British Museum (Natural History). Ninety-one New Zealand plants are included, and these are listed in an appendix by Phyllis Edwards to Forster’s *Journal* (Hoare, 1982). (One of the New Zealand plants, the Forster’s *Wintera axillaris*, now *Pseudowintera axillaris*, is incorrectly identified as *Drimys winteri*, a South American...
plant). Two hundred and three of the illustrations are in pencil, ten in pen
and ink, forty-seven are finished watercolours, and forty-one are outline
drawings with some watercolouring. One of George Forster's incomplete
watercolours is reproduced in the Beggs' book, Dusky Bay (1975). A line
drawing of Olearia operina is also reproduced there, and comparison with a
colour photograph of the plant on the opposite page demonstrates the
accuracy of George's drawing. Reproductions of his watercolours of four
fish and twelve birds from Dusky Sound are shown too. Many of these are
superb. Other watercolours, drawings and engravings of New Zealand plants
by George Forster are shown in the Beggs' James Cook and New Zealand (1970).

Banks, to his annoyance, did not obtain all of George's botanical
illustrations. George retained some, which he took to Germany; some were
sold on his death. The Forsters' herbarium specimens were distributed to
numerous botanical correspondents and institutions, and are now scattered
in herbaria as far afield as Europe, Russia and USA. It is therefore difficult
to locate many type specimens of the plants the Forsters described.

Botanical publications and
G. Forster's Voyage
round the World

It is a sad fact that, as with Cook's first voyage of discovery, manuscripts
planned and worked on for years were not published. Before the voyage
ended, however, the Forsters had a small book almost ready for publication.
This work, Characteres Generum Plantarum, quas in itinere ad Insulas Maris
Australis Coelestem, Descriptarunt, Delineantur, Annis MDCCCLXXII-
MDCCCLXXV, written in Latin, appeared in a folio edition of only six copies
in 1775 and in a larger quarto edition in 1776 (published by White, Cadell
and Elmsly, London). Some copies had hand-coloured plates. The book
described seventy-five new genera and ninety-four new species from the
voyage; thirty-one of the new genera were from New Zealand. It was written
in haste and contains many errors and omissions (localities are not given for
some species). Cheeseman (1906) commented, "The book is interesting on
account of containing the first published descriptions of New Zealand plants,
but otherwise is most disappointing. The descriptions are short and meagre,
and the illustrations so badly executed as to be practically useless." Later in
life, J. R. Forster recorded his regret in publishing so quickly, without taking
time to consult Banks's collections.

For a time there were plans for Forster to write the narrative of the
voyage, using his own and Cook's journals, under sponsorship of the Admira-
talty and sharing the profits with Cook. An agreement was signed whereby
Cook would be responsible for writing the nautical and "ethnographical
descriptions" of the voyage, and Forster would concentrate on the natural
history, linguistics and "ethnographical observations". Misunderstandings
arose and Forster refused to submit his narrative for correction, which he
considered was treating him like a schoolboy. Cook's account of the voyage
proceeded, and J. R. Forster was forbidden by the Admiralty to publish
anything until the "official volumes" had appeared. Johann Forster overcame
this difficulty by giving his journals to George, and the latter used them,
along with his own notes, to produce A Voyage round the World, in his
Britannic Majesty's Sloop, Resolution, commanded by Capt. James Cook, dur-
ing the Years 1772, 3, 4 and 5. Professor J. C. Beaglehole (1961) commented:

It must be admitted that this is a remarkable performance for a young man of
twenty-two. It is remarkable even though based largely on the record kept by
his father; for J. R. Forster could not write like this. Nevertheless, only too
clearly can we see that it was done with the father hanging over the desk.

George's A Voyage round the World appeared in two volumes in 1777, six
weeks before James Cook's two-volume A Voyage towards the South Pole,
and Round the World. Performed in his Majesty's Ships the Resolution and
Adventure, in the Years 1772, 1773, 1774, and 1775. Written by James
Cook, Commander of the Resolution, in which is included, Captain Furneaux's
Narrative of his Proceedings during the Separation of the Ships. Both accounts
sold for two guineas, but Cook's contained over sixty engravings and sold
rapidly, whereas Forster's book sold poorly and did not cover publication
costs. Cook, who had set off in July 1776 on his ill-fated third voyage, did
not live to see his book in print.

A second work dealing with the botany of the voyage appeared ten
years after Characters Generum Plantarum. Written by George Forster and
published in 1786 in Göttingen, Florulae Insularum Australium Prodromus
is a catalogue containing brief diagnoses of 594 species, of which 141 were
New Zealand plants. Twenty-three names were added without descriptions.
The book is not illustrated, and Cheeseman's (1906) suggestion that "the
descriptions are short and unsatisfactory, and usually quite insufficient for
the proper identification of the species" has been echoed by other New
Zealand botanists. Prodromus makes use of some information in Solan-
der's unpublished manuscript, but it is still not clear what access the Forsters
were permitted to Banks and Solander: material, both before and after the
voyage.

A third short work appeared in the same year as Prodromus. This was
the published thesis that George Forster presented for the degree of Doctor
of Medicine at Halle, Germany — De Plantis Escolenisi Insularum Oceani
Australis. Commentatio Botanica (Halle and Berlin). It included, as Chee-
seman put it, "full descriptions and much curious information respecting the
esculent [food] plants, fifty-four in number, observed during the voyage,
fourteen of which were from New Zealand." George gave the manuscript
to his father to check on its way to press in Halle, and to his anger, when
the book appeared, he found that Johann had included, inter alia, a personal
attack on a man who had given some of their plants to Linnaeus's son.
Linnaeus the Younger (1741-83) had then published descriptions of the
plants, thereby "squealing a march" on the Forsters. An example of this,
from the New Zealand flora, indicated by the suffix 'Linn.f.' (f. = flius
(Latin) = son) after the scientific name of the plant, is the karahih, Wein-
mannia racemosa.
George had a further 300 copies of *De Plantis Esculentis* printed in Berlin, omitting his father's remarks. These publications are the only ones dealing with New Zealand plants collected on the second voyage. The Forsters' reputations as botanists would surely have been enhanced had George published the major work planned on the botany of the second voyage — *Icones Plantarum in Itinere ad Insulam Maris Australis Collectarum*. Even the plates had been prepared and some pulls taken from these 131 engravings. Two sets remain, one now in Leningrad and the other in the British Museum. One of George's sisters, Virginia, was the best artist in the Forster family. She copied and reworked some of his original sketches, although his name appeared on them.

One must also regret that an equivalent work by Johann Forster on the zoology of the voyage was not published in his lifetime. This *Descripiones Animalium*, which has been described as a "hidden treasure", did appear posthumously, edited by M. H. K. Lichtenstein in 1844. J. R. Forster's published monographs on penguins (1780) and albatrosses (1785) from the second voyage have been universally admired.

After the voyage

By 1778 J. R. Forster was considerably in debt and there was a very real danger that he might be imprisoned. George, now twenty-three, boarded a ship for Holland and Germany, without his father's blessing, in the hope that he could find a suitable job for his father and himself. He received a warm welcome in both Holland and Germany and accepted, after first trying to obtain the position for his father, the professorship of natural history at the Collegium Carolinium in Cassel. He continued to seek employment for his father and spent five weeks in Berlin trying to arrange his father's release from debts in England and a position for him in Germany. Finally, through the interest of Karl von Zedlitz, Frederick the Great's Minister for Education and Culture, the post of professor of natural history and mineralogy was obtained for Johann at the University of Halle, his alma mater. The university had been rather in the doldrums, and Forster's appointment was one of several made to lift academic standards. Johann Forster was a member of the masonic lodge, and a scheme was instituted to raise money from the masonic lodges in Germany — about £1,000 was needed — to secure Forster's release from London. This was achieved with the help of Frederick the Great's brother-in-law, Duke Ferdinand, Grand Master of the masonic orders. After his pride and stubbornness were overcome, J. R. Forster, now fifty, took his family by ship to Hamburg in July 1780.

Johann Forster spent the rest of his days in Halle. With such a man, life inevitably had its ups and downs and at times Forster tried to obtain employment elsewhere. He mellowed a little and eventually "was far from forgotten, certainly not neglected and was more popular and respected in Halle than on the eve of his arrival" (Hoare, 1975). Both Forsters translated
many books on travel and natural history in the last decades of the eighteenth century. Some of these contained footnotes by the Forsters that recorded observations they had made on the second voyage. J. R. Forster also co-edited some children’s books on natural history, and George translated an account of Cook’s third voyage into German. Johann Reinhold Forster died in Halle, 9 December 1798.

George Forster had left Cassel in 1783 and moved to Wilna in Lithuania, where he was employed by the Polish Government as professor of natural history at the university. In 1789 he married Therese Heyne, daughter of a classical scholar in Görlingen. George’s father-in-law became a father figure to him. In 1788 George Forster and family moved to Mainz, when he obtained the post of librarian at the university. The Forsters had four children, one a son who died in infancy. George Forster’s last years were unhappy ones. In 1792 Mainz was captured by the French. George, with his liberal views, joined the provisional government, to his father’s dismay. His wife, who had been having an affair with Ludwig Huber, secretary to the Saxon embassy in Mainz, left with the children to join Huber, then in Frankfurt. George Forster became a citizen of the French Republic and moved to Paris, with a price on his head. He became disgusted with the excesses of the Revolution and died, poverty striken, in Paris in January 1794 and was buried in an unmarked grave. He was outlived by his father by four years.
III

Dumont D'Urville's Voyages

Jules Sébastien Cesar Dumont d'Urville (1790-1842), of which Dumont d'Urville is the surname, made three visits to New Zealand.

Dumont d'Urville was born in Condé sur Noireau, an ancient village in Normandy, France. His father was a judge and affluent landowner, his mother was descended from one of the oldest families of the French nobility. The French Revolution, following the storming of the Bastille in 1789, saw the family fleeing their estates and moving to a secluded property on the banks of the Orne. In 1797 Jules' father died, leaving him as the only surviving son. He developed a love of nature as a child and spent much time in the countryside. He had little early formal education, but his mother's brother, Father de Croisilles, joined the family, and d'Urville has written: "The little I am worth I owe to my good uncle whose scholarship was as attractive as it was varied in its scope" (Wright, 1950). When de Croisilles was appointed to the diocese of Bayeux in about 1802, the Dumont d'Urville family moved too and Jules attended the college there. Later he obtained a scholarship to enter the Lycée Malherbe as a boarding pupil. (Napoleon founded the lycées for the gifted youth of France.)

Jules gained many prizes for his scholastic abilities, but he was a rather frail boy who seldom took part in sport. He was ambitious and when still at school had a bet with a friend that he would be an admiral by the time he was fifty, an ambition he didn't quite achieve as he was made one some seven months after his fiftieth birthday. D'Urville was inspired by accounts of the voyages of the great navigators such as Cook and Bougainville, and in 1807 he entered the French Navy as a midshipman. Like Joseph Hooker, Jules Dumont d'Urville believed that "nothing is nobler or worthier of a lofty spirit than to devote one's life to the progress of knowledge. That is why my inclination urged me to voyages of discovery rather than to the purely fighting navy" (d'Urville, Voyage au Pôle Sud, translated by Olive Wright). For a time there was little to do, and d'Urville studied Greek, Latin and Hebrew, and later physics, biology and astronomy. Much of his spare time was devoted to botany. In 1815 he married a Provençal girl "without rank or wealth". Then, in 1819-20, by which time he was an ensign, d'Urville took part in a nine-month voyage to the eastern Mediterranean.

The plants he collected formed the basis for a book, Enumeratio
plantarum quas in insulis archipelagi ant ille regionibus Ponti-Euxini, written in
Latin, which was published at his own expense. During the voyage, when the Chevreau
was anchored off Milos (Melos) Island in the Aegean Sea, word was received that a peasant on the island had unearthed an ancient
marble statue. D'Urville was very impressed with it and even offered to pay
the 400 francs for it out of his own pocket, for France. His captain was
apparently unimpressed and considered it too cumbersome to transport.
When the Chevreau reached Constantinople (Istanbul), d'Urville repeatedly
urged M. de Rivier, the French Ambassador there, to secure the statue for
France. The ambassador finally agreed and the now famous “Venus de Milo”
was placed in the Musée du Louvre, Paris. After the voyage d'Urville was
promoted to lieutenant and was made a Chevalier de la Légion d'Honneur.

The first voyage to New Zealand

Louis Isidore Duperrey (1786-1865), a friend of d'Urville's and senior to
him in the navy, drew up a plan for a voyage of discovery. This was
eventually accepted by the authorities, and the Coquille sailed for southern
waters in August 1822, with Duperrey as commander and Dumont d'Urville
second-in-command as executive officer. The voyage lasted two years
and seven months, with the Coquille sailing about 73,000 miles (117,500
kilometres) from Toulon to the Canary Islands, Brazil, around Cape Horn,
up the west coast of South America, then to New Guinea, the Moluccas
and down to Port Jackson (Sydney). They reached the Bay of Islands, New
Zealand, on 20 March 1824 and stayed there until 17 April. The return
journey from New Zealand was via New Guinea, the East Indies, around
the Cape of Good Hope to the Mediterranean, and back to Toulon in
March 1825.

PLATE 9 Cyathea dealbata (ponga or silver tree fern)

One of New Zealand’s best-known plants, with a leaflet that is the national emblem
for sporting teams and the armed forces, the silver tree fern occurs in lowland to
montane forest throughout New Zealand, including the Chatham Islands. It is also
found on Lord Howe Island. The trunks, clothed with the persistent bases of leaf
stalks, reach up to ten metres high. The name “silver fern” derives from the silvery-
white colour of the undersurfaces of the leaflets, which are bright green above (and
green underneath on very young plants). The rows of reddish-brown hemispherical
objects between the margin and midrib on the underside of each leaf segment, shown
near the top of the page, are known as indusia. Each encloses a mass of sporangia,
and each sporangium releases a mass of spores when the indusium withers under dry
conditions. In the enlarged, uncoloured drawing at lower right, sporangia are shown
covered (left) by two indusia and, at right, after they have withered. The enlarged
drawing at left shows these same features at a lower magnification. A portion of the
entire leaf (frond) is shown in the coloured part of the illustration, which is from
Atlas Botanique de Voyage de l'Astrolabe (1826-1829). It was drawn by Vauhier and
engraved by M. Moustier, who also did some engravings for the botanical Atlas of
d'Urville's last voyage.
Plate 9  

*Cyathea dealbata* (Forst. f.) Swartz. (silver tree fern)  
M. Vauthier  
(in d'Urville's *Voyage de l'Astrolabe* 1826-1829)
Plate 10

*Cyperus ustulatus* A. Rich. (coastal sedge)

M. Vauthier

(in d'Urville's *Voyage de l'Astrolabe* 1826-1829)
The voyage resulted in the discovery of some islands, improved map making and the collection of a vast number of biological specimens. It was achieved without the loss of a crew member. There were others on board who contributed to the biological work on the voyage, in addition to Dumont d'Urville, who was very knowledgeable, extremely hard working and an avid collector. Réné Primevère Lesson (1794-1849), doctor and pharmacist on the Coquille, and M. Garnot were, with d'Urville, responsible for zoological collecting on the voyage. D'Urville's chief interest in that field was entomology. He was in charge of botanical collections and was assisted by Réné Lesson, who made drawings on the spot of plants too delicate to be preserved. Other scholarly crew members who assisted with scientific work on the voyage included ensigns Charles Hector Jacquinot (1796-1879) and Victor Charles Lottin (1795-1858). Although the Coquille was in New Zealand for only three weeks, d'Urville was much impressed with the country and keen to return and explore the whole coast.

The Coquille received a warm welcome on its return to France, and Charles X ordered that an account of the voyage be published on a lavish scale. This appeared in the form of eight volumes and a five-volume atlas of illustrations, as Voyage autour du monde, Exécuté par Ordre du Roi, Sur la Corvette de Sa Majesté, La Coquille, pendant les années 1822, 1823, 1824 et 1825, under the general authority of Duperrey. The historical narrative of the voyage (Part historique) was incomplete and ended before the arrival in New Zealand. The botanical section (Botanique), under the general authorship of Dumont d'Urville, was published in two volumes. It included contributions from Adolphe Théodore Brongniart (1801-76), who has been described as the leading French taxonomist of the nineteenth century, and Baron Jean Baptiste Geneviève Marcellin Bory de Saint-Vincent (1778-1846), a geographer, explorer and naturalist. The first volume (Cryptogamie) described some lower plant groups (algae, lichens, lycopsods and ferns) and the second (Phanérogamie), which was published in an incomplete form.

PLATE 10 Cyperus ustulatus (coastal sedge)

This member of the sedge or rush family is quite similar in appearance to the classical papyrus (Cyperus papyrus), the stems of which provided paper in ancient times. There are about 550 species of Cyperus, only one of which occurs in New Zealand. Cyperus ustulatus is found in lowland regions, near rivers and on moist ground, especially near the coast, throughout the North Island and parts of the South Island. It occurs too on the Kermadec, Chatham and Three Kings Islands. For some time Cyperus ustulatus was known as Mariscus ustulatus. This illustration is from the botanical atlas of Voyage de l'Astrolabe (1826-1829) and was drawn by Vautier. The engraving was made by Madame Revel.

The enlarged section at lower left shows part of an inflorescence of sedge flowers. Figure 2 shows a single flower with three stamens, each bearing terminal pollen sacs, and three central filamentous stigmas to which pollen adheres. Figure 3 shows the central female part of the flower, with three stigmas attached to a cylindrical style, which is attached at its base to the ovoid ovary. A single seed develops within each ovary.
described seed plants. These volumes appeared between 1827 and 1834, at first in sixteen separate parts. The *Atlas*, which was published between the same dates, had two parts devoted to botany. The first illustrates lower plants and consists of forty plates (thirty-nine in some copies). Plates 1 to 24 (hand-coloured engravings) illustrate seaweeds (algae) and were drawn by Bory de Saint-Vincent. The other plates, by Pancrace Bessa (1772-1833), a botanical artist at the Jardin des Plantes, Paris, were uncoloured and included two New Zealand ferns that were described as new species in the text by Bory de Saint-Vincent. These were *Polypodium eleagnifolium* (now *Pyrrosia sorbens*) and *Lindsaea lessonii* (now *Lindsaea cuneata* var. *lessonii*). It has been established that another fern, *Grammitis scopulopendrina*, described as a new species from New Zealand, was not in fact collected there. The second set of illustrations, covering seed plants, consisted of sixty-seven plates numbered from 1 to 78 with plates 55, 57, 58, 63, 65 to 67, 72 to 74, 76 not published. These too are superb engravings, uncoloured. Pancrace Bessa drew the first fifty plates, the others were by Joseph DeCaisne (1807-82), a Belgian botanist attached to the National Paris Museum of Natural History. The only New Zealand plant to be described in the text, also illustrated in the *Atlas*, was *Lampocarya affinis*, a sedge that is now known as *Moreletia affinis*.

The second voyage

During his absence from France on the *Coquille*, d'Urville's first child, a son, had died. His promotion to commander in November 1825 gave financial relief to his family, and d'Urville became eager to return to the Pacific. He was commissioned to take the same vessel back there and to continue with exploration and scientific research. At Dumont d'Urville's request, the *Coquille* was renamed the *Astrolabe*. The previous *Astrolabe*, under the command of La Pérouse (1741-88), had disappeared in 1788 and d'Urville was ordered to search for evidence of the ship and the fate of its crew. Although d'Urville did find relics of La Pérouse's voyage (anchors, cannon balls and iron utensils) at Vanikoro (lying between the Fijian and Solomon Islands), it was an Englishman, Captain Dillon, who discovered the wreck of the missing vessel at Vanikoro in March 1828. There seems little doubt that after the shipwreck La Pérouse and his crew were massacred by the natives.

In April 1826 the *Astrolabe* sailed from Toulon on a three-year cruise, which was to be the greatest achievement of d'Urville's life. He sailed to Australia and New Zealand via the Canary Islands, Trinidad, the northeast coast of South America, and south of the Cape of Good Hope. The mapping of reefs and islands close to shore is a hazardous venture in a sailing ship, but one that d'Urville relished. Officers who were with d'Urville on the previous voyage included Jacquinot (now a lieutenant and second-in-command) and Lottin. Although it has sometimes been stated that d'Urville was also accompanied on this voyage by R. P. Lesson, who had been on the
Coquille, it was in fact his younger brother, Pierre Adolph Lesson (1805-88), who served as surgeon (second class) and naturalist on this voyage. Lesson used his second Christian name in preference to the first, and title pages of books he wrote cite him as "A. Lesson". There were two other surgeons (first class) on the Astrolabe: Jean René Constant Quoy (1790-1869) and Joseph Paul Gaimard (1793-1858). They were trained zoologists, who, with d’Urville, wrote sections of the zoology of the voyage and prepared numerous fine drawings and watercolours, which were published in the atlases.

The Astrolabe spent sixty-seven days (January to March 1827) in New Zealand waters. It made landfall near Cape Farewell and sailed into Tasman Bay and anchored on the west side, under shelter from Adele Island, named after d’Urville’s wife. A large number of plants were collected in this region and several new species were subsequently named. Dumont d’Urville discovered French Pass, which separated D’Urville Island from the South Island mainland and Tasman Bay from the Marlborough Sounds. The Astrolabe struck a reef twice while attempting to go through French Pass, and for a time lay on her beam ends with the likelihood that she would be wrecked. The officers, relieved to escape, asked their captain to permit the island bordering the pass to be named D’Urville Island in his honour. He agreed, with the proviso that it revert to its Maori name when this was known. A detailed coastal survey was made around Cook Strait, and the Astrolabe then explored the east coast of the North Island. At Bream Head, north of Whangarei, d’Urville found a species of five finger that is restricted to coastal forest from Three Kings Islands to Poverty Bay. This was named Pseudopanax lessonii, after Adolph Lesson. D’Urville treated the Maoris he met with kindness, welcomed the chiefs on board and gained valuable information from them.

The Astrolabe then explored Tonga, Fiji, New Guinea and part of Indonesia, and returned to Australia via the southeast coast and went to Hobart. The voyage home was via Fiji, Vanikoro, Guam, Indonesia and the Cape of Good Hope. The Astrolabe reached Marseilles in March 1829. In d’Urville’s words, the voyage had resulted in a "prodigious mass of discoveries, material and records that we brought back to enrich every field of human knowledge" and was one in which "A thousand times I risked the lives of my fellowmen to carry out the purpose of my instructions and I can affirm that throughout two whole years we ran more real dangers every day than would be met with in the whole course of the longest ordinary voyage" (translation by Olive Wright). There was, as with Duperrey’s voyage, a royal command to publish the results of the expedition.

Dumont d’Urville devoted many years of hard work as editor and major author to the account of the voyage of the Astrolabe (1826-9), and it was published between 1830 and 1834 in fifteen parts in thirteen volumes, plus three atlases, normally bound as five volumes.

In contrast to Duperrey’s Voyage autour du monde . . . Coquille, a large
part of *Voyage ... du l’Astrolabe* was devoted to New Zealand. The work has been described as a “magnificent record”, and d’Urville, who wrote the entire narrative of the voyage, a “man of letters, a master of the French tongue”. The botanical section was published in two volumes (1832, 1834) with the title *Voyage de Découvertes de l’Astrolabe exécuté par ordre du Roi, pendant les années 1826-1827-1828-1829, sous le commandement de M. J. Dumont d’Urville. Botanique*.

The first volume was by A. Lesson and A. Richard. Achille Richard (1794-1852) was not on the voyage, but was one of the leading botanists of his time and a member of the staff of the National Paris Museum of Natural History until 1831, when he became professor of botany at the Paris Faculté de Médecin. Richard was author and co-author of a large number of floras of various countries, and wrote taxonomic revisions of many plant groups. This first volume was devoted entirely to the flora of New Zealand and consisted of a 376-page *Essai d’une Flore de la Nouvelle-Zélande*. It described 211 species of seed plants (conifers and flowering plants) and 169 species of lower plants (twenty-nine seaweeds, twenty-seven lichens, twenty-eight liverworts, twenty-eight mosses and fifty-seven ferns and fern allies), many for the first time. Richard included not only specimens collected on the two expeditions by Duperrey and d’Urville, but also most of those obtained by the Forsters on Cook’s second voyage, based on collections in the Paris Museum. Some plants collected on the voyage of the *Astrolabe*, which were described in print for the first time, had been collected by Banks and Solander on Cook’s first voyage, but, of course, their studies had not been published.

The second botanical volume of 167 pages included a seven-page section devoted to additions and corrections to the algal flora of New Zealand, and a nine-page explanation of figures in the *Atlas* that illustrated New Zealand plants.

The botanical and zoological sections of the *Atlas* of plates were published in 1833 or 1834 (the title page states 1833, but a preface by Gaimard and Quoy is dated 1834). There are forty-one pages of engravings (numbered one to thirty-nine with numbers seven and thirty-four being duplicated for different plates) devoted to New Zealand plants (eight seaweeds, two lichens, seven ferns, one conifer and twenty-three flowering plants). Some copies of the botanical section of the *Atlas* have hand-coloured plates (PLATE 9), but the number of these coloured plates varies from copy to copy. The artists of the botanical section were E. Delile and Vautier, and the original paintings are in the National Paris Museum of Natural History. A number of highly skilled engravers prepared the plates and, as the “Mlle” or “Mme” preceding several surnames shows, some were women. Thomas Cheesman noted that *Essai d’une Flore de la Nouvelle-Zélande* “is the first publication dealing with the flora of New Zealand as a whole, and possesses considerable merit, so much so that it is to be regretted that so little use has been made of it by New Zealand botanists”.

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In 1835, when d’Urville had completed his account of the voyage, he was posted to dockyard duties in Toulon, where it seemed his career might end in obscurity. Undaunted by the rather hostile attitude of some naval authorities, Dumont d’Urville pressed for command of his ship and drew up a project for further research and exploitation in southern regions. It was a propitious time for such a suggestion. King Louis-Phillipe, who succeeded Charles X when the latter abdicated, was well aware that his reign so far lacked the sort of adventurous exploits that were dear to the hearts of his subjects. He therefore accepted the proposals of d’Urville, which the naval authorities had passed on to him, but added a modification to the plans. Dumont d’Urville was ordered to take the French flag as far south as possible in the Weddell Sea, within the Antarctic Circle. Each of the crew was promised 100 francs if the latitude of 75° S was reached, and ten francs for every degree of latitude beyond that. The British and Americans too were interested in exploring southern polar regions. Ross’s expedition set out in 1839, and the second United States Expedition, authorised by Act of Congress in 1836 and led by Wilkes, set out in 1838.

Two corvettes took part in the expedition: the Astrolabe under d’Urville, and the Zélée captained by d’Urville’s second-in-command on the previous voyage, Charles Jacquinot. Botanical collecting was assigned to Jacques Bernard Hombrot (1800-52), senior surgeon of the Astrolabe, and Honore Jacquinot (b. 1814), junior surgeon on the Zélée and younger brother of the captain. Two other surgeons on the Zélée also served as naturalists: Elie Jean Françoise Le Guillou and Jules Grange. D’Urville, who “was planning to botanise only as a simple amateur”, did contribute to collections made on the voyage. Dumont d’Urville was forty-seven when the Astrolabe and Zélée sailed from Toulon on 7 September 1837, returning there on 7 November 1840. The vessels reached polar regions in February 1838, and d’Urville named parts of the Antarctic coast on the west side of the Weddell Sea (for example, Joinville Land, after one of Louis-Phillipe’s sons).

In March they withdrew to the north after fruitless attempts to penetrate the pack ice and headed for Chile. Then the expedition spent twenty-one months exploring the islands of the Pacific and reached Hobart in December 1839. There, spurred on by news of the polar expeditions of Ross and Wilkes and lured by the quest for the South Magnetic Pole, d’Urville decided to ignore his written orders and head south again. A number of the crew of both ships had become ill during the voyage to Hobart and were hospitalised there, so d’Urville and Jacquinot hired some English seamen. The Astrolabe and Zélée headed south on New Year’s Day 1840, and on 21 January they set foot on islands off the Antarctic coast, naming Adélie Land after d’Urville’s wife and Côte Claire after Jacquinot’s. When they encountered one of the ships of Wilkes’ expedition, the rival vessels apparently ignored each other. The cruise in Antarctic waters was brief and on 17 February the Astrolabe and Zélée returned to Hobart. Eight
days later they set off for New Zealand via the Auckland Islands and Stewart Island, sailing up the east coast of both islands. When they reached Akaroa, it was learned that Captain Hobson had arrived in the Bay of Islands two months previously and had been appointed governor of New Zealand. D'Urville's diary reveals his disappointment that the British had claimed all of New Zealand, especially as he knew that sixty French colonists were on their way to Akaroa on Le Conte de Paris. When the Astrolabe and Zélée reached the Bay of Islands, d'Urville met Hobson and from there sailed for France.

The crews of the Astrolabe and Zélée received a warm welcome on their return to France, and d'Urville was promoted to rear-admiral and the crew received financial rewards from Louis-Phillipe for "their heroic exploits". It had not been an easy voyage for, of the combined crew of 165 officers and men, twenty-two had died and thirteen deserted. Another of d'Urville's sons died in France during his absence. (A daughter had died of cholera when the family were together in Toulon in 1835. Jules and Adèle Dumont d'Urville apparently had four children of whom three were boys.)

Again by royal command, d'Urville began to prepare an account of the voyage for publication. This Voyage au Pôle Sud et dans l'Océanie sur les corvettes l'Astrolabe et la Zélée, exécuté par ordre du Roi pendant les années 1837-1838-1839-1840, sous le commandement de M. J. Dumont d'Urville was published in twenty-three parts (in twenty-two volumes), with an Atlas of seven parts (bound into five volumes), between 1841 and 1854. Sadly, Dumont d'Urville did not live to see its completion. He, his wife and their surviving son were burned to death in a horrifying train accident on the Paris-Versailles line. D'Urville had seen the first two volumes of the narrative of the voyage through the press; it was completed by his friend Vincendon-Dumoulin, marine engineer on the Astrolabe, who had access to his papers.

The botanical section, Voyage au Pôle Sud... Botanique, under the general supervision of Hombron and Jacquinot, appeared in two volumes in 1845 and 1853, together with an atlas of sixty-five plates (twenty in colour) in 1852. The first volume (1845) dealt with lower, non-vascular plants and was written by Jean Pierre François Camille Montagne (1784-1866), who had been a military physician but was then a private scientist in Paris. Montagne was a prolific author of works on lower plants. When Hombron died in 1852, the text describing the vascular plants (ferns, conifers and flowering plants) collected during the voyage had not been written. This task was taken on by Decaisne of the Paris Museum, who had drawn plants for the Atlas of the Coquille voyage. This second volume is only some ninety-six pages in length. In contrast to the first volume, only those plants illustrated in the Atlas, which had already been published, were described in the text.

Decaisne made a number of corrections to vascular plant names given in the Atlas, but it remains a mystery whether vascular plants other than those illustrated in the Atlas had been collected. Certainly some of specimens
illustrated had been lost by the time Decaisne began his work, and he had to base some descriptions on those in Joseph Hooker's *Flora Antarctica*. As many botanists have commented, it is surprising that only sixteen species of ferns and eighty-four flowering plants were collected on the expedition — if, in truth, Decaisne's list represented the total number of higher plants collected by several naturalists on such a long voyage. Fifteen of these eighty-four plants were collected from the Auckland Islands (most of these had already been described in Hooker's *Flora Antarctica*). The *Atlas . . . Botanique* (1852) comprises sixty-five plates, twenty of which illustrate non-vascular plants. These are in colour. The other forty-five plates are in black and white, and are devoted to ferns and seed plants. In addition to the plants from the Auckland Islands, most plates illustrate plants collected near the Strait of Magellan, South America, but a few New Zealand ones are included, for example, the hen and chicken fern (*Asplenium bulbiferum*) and a species of biddy-biddy (*Acena sanguisurbe*, now known as *Acena anserinfolia*). These plates were drawn by a number of artists, none of whom were on the voyage. The chief contributor was Alfred Riocreux. The plates were engraved by more than a dozen highly skilled engravers.

Dumont d'Urville is commemorated in botany by a genus of brown seaweeds, *Durvillea*, which includes the giant bull kelp, *Durvillea antarctica*. This is common on exposed coasts around New Zealand up to the low-tide mark. It was first collected off Cape Horn, and the genus was named by Bory de Saint-Vincent in 1826. He is also remembered in the species names of several New Zealand flowering plants — *Dracophyllum urvilleanum*, one of our "grass trees" (PLATE 47 illustrates a different species of *Dracophyllum*); *Hebe urvilleana* and a species of buttercup, *Ranunculus urvilleanus*. Jules Dumont d'Urville was unusual among the admirals of his time in that he was a knowledgeable naturalist as well as an outstanding seaman and navigator. One wonders, had he lived to direct the completion of *Voyage au Pôle Sud*, whether the section on botany might not have been more extensive.
PLATE 11  Parsonia capsularis var. rosea

This twining woody liane (climber), a close relative of the kahiku (Parsonia bistortifolia), is a member of the family Apocynaceae, which includes the petiwinkles (Vinca) and oleanders (Nerium). The rapidly growing shoots encircle the stems of the supporting forest trees and soon attain full sunlight for the drooping leafy branches. The fragrant clusters of flowers are normally white, but in this variety (originally described by Raoul as a separate species, Parsonia rosea) the petals are rose to dark red in colour. This variety was originally collected by Raoul near Akaroa and is restricted to the South Island, where it is common on the Port Hills and Banks Peninsula.

Each flower (lower right) has five small, green sepals, five petals, united into a tube for most of their length, and a central, protruding cone of stamens. They are attached basally to the inside of the petal tube and conceal the female part of the flower. This consists of two coherent carpels in the centre of the flower. They develop into pod-like elongated fruits, which become separated from each other and split lengthwise to release numerous seeds, given buoyancy by a tuft of hairs. This illustration from Choix de Plantes by Alfred Riocreux was engraved by Mademoiselle E. Tailtant.

PLATE 12  Helichrysum aggregatum (Helichrysum glomeratum)

In his original description, Raoul named this plant Suaveolensia (misspelt as Suaveolensia on the illustration) glomerata. Its name was changed to Helichrysum glomeratum by Bentham and Hooker in 1873, and in 1970 it was changed by Yeo to Helichrysum aggregatum. It too was first discovered at Akaroa by Raoul, but it is widely distributed in coastal and lowland shrubland and forest margins throughout the North and South Islands. There are nine endemic species of Helichrysum in New Zealand. About 350 other species of this member of the daisy family (Compositae) occur in Europe, Asia, Africa and Australia. Helichrysum aggregatum is a shrub up to three metres high with slender branchlets.

The main illustration is approximately natural size. Figure 1 shows an inflorescence of florets; figure 2, an outer female floret (flower) with its ring of pappus hairs, tubular petals, free at their tips only, and central style, with its terminal, two-part stigma; figure 3, part of a pappus hair; figure 4, a more central disc floret with stamens bearing terminal pollen sacs, bent to the right; figure 5, part of a stamen showing the pollen sacs; figure 6, part of the style and terminal two-part stigma of the female part of a floret. The style is attached at its base to the ovary (not visible in the illustrations), which contains a single ovule (potential seed). This illustration is by Alfred Riocreux from Choix de Plantes and was engraved by Mlle Tailtant. The delicate engravings of the French illustrators (PLATES 9 to 12) are quite a contrast to the more robust engravings of many British works (for example, PLATES 4 to 7).
Plate 11

*Parsonia capsularis* var. *rosea* (Raoul) Ckn.

Alfred Riocreux
(in Raoul's *Choix de Plantes*)
Plate 12

*Helichrysum aggregatum* P. F. Yeo.

Alfred Riocreux
(in Raoul's *Choix de Plantes*)
Plate 13  Sophora tetrapetra J. Mill. (kowhai)  Sydenham Edwards
(in Curtis’s Botanical Magazine, 1791)
Plate 14

Pittosporum cornifolium A. Cunn.

William Hooker
(in Curtis's Botanical Magazine, 1832)
PLATE 13  *Sophora tesrupiera* (kowhai)

This was the first New Zealand plant to be illustrated in *Curtis's Botanical Magazine*. It appeared as illustration no. 167 in volume 5, 1791, painted by Sydenham Edwards, with explanatory text by William Curtis. The kowhai was collected at Poverty Bay by Banks and Solander on Cook's first voyage in 1769. The seeds they gathered survived the return voyage and, as Solander predicted, the plants that were raised became popular in Britain and were widely cultivated from cuttings and seeds. The specimen illustrated was obtained from the Apothecaries' Garden, Chelsea, where it had been planted about 1774.

There are approximately thirty species of *Sophora*, in temperate and subtropical regions of both hemispheres. Two of the three New Zealand species of kowhai are endemic (*Sophora tesrupiera* and *S. pruinata*), the other, *S. microphylla*, occurs also in Chile and on Gough Island in the South Atlantic. Experiments have shown that the seeds, which float on the sea, will germinate after even three years' immersion. *Sophora tesrupiera*, the largest-leaved kowhai, is restricted in natural vegetation to the east of the North Island, from East Cape to Hawke's Bay and Taitake.

PLATE 14  *Pittosporum cornifolium* (tawhirikaro)

This illustration, no. 3161 in volume 59, 1832, was by William Hooker himself. The plate was engraved by Joseph Swan, a Glasgow printer and engraver. The pittosporums include some of our most widely grown native plants. Some of them are popular overseas, especially in parts of California. There are twenty-six species of *Pittosporum* (family Pittosporaceae) in New Zealand's flora. Some are widespread, others are rare, and all are restricted to the New Zealand region. About 135 species grow in mainly tropical and subtropical regions of the Southern Hemisphere.

Tawhirikaro, or the perching kohuhu, is an open-branched shrub up to two metres tall, which is often perched on large forest trees such as kauri (T) and rimu (*Dacrydium cupressinum*). It also grows on rocks. In contrast to most other pittosporums, in which the leaves are arranged alternately on the branches, tawhirikaro has leaves arranged mostly in whorls of three to five. The leaves are shiny dark green above and paler below, with very short stalks. Flowers have light red to yellowish petals. There are usually separate male and female flowers, but sometimes bisexual flowers are present too. Each flower is one and a half centimetres in diameter and consists of a ring of five small green sepals with finely tapering tips, five petals, five stamens which are present but sterile on female flowers and a central ovary, which has a reduced sterile form in male flowers. Mature fruits are woody capsules about one and a half centimetres in diameter. While still on the plants, the greenish capsules split open to reveal a red-lined interior with shiny, black seeds embedded in a sticky yellow fluid. Tawhirikaro grows in lowland to lower montane forest throughout the North Island, but occurs only in the north of the South Island from the Marlborough Sounds to Whanganui Inlet. The specimen illustrated was sent to William Hooker from Kew, where it had been introduced by Allan Cunningham.
IV

Etienne Raoul

It was noted in the previous chapter that when Dumont d'Urville reached Akaroa on his last voyage, he was disappointed to learn that the British had claimed all of New Zealand. He knew that Le Comte de Paris, with about sixty French emigrants on board, was already headed for Akaroa, a venture that was sponsored by the French Nant-Bordelaise Company. A French corvette, l’Aube, under the command of Charles Lavaud, was sent to Akaroa to protect the interests of the settlers and the French whalers in the region. It arrived at the Bay of Islands in July 1840, and after a brief stay, proceeded to Akaroa, arriving on 17 August. It remained in the vicinity of Akaroa for over a year. The surgeon of l’Aube was Etienne Fiacre Louis Raoul (1815-52), who was a keen naturalist. He made extensive collections of plants, mostly near Akaroa. When l’Aube was replaced by another corvette, l’Allier, which arrived in January 1842, Raoul was transferred to that vessel as its surgeon. L’Allier was stationed at Akaroa until January 1843, when she returned to France.

Etienne Raoul, the son of a French naval captain, was born in Brest on 23 July 1815 and qualified as a surgeon at l’École de Santé (the School of Health) at Brest in 1836. In 1837 he was appointed a member of the Commission of African Exploration. In December of that year the crew of La Malouine were struck by an epidemic at Casamance Island, French West Africa (Sénégal). Raoul is credited with saving the lives of many, and his efforts were recognised in August 1838 when he was made a Chevalier de la Légion d’Honneur. His medical skills were put to the test in Akaroa in 1841. Several of the crew of l’Aube had, during a walk near Akaroa, eaten the highly poisonous berries of tutu (Coriaria arborea). One sailor died almost immediately, but the others were “rapidly put out of danger” by Etienne Raoul, who received some assistance from an English doctor, William Davies, of Port Jackson, Australia.

On his return to France in the autumn of 1843, Raoul was invited to classify the botanical specimens he had collected in New Zealand, which had been sent to the National Paris Museum of Natural History. He worked under the direction of Adolphe Brongniart and Joseph Decaisne. As Raoul was the first to investigate the flora of the eastern side of the South Island in any detail, many of the plants he collected were new species. He published
a preliminary report of the new species in the journal *Annales de Sciences Naturelles* in 1844. Two years later his *Choix de Plantes de la Nouvelle-Zélande* (1846) appeared. This book, with Latin text and thirty plates, contained detailed descriptions of the forty-four new species, most but not all of which Raoul had published in the *Annales*. Thirty-three of these were illustrated. The new species included such now well-known plants as karanu (*Coprosma robusta*), korako (*Corokia cotoneaster*), tukaruru or wild Irishman (*Disocaria toumatou*), pokaka (*Elasocarpus hookerianus*), broadleaf (*Griselinia littoralis*) and a ribbonwood (*Hoheria angustifolia*). *Choix de Plantes* also contains a listing of the then-known species of the New Zealand flora, totalling about 950 species, of which over 500 were flowering plants. Thomas Cheeseman noted that these species "included no small number of synonyms and introduced plants. If these are eliminated his list will probably be reduced to under 800." Most of the new species Raoul described are still accepted today.

The thirty black-and-white plates in *Choix de Plantes* are beautifully drawn and engraved. The artist was Alfred Riocreux (1820-1912), who, as noted in the previous chapter, drew many of the illustrations for the botanical *Atlas de l'Urrive's Voyage au Pôle Sud*. Riocreux was employed as an artist at the National Paris Museum of Natural History. He was born near Paris, at Sèvres, where his father was curator of the Musée de Céramique. Previously his father had been an artist at the State Porcelain Factory at Sèvres, and Alfred was trained as an artist by his father. When Adolphe Brongniart saw the sketches done by the teenage Alfred while visiting his father, who was now manager of the State Porcelain Factory, he drew his attention to botany. Brongniart was probably responsible for bringing Alfred Riocreux to the Paris Museum. Riocreux produced many fine illustrations at the Paris Museum, including those for publications by Joseph Decaisne. These included drawings for the periodical *La Revue Horticole*, which Decaisne edited for a time. T. G. Hill, author of *The Essentials of Illustration* (London, 1915), described the drawings Riocreux made for a work on seaweeds by Gustave Thuret as "the finest plates ever published in a botanical work". The distinguished Dutch botanist F. A. Sarsfle, writing in 1966, commented: "it must be stated again that Riocreux was one of the great botanical artists of all times". Surprisingly, thirty of Riocreux's original black-and-white drawings for Raoul's *Choix de Plantes* are now at the Royal Botanic Gardens, Kew. Alfred Riocreux had a good eye for botanical detail, and his illustrations are accurate and life-like.

Etienne Raoul continued with medical work on his return to France and in 1844 wrote a thesis on the relationship between rheumatic fever and heart conditions. Raoul had so impressed the scientists at the Paris Museum that they wrote to the Minister of Marine, urging that Raoul be sent overseas again to continue his studies on natural history and medicine, and suggesting the West Indies. The Minister accepted their suggestion in part and Raoul was sent to West Africa (1846-7), with the task of centralising health
services for the French fleet there. Despite the considerable work involved in these duties, Raoul found time to collect plants. In 1849 he was made "médecin-professeur" at the port of Brest, his birthplace. He wrote a book, Guide hygiénique et médical pour les bâtiments de commerce qui fréquentent la Côte d'Occidental d'Afrique (a guide to hygiene and medicine for ships of commerce visiting the coast of West Africa), published by R. Dupont, Paris, 1851. He died in Brest on 30 March 1852, aged thirty-seven.

His services to New Zealand botany have been commemorated in the genus Raoulia, which Sir Joseph Hooker described from specimens Raoul had collected. He did not, it seems, see the most famous species, Raoulia eximia, the vegetable sheep. Étienne Raoul is remembered too in the species names of several New Zealand plants — Plantago raoulii, Hebe raoulii and Carex raoulii. There has been some confusion in the literature between three members of the Raoul family. Raoul Island (until recently known as Sunday Island) is the main island of the Kermadec group to the north of New Zealand. It was named after Étienne's uncle, Joseph Raoul, who was pilot master on the Recherche under Admiral d'Entrecasteaux when the island was discovered in 1793. Another Raoul, Étienne's nephew Edouard, arranged publication of a French edition of Mrs Hetley's book (chapter XII), which included a description by Edouard Raoul of some New Zealand woods.
William Curtis's Botanical Magazine

Curtis's Botanical Magazine is the oldest surviving colour-illustrated journal. The first volume was published in London in February 1787 with the title Botanical Magazine or Flower-Garden Displayed by William Curtis (1746-99). It has become, in the words of Willaard Blunt (The Art of Botanical Illustration), "a national institution of which Englishmen may justly be proud". Curtis's aim was to produce a scientifically accurate, coloured magazine for those interested in botany and horticulture, to illustrate and describe "the most ornamental foreign plants", thereby introducing them to gardeners. New Zealand plants were not neglected, and by 1973, 135 of our native plants, from forty-three families, had been illustrated. In some instances, as with the rengarenga or rock lily (Arthropodium cirratum) and the whau, Entelea arborea (PLATE 1), the first published description appeared in Botanical Magazine. It is something of an anachronism, for until volume 165 (April to December 1948) all the plates had been coloured by hand, apart from a few chromolithographs in one issue. From 1950 onwards, a costly, four-colour gravure process has been used, which gives results close to those obtained by hand-colouring. For many years one could obtain uncoloured copies and save money — thus, in 1911, "Monthly, price 3s. 6d. coloured, 2s. 6d. plain".

William Curtis

Curtis was born in Alton, a town in Hampshire where Jane Austen lived for ten years. His home has been converted into a small museum in his memory. At the age of fourteen he was apprenticed to the local apothecary, his grandfather. He therefore began to study plants for their medicinal properties, although it is said he caught the "botanical disease" from a literate plant enthusiast, who was a stableman at the Crown Inn next to his grandfather's shop. At the end of his apprenticeship, William Curtis, aged twenty, moved to London and worked, first as an assistant, then as a partner, in an apothecary's practice in Gracechurch Street. Before long, Curtis sold his share of the business so that he could more readily pursue his obsessional interests in natural history. He purchased land for a garden, at first at
BERMONDSEY, AND SPENT HIS TIME COLLECTING, READING, GARDENING AND EXCHANGING IDEAS WITH OTHER NATURALISTS. IN 1773, AT THE COMPARETIVELY YOUNG AGE OF TWENTY-SEVEN, HE WAS APPOINTED GARDEN SUPERINTENDENT AND BOTANICAL DEMONSTRATOR TO THE SOCIETY OF APOTHECARIANS AT CHELSEA, AN OFFICE HE HELD FOR FOUR YEARS. HE RESIGNED THE POST TO GIVE HIMSELF MORE TIME FOR GARDENING AND WRITING. HE WROTE A BOOK ON INSECTS, AND TRANSLATED AND ILLUSTRATED A BOOK ON THE SAME TOPIC BY LINNAEUS. THEN HE DECIDED TO START HIS OWN BOTANICAL GARDEN, WHICH, AFTER SEVERAL MOVES, WAS FINALLY ESTABLISHED AT A PLEASANT SITE AT BROMPTON, WHERE HE MAINTAINED IT UNTIL HE DIED. THE GARDENS EVENTUALLY CONTAINED MORE THAN 6,000 SPECIES AND WERE DIVIDED INTO VARIOUS SECTIONS—MEDICINAL, CULINARY, AGRICULTURAL, POISONOUS, BRITISH AND ORNAMENTAL PLANTS. FOR AN ANNUAL SUBSCRIPTION OF A GUINEA, ADMISSION WAS GAINED TO THE GARDENS AND TO LECTURES HE GAVE THERE, WHICH ATTRACTION LARGE AUDIENCES. FOR TWO GUINEAS A YEAR, SUBSCRIBERS RECEIVED A SHARE OF PLANTS AND SEEDS AS THEY BECAME AVAILABLE FOR DISTRIBUTION. CURTIS RECEIVED PLANTS FROM A NUMBER OF SOURCES, INCLUDING KEW GARDENS AND SIR JOSEPH BANKS.

SIX YEARS AFTER HIS DEATH, CURTIS’S LECTURES WERE PUBLISHED IN THE FORM OF THREE ILLUSTRATED VOLUMES BY HIS SON-IN-LAW, AND THEIR POPULARITY WAS SUCH THAT A SECOND EDITION APPEARED TWO YEARS LATER. WILLIAM CURTIS WAS AN INDEFATIGABLE WRITER. HIS BOOKS INCLUDED A HISTORY OF THE BROWN-TAIL MOTH (1782) AND PRACTICAL OBSERVATIONS ON THE BRITISH GRASSES (1790), WHICH RAN TO SEVERAL EDITIONS. HE WAS ALMOST RUINED FINANCIALLY WHEN HE STARTED AN AMBITIOUS PROJECT, THE FLORA LONDINENSIS. THE PURPOSE OF THIS WAS TO DESCRIBE AND ILLUSTRATE PLANTS THAT GREW WITHIN A TEN-MILE RADIUS OF LONDON. IN 1777, THE SAME YEAR IN WHICH HE RESIGNED FROM HIS POST AT CHELSEA, THE FIRST PART OF FLORA LONDINENSIS APPEARED. FOR TEN YEARS HE PERSEVERED WITH THIS TASK, BUT BY 1787, WHEN ANOTHER VOLUME APPEARED, HE WAS ALMOST BANKRUPT. CLEARLY, PEOPLE WERE NOT VERY INTERESTED IN BUYING ILLUSTRATED ACCOUNTS OF THE MODEST WAYSIDE PLANTS OF BRITAIN. THEY MIGHT WELL, HOWEVER, WISH TO PURCHASE A MAGAZINE FEATURING THE EXOTIC PLANTS THEY WERE INCLUDING IN THEIR GARDENS. AFTER ALL, IT WAS “THE GOLDEN AGE OF BOTANY” AND COLLECTORS WERE TRAVELLING THE WORLD IN SEARCH OF NEW EXOTICS TO INTRODUCE INTO BRITAIN. SO, THE BOTANICAL MAGAZINE WAS INITIATED AND IT BECAME “A BOTANICAL AND PUBLISHING PHENOMENON”.

THE MAGAZINE

THREE THOUSAND COPIES OF THE FIRST PART, WITH THREE PLATES, WERE SOLD AT A SHILLING EACH. THIS CIRCULATION FIGURE WAS MAINTAINED THROUGHOUT CURTIS’S LIFE. THE PRICE OF SUBSEQUENT ISSUES AND THE NUMBER OF PLATES FlUCTUATED OVER THE YEARS; ON AVERAGE ABOUT FORTY-FIVE PLATES WERE ISSUED EACH YEAR. EACH PLATE WAS ACCOMPANIED BY A CONCISE DESCRIPTION OF SALIENT BOTANICAL DETAILS OF THE PLANT (IN LATIN), ITS VARIOUS NAMES, HABITAT, TIME OF FLOWERING AND NOTES ON ITS CULTIVATION (ALL IN ENGLISH). ALTHOUGH WILLIAM CURTIS WROTE THE TEXT AND HAD SOME ABILITIES AS A DRAUGHTSMAN, HE DID NOT, IT NOW SEEMS, DRAW ANY OF THE PLANTS HIMSELF.
Nearly all of the first 1,200 plates were the work of Sydenham Edwards (1769-1819). Curtis brought Edwards, then a youth living in Southampton, to London after hearing of his artistic abilities from a friend. Sydenham Teaste Edwards, who was the son of a Welsh schoolmaster, was specially trained for the purpose of illustrating the *Botanical Magazine*. He has been described as “one of the most skilful delineators of plants England has produced”. The first New Zealand plant to be illustrated in the *Magazine* — the kowhai, *Sophora tetrapetala* — was done by Edwards and appeared in volume 5, 1791 (PLATE 13). About seventy plates in the first four volumes were the work of James Sowerby, a distinguished artist and engraver and a scientist of wide interests, who was the first of a family of botanical artists who were active for nearly a century. Sydenham Edwards became William Curtis’s constant companion on botanical excursions and continued as sole regular artist of the *Magazine* until 1815, sixteen years after Curtis’s death. When comparing his early drawings with later ones, one can see an improvement in his style, with greater realism as he developed a better idea of the structure and habit of plants. His work is pleasingly composed and accurate, with clear colouring.

For about the first seventy years of its existence, the plates for *Botanical Magazine* were engraved on copper. At first Edwards did his own engravings, but within a few years a Mr F. Sansom was employed as engraver. Sansom also drew about eight plates for the *Magazine*. As well as having the services of an engraver, Curtis employed a colourist, William Graves, whose task was to faithfully hand-colour the several thousand copies of each issue from Edwards’ original painting. Nearly two hundred years later the colours are still fresh, except for some deterioration in instances where lead pigments were used for whites and some reds. The *Magazine* was of quite small format, about 5×9 inches (13×23 centimetres), but some plates were larger as they folded out, for example, the orchid *Pterostylis barbata* (PLATE 15).

On William Curtis’s death, the copyright of the *Magazine* passed to his son-in-law, Samuel Curtis, who was also his cousin. A medical friend of William Curtis, Dr John Sims, became general manager and editor (1801-26). When Sydenham Edwards severed his connection with the *Magazine*, apparently as the result of a misunderstanding, various artists were engaged. They included John Curtis, an entomologist — not, it seems, related to William Curtis — who illustrated the first published description of the rangarenga, *Arthropodium cirratum*, in the 1822 issue. His illustrations did not reach the standards set by Edwards.

In 1826 William Jackson Hooker took over the direction of *Curtis’s Botanical Magazine* from John Sims and was also responsible for the illustrations for the next ten years. When he took over the *Magazine*, its popularity and circulation had declined. William Hooker was then professor of botany at Glasgow University, and with his great abilities as a botanist and an artist, the fortunes of the *Magazine* improved. He had a distinctive style and was able to enlist the services of talented colourists (PLATE 14).
Such people needed the ability to accurately copy the colours of the original painting and the patience to colour in several thousand copies of the same illustration. In 1834 Walter Hood Fitch (1817-92) began to relieve Hooker of the task of preparing the illustrations and soon became the sole artist, a position he held until 1877. Walter Fitch, of East Anglian stock, was born in Glasgow and, like Scotsman John Buchanan, began his career as an apprentice designer of textile fabrics. In the evenings he did work for Hooker at the university, mounting plants for the herbarium. William Hooker was so impressed with some botanical drawings Fitch had copied that he offered him a job and instructed him in botanical drawing. Hooker also made use of the talents of Francis (Franz) Bauer, a German, whose brother Ferdinand was equally famous as a botanical artist. Bauer had been encouraged to become a draughtsman at the Royal Botanic Gardens, Kew, by Sir Joseph Banks. He illustrated one of New Zealand’s best-known orchids, Pterostylis bankii (PLATE 15), commonly known as the large greenhood orchid or tutukīwi. Wilfrid Blunt unhesitatingly considered him “the greatest botanical artist of all time”. When William Hooker became director of the newly nationalised Royal Botanic Gardens in 1841, Walter Fitch accompanied him to Kew. The connection that was thereby established between Kew and Curtis’s Botanical Magazine has been maintained to the present day. A large proportion of the plants illustrated in the Magazine were growing at Kew.

In 1845 the connection between the Curtis family and the magazine was severed when Messrs Lovell Reeve took over the copyright and were its publishers until 1920. From the mid-1840s lithography replaced engraved illustrations, and Walter Fitch prepared his own lithographs.

PLATE 15  Pterostylis bankii (tutukīwi or greenhood orchid)

This illustration, a fold-out one in Curtis’s Botanical Magazine, is no. 3172 in volume 59, 1832. The painting is by Francis Bauer, whom Wilfrid Blunt (The Art of Botanical Illustration) considered the greatest botanical artist of all time. The text, by William Hooker and Allan Cunningham, described this species for the first time. There are some sixty species of Pterostylis, of which nineteen occur in New Zealand. Some of these occur in Australia too. The greenhood orchids appear above ground in late winter in the north and into summer in the south, sprouting from underground tubers. They flower, fruit and die back within six months. Pterostylis bankii is the most widespread of the New Zealand species and varies considerably in size. It is found in the North and South Islands and on Stewart Island and the Chatham Islands, usually in damp shady areas. The plant illustrated was collected by Allan Cunningham from the Bay of Islands in 1826. Cunningham related that he took it from Sydney to Kew, where it was planted but “long supposed to be dead, when, to the surprise of all of us, it has thrown up a perfect flower-stem, which I carried to Mr. Bauer, who has not only made a beautiful drawing of it, but has most kindly permitted me to send it to you [William Hooker] to publish in the Botanical Magazine.”

Figure 1, flower, a little smaller than natural size; figure 2, 3, front and side views of the labellum of the flower, about natural size; figures 4 to 8, other parts of the flower, magnified; figure 9, a magnified transverse section of the ovary, figure 10, enlarged pollen grains (about 500-times magnification).
Plate 15

*Pterostylis banksii* A. Cunn. in Hook.

Francis Bauer

(in *Curtis's Botanical Magazine*, 1832)
Plate 16

Hebe lavandiana (Raoul) Ckn. et Allan

Matilda Smith

(in Curtis's Botanical Magazine, 1891)
Plate 17

Gentiana concinna Hook. f.
(Auckland Islands gentian)  (in J. D. Hooker's Flora Antarctica)

Walter Fitch
Ranunculus pinguis Hook. f.
(Auckland and Campbell Islands buttercup)

Walter Fitch (in J. D. Hooker's Flora Antarctica)
PLATE 16  *Hebe lavandulana*

It is appropriate that a species of *Hebe* (also known as *Veronica*) should be illustrated, for with some eighty species it is New Zealand's largest genus of flowering plants. A number of hebes have appeared in *Curtis's Botanical Magazine*, *H. lavandulana* was illustration no. 7210 in the December 1891 issue. Matilda Smith did the painting from which John Fitch made the lithograph. Sir Joseph Hooker wrote the text to accompany the plate. He noted that numerous New Zealand hebes (members of the snap-dragon or foxglove family, Scrophulariaceae) were being introduced through the agency of Mr Armstrong of the Christchurch Botanical Gardens. Hooker pointed out that hebes are "the prominent botanical feature of the under-shrubbery of the New Zealand Archipelago, from the Northern Cape to the Antartic Islands". *Hebe lavandulana* was discovered in 1840 at Akaroa by Etienne Raoul, surgeon on board *Aube*, who named it in honour of his captain, C. F. Lavand. *Hebe lavandulana*, a small, semi-woody shrub up to forty centimetres high, now occurs only on rocky parts of Banks Peninsula. It once grew naturally also on river beds of the Canterbury Plains.

Figure 1, enlarged flower; figure 2, bracts and sepals (petals removed) and central style with terminal stigma; figure 3, petals and stamens; figures 4 and 5, stamen in internal and external view.

PLATE 17  *Gentiana concinna* (Auckland Islands gentian)

The gentians are a widespread group of plants, some annuals, others perennials, which are especially common in alpine regions of both hemispheres. World wide there are some 400 species, twenty-four of which occur in the New Zealand botanical region, which includes Auckland, Campbell and the Antipodes Islands. An unusual feature of most New Zealand gentians is that they have white-to-cream flowers, in contrast to the more showy flowers of some other regions. This may be related to the insects that pollinate them. The Auckland Islands gentians, *G. corina* (a perennial) and *G. concinna* (an annual), have white petals that are streaked with red or purplish veins. The painting and lithograph by Walter Fitch, published in *Flora Antarcctica*, was based on drawings by Joseph Hooker.

Figure 1, flower; figure 2, flower with petals removed; figure 3, petal tube removed from flower; figure 4, petals laid open; figures 5 to 7, stamens; figure 8, pollen grains; figure 9, ovary; figure 10, an ovary shown in longitudinal section; figure 11, fruit; figure 12, seeds. All magnified.

PLATE 18  *Ranunculus pinguis* (Auckland and Campbell Islands buttercup)

This buttercup (family Ranunculaceae) has two forms, one larger than the other. Joseph Hooker found it to be widely distributed on Campbell Island in boggy and rocky places from sea level to mountain tops (ca. 350 metres altitude). It grows also on the Auckland Islands. There are thirty-five native species of *Ranunculus* in New Zealand and the outlying islands, and a further twelve exotic species have become established as weeds since the time of European settlement. *Ranunculus* is a cosmopolitan genus and there are about 400 species world wide. The painting and lithograph by Walter Fitch, published in *Flora Antarcctica*, are based on Hooker's sketches.

The plant at upper left is in flower, the central one has two fruit heads. Figure 1, a sepul; figures 2 to 4, petals; figure 5, a stamen; figure 6, an immature fruit; figure 7, a sectioned fruit, showing the single, central seed.
Sir William Hooker continued as editor of *Botanical Magazine* until his death in 1865, when he was succeeded both as editor and as director of Kew by his son, Joseph Dalton Hooker. Although Joseph Hooker was then forty-eight years old, he was editor for forty years. He wrote most of the text during his term as editor, but from time to time other Kew staff contributed articles. With Joseph Hooker's strong interest in the New Zealand flora, a considerable number of our plants were illustrated in *Botanical Magazine* during this time. Sir Joseph maintained the high standard that his father had set for the *Magazine*. When Walter Fitch resigned his position at Kew in 1877 after a dispute with his employers, he had had some 10,000 drawings published, approximately 3,000 of which had been in *Curtis's Botanical Magazine*. His late employer, Sir Joseph Hooker, had praised his "unrivalled skill in seizing the natural character of a plant...I don't think that Fitch could make a mistake in his perspective and outline...even if he tried." Wilfrid Blunt also noted that, all things considered, Walter Fitch was the most outstanding botanical artist of his day in Europe. He was, like John Buchanan, elected a fellow of the Linnean Society. Fitch's only published written work was a series of articles on botanical drawing, published in the *Gardeners' Chronicle* in 1869 and reprinted as an appendix to Blunt's *The Art of Botanical Illustration* (1951). The articles are excellent, as useful today as any aspiring botanical artist as when they were written. Later in his life the government acknowledged Fitch's contributions to botany by awarding him a Civil List pension.

Within a year, Walter Fitch was replaced as the *Magazine's* artist by Matilda Smith, and as its lithographer by his nephew, John Nugent Fitch (see chapter XV). Miss Smith contributed about 2,300 plates (the last in 1923), and John Fitch prepared nearly 2,500 lithographs (the last in 1920).

Although the subsequent history of *Botanical Magazine* is outside the timespan of this book, it seems worthwhile for me to summarise it. When Sir Joseph Hooker relinquished the editorship in 1904, he was succeeded by his son-in-law, Sir William Thiselton-Dyer, who was by then director of Kew. Two years later he was succeeded as editor by the new director, Sir David Prain, who remained the editor until 1920. In that year Lovell Reeve & Co. announced they could not continue publication because the *Magazine* had, on account of increased production costs, been published at a loss for several years. Fortunately the £250 copyright was purchased by a group of horticulturists and presented to the Royal Horticultural Society. After a year's delay, the next issue, dated 1922, was published by the Royal Horticultural Society under the editorship of Dr Otto Stapf, who had just retired from the staff of Kew.

For the next thirty years most of the drawings and lithographs (the latter made on specially prepared zinc plates rather than on limestone) were made by Miss Lilian Snelling and Miss Stella Ross-Craig (who was appointed
as additional artist in 1932). Today, the journal is still published by the Royal Horticultural Society, in close association with the Royal Botanic Gardens, Kew. Margaret Stones, who was born in Australia, became artist to the *Botanical Magazine* in 1955 and since that time she has produced most of the plates for it. Martyn Rix (*The Art of the Botanist*, 1981) has described Miss Stones as “probably the foremost botanical illustrator living today”. Her beautifully composed watercolours almost bring the plants to life, and her eye for fine detail is unrivalled. She uses a single brush hair for inserting the finest detail, and in some watercolours one needs a magnifying lens to fully appreciate their detailed accuracy.

Sadly, as this book was going to press, it was learned that *Curtis’s Botanical Magazine* no longer exists, at least in name. It has been incorporated in a new quarterly, *Kew Magazine*, the first issue of which appeared in May 1984. The new journal will continue to publish “life-size plant portraits painted by the most celebrated botanical artists”.

[67]
Sir William and Sir Joseph Hooker

The Hookers, father and son, both made significant contributions to New Zealand botany. Sir William Jackson Hooker (1785-1865) included descriptions and illustrations of New Zealand plants in books he wrote and in journals he edited, including Icones Plantarum and Curtis's Botanical Magazine. He introduced many of our plants into Kew Gardens during his tenure there. His son, Sir Joseph Dalton Hooker (1817-1911), continued this tradition when he became editor of the above two periodicals and director of Kew. Furthermore, Joseph Hooker's The Botany of the Antarctic Voyage — Flora Novae-Zelandiae (1852, 1855) was the first comprehensive and illustrated account of the New Zealand flora. It was updated by his two-volume, but unillustrated, Handbook of the New Zealand Flora (1864, 1867), which remained the standard work until the appearance of Cheeseman's Manual in 1906 (see chapter XV).

Their overall contributions to botany were enormous. William Hooker turned eleven "ill-kept" acres of royal gardens at Kew into a 300-acre public garden, "the most beautiful in the world", and the world's leading centre for botanical taxonomic research and the propagation and dissemination of economically important plants. Joseph Hooker became the most highly honoured botanist in history. He was also a physician, naturalist, artist, geographer and explorer who, it has been written, was the first European to climb to over 19,000 feet (5,800 metres), which he accomplished when in the Himalayas. He explored almost all the world's continents and wrote and often illustrated a vast number of papers and books. He was the pioneer and leading exponent in his day of the science of plant geography.

William Jackson Hooker

William Hooker, the son of a merchant's clerk, was born in Norwich on 6 July 1785. He inherited a love of plants and books from his father and his mother's artistic abilities. While still a youth he became interested in insects, birds and plants. At the age of twenty he became known in natural history circles, when he discovered for the first time in Britain a curious moss, Buxbaumia aphylla. It was suggested that he show it to Dawson Turner, a
Yarmouth banker and botanist, whose protégé he became. A year later he was, on Turner’s sponsorship, elected a fellow of the Linnean Society, almost the youngest ever admitted. In 1806, armed with introductions from Dawson Turner and others, he went to London and met Sir Joseph Banks. In those days jobs for naturalists depended largely on the patronage of prominent people, and Banks had a high reputation for being able to sum people up and recommend “the right person for the right job”. William Hooker was kindly received by Banks, who was very impressed with his knowledge and enthusiasm. Sir Joseph Banks had a large library and herbarium, which he made freely available to others. By the time William Hooker met him, Banks had become botanical and horticultural adviser to the Royal Gardens at Kew.

The visit with Banks inspired William Hooker to become a botanist. He decided to write a book on a group of liverworts (plants on a similar evolutionary level to mosses, though not as well known to the layperson), the British Jungermanniaceae. William had, on reaching twenty-one, come into an inheritance from his maternal grandfather and could devote himself full-time to botanical interests. Progress on the British Jungermanniaceae was slow. It eventually appeared in parts at six-monthly intervals, the first in 1812 and the last in 1816. His son Joseph described it as “the most beautiful of all my father’s works, in point of the drawing, analyses and engraving of the plates”. In it 197 species (some named for the first time) were described and illustrated in colour. One reason for its delayed appearance was that Dawson Turner soon discovered what a fine artist William Hooker was. Turner was engaged in writing a history of British seaweeds (Historia Fucorum) and whenever possible he invited William to be a house guest and make drawings for his book. Of the 258 plates in the four volumes of Turner’s Historia Fucorum, 234 were by Hooker, Mea Allan, in her delightful, scholarly and very readable book The Hookers of Kew (1967), writes: “Looking at William Hooker’s paintings of these seaweeds it is hardly believable that they are not actual specimens glued on the pages. Instinctively one touches them, to feel the texture of the once-live plant! So real they are, description is hardly necessary.” Yet Turner made no acknowledgement of Hooker’s assistance. Only the small inscription “W. J. H. Esq. deli.” indicates his involvement.

William’s visits to the Turner household in Yarmouth did have their rewards; for in June 1815, aged twenty-nine, he married Dawson Turner’s eldest daughter, Maria, when she was sixteen. Even before William Hooker married his daughter, Dawson Turner treated him like a son. This had its disadvantages, for his financial advice to William led to several disasters. William was anxious to explore the plants of distant lands, but Dawson Turner actively discouraged this, partly, it seems, to avoid losing the services of such a talented artist. Hooker had nevertheless managed, in 1809, through the offices of Sir Joseph Banks, to take part in an expedition to Iceland on the Margaret and Anne. It was an exciting trip, complete with
a bloodless revolution in Iceland, and near the start of the return voyage the *Margaret and Anne* (with its holds packed with flammable tallow) caught fire. Shortly before the powder magazine blew up, the passengers and crew were rescued by another vessel, the *Orion*. William's botanical collections were destroyed, but his journal was saved and this *Journal of a Tour in Iceland* was published in 1811 (second edition, 1813).

Ten months after their marriage, Maria and William's first son, William Dawson Hooker, was born. A little over a year later (30 June 1817), Joseph Dalton Hooker arrived. By then there were difficult economic times in England, and the brewery in which his father-in-law persuaded William to invest was losing money. William continued with his botanical work and two books on mosses appeared: *Muscologia Britannica* (1818), with Dr Thomas Taylor of Dublin as co-author, and the two-volume *Musei Exotici* (1818, 1820). The latter work included descriptions of New Zealand mosses that had been collected by Archibald Menzies at Dusky Bay during George Vancouver's voyage in 1791. Vancouver, who had been on Cook's second voyage, was in command of the *Discovery*, and Menzies was the ship's surgeon. A second vessel, the *Chatham*, was under the charge of Captain Broughton.

After the birth of a third child, Maria, in 1819, William began looking for a professional botanical position. With help in the background from Banks and others, he was appointed by the Crown to the chair of botany at Glasgow University in February 1820. In those days botany was regarded as an ancillary subject to medicine, and medicinal plants were prominently featured in the courses. William Hooker's duties included the supervision of the Glasgow Botanic Gardens. He became a brilliant lecturer, who attracted an increasing number of students. His blackboard sketches and coloured charts, an innovation in those days, were greatly admired. Even officers from a barracks three miles away began to attend his lectures. He was a keen walker and could cover sixty miles in a day, and he initiated vigorous botanical excursions for his students.

During his stay in Glasgow the number of plants in the Botanic Gardens more than doubled. His varied duties did not prevent William from building up his herbarium (which eventually comprised 1,000,000 specimens — the largest in the world), his library and extending his research. He prepared a new edition of Curtis's *Flora Londinensis* (1817-28), wrote a flora of Scotland, *Flora Scotica* (1821), and his *The British Flora* ran to four editions between 1830 and 1838. He became editor of *Curtis's Botanical Magazine* in 1826 and was its illustrator too until Walter Fitch began as artist in 1834. In 1836 William Hooker was knighted for his services to botany. During his time at Glasgow, Sir William began an intensive study of ferns. He wrote the two-volume *Icones Filicum* (1831) with Dr Robert Greville (1794-1866), a well-known botanist of his day, who provided the illustrations. This was available in coloured or uncoloured versions and contained an account of New Zealand plants collected by
Menzies from Dusky Bay during Vancouver's voyage of 1791. Between 1838 and 1842 the twelve-part _Genera Filicum_ appeared, with hand-coloured lithographs based on watercolours by Francis Bauer (see chapter V). Another large work, _Species Filicum_, "being descriptions of the known ferns, particularly of such as exist in the author's herbarium", was published in five volumes (1846-64), with uncoloured lithographs by Walter Fitch. Hooker went on to write many more books on ferns.

Sir William Hooker's greatest long-term ambition was finally realised in 1841 when he became director of the Royal Botanic Gardens at Kew. It had taken many years of delicate negotiating by Banks (who died in 1820, the year in which William Hooker moved to Glasgow) and other prominent men before the gardens were, in effect, nationalised in 1840, when their control passed from "the Board of Green Cloth to the Commissioners of Woods and Forests". Kew Gardens were in poor condition when Hooker arrived. William Hooker's achievements at Kew have been chronicled in many publications and are well summarised in _Royal Botanic Gardens Kew — Gardens for Science and Pleasure_ (edited by F. Nigel Hepper, 1982), which contains excellent illustrations. A measure of the increasing popularity of Kew was shown in the number of visitors. In Hooker's first year as director there were 9,000, and by 1865, the year he died, there were 500,000.

Sir William Hooker published a number of botanical journals. Some were short-lived, for example, _London Journal of Botany (Hooker's London Journal of Botany)_ (1844-8), but one he founded, _Icones Plantarum_ (1837), which from 1867 onwards was called _Hooker's Icones Plantarum_, is still being published at Kew. This journal began with the subtitle "or figures with brief descriptive characters and remarks, of new or rare plants, selected from the author's herbarium". It has much in common with _Curtis's Botanical Magazine_, and both journals shared editors (for example, the Hookers, Sir William Thiselton-Dyer, Sir David Prain) and artists (for example, Walter Fitch, Matilda Smith, Stella Ross-Craig, Margaret Stones). Unlike _Curtis's Botanical Magazine_, the plates are uncoloured. A number of New Zealand plants have been illustrated in _Icones Plantarum_. One of the earliest to appear was _Fuchsia procumbens_, the creeping fuchsia (volume 5, 1842). It has been estimated that of the 8,000 or so plates William Hooker had published, 1,800 were based on his own drawings.

Joseph Dalton Hooker

Several biographers have emphasised that William and Joseph Hooker, and their contributions to botany, are related parts of the same subject. Being the son of a renowned botanist and brought up in a botanical environment clearly had a strong influence on Joseph. He apparently inherited, from his father, physical stamina, artistic ability and a great capacity for hard work. Joseph greatly admired his father, as is evident from his eighty-eight-page article "A sketch of the life and labours of Sir William Jackson Hooker"
(Annals of Botany, 1902). William Hooker had a similarly high opinion of his son and spared no effort to have him appointed assistant director of Kew (1855) and to ensure that he would succeed him as director.

Joseph was three years old when the family moved to Glasgow early in 1821 to join William, who had been there for nearly a year. By the time he was thirteen and attending Glasgow High School, he was described as a "zealous botanist". When still a child

I remember on one occasion, that, after returning home, I built up by a heap of stones a representation of one of the mountains I had ascended, and stuck upon it specimens of the mosses I had collected on it, at heights relative to those at which I had gathered them. This was the dawn of my love for geographical botany.

At the tender age of fifteen, he entered Glasgow University and attended lectures in Latin, Greek, mathematics and philosophy. His spare time was spent in collecting insects and plants in Scotland and parts of England. He had taken part in botanical field trips led by his father long before he was a regular student. Then he embarked on a medical degree.

PLATE 19 Anisotoma latifolia

This member of the carrot family (Umbelliferae) is restricted to Auckland and Campbell Islands, where it was once common in moist places from sea level to mountain tops. It is now almost restricted to places inaccessible to stock. Joseph Hooker commented, "This is certainly one of the noblest plants of the natural order to which it belongs, often attaining a height of six feet, and bearing several umbels of rose-coloured or purplish flowers, each compound umbel as large as a human head. The foliage is of a deep shining green, and the whole plant emits, when bruised, an aromatic smell." There are some twelve other species of Anisotoma in New Zealand.

The illustration shows "A small flowering portion of the plant, with the limb of the leaf". Figure 1, unexpanded male flower; figure 2, the same expanded; figure 3, sepals and the central, sterile ovary region of a male flower. Part of a leaf is shown, uncoloured, in the background.

PLATE 20 Drosera stenopetala (sundew)

This species, like all I have chosen to illustrate from The Botany of the Antarctic Voyage, was first described by Joseph Hooker. This illustration is from Flora Antarctica. The sundews are insectivorous plants — often growing in nitrogen deficient soils — which supplement their diet by obtaining nitrogenous compounds from insects. These are trapped on the leaves, which have sticky surfaces and long sticky hairs. Drosera stenopetala is a widely distributed species that occurs in the North Island south of latitude 40°, South Island, Stewart Island, Auckland and Campbell Islands. In the northern part of its range it is found in montane to subalpine bogs, but in the south it descends to sea level. There are six New Zealand species of Drosera (family Drosenataceae), a cosmopolitan genus with about 100 species worldwide. The specimen Joseph Hooker based his description on was collected by David Lyall from Preservation Inlet, at the south of the South Island.

Figure 1, flower; figure 2, petal (considerably enlarged); figure 3, stamen; figure 4, central ovary and surrounding stamens.
Plate 19

Anisotome latifolia Hook. f.

Walter Fitch

(in J. D. Hooker's Flora Antarctica)
Drosera stenopetala, Hook. fil.

Plate 20

Drosera stenopetala Hook. f. (sundew)  Walter Fitch
(in J. D. Hooker's Flora Novae-Zelandiae)
Plate 22

*Knightia excelsa* R. Br. (New Zealand honeysuckle or rewarewa)

Martha King
The lectures his father gave in botany were part of the medical course, and, with a few exceptions, William Hooker’s students were taking a medical degree. It does not seem as if Joseph Hooker studied medicine with the intention of becoming a doctor. It has been recorded that he only occasionally attended the dissecting room. The qualification would, however, enable him to take part, as ship’s surgeon, in expeditions to various parts of the world, where he could extend his botanical interests. No sooner had he graduated in 1839, aged twenty-one, than he was able, largely through his father’s efforts, to join the British Navy so that he could be employed on Captain James Clark Ross’s forthcoming Antarctic Expedition.

This curious, many-branched shrub looks much like a conifer when in fruit (figure 4), for the leaves are reduced to scales and the fruit has a superficial resemblance to that of, say, totara (Podocarpus totara), with a fleshy, red aril below what looks like a black seed. What appears to be a seed in Exocarpus is, in fact, a fruit and when flowers are present (figure 3) it is obvious that the plant is not a conifer. Another curious feature of Exocarpus, which is shared by many other members of the sandalwood family (Santalaceae), is that it is a root parasite. Long roots of the plant attach themselves to the woody roots of one or more hosts and these penetrate them and absorb nourishment from the sap of the host. Host plants include mountain beech (Nothofagus solandri var. cliffortioides), manuka (Leptospermum scoparium) and species of Dracophyllum, Hebe and a conifer, snow totara (Podocarpus nivalis). Exocarpus bidwillii is the sole New Zealand species and is confined to montane and alpine regions in the South Island mountains. The specimen that formed the basis for Joseph Hooker’s description was collected by John Bidwill (1815-53) from the Wairau mountains, near Nelson. Walter Fitch did the painting and lithograph. There are twenty-five other species of Exocarpus distributed in Australia, Malaysia, Indo-China and the Pacific islands to Hawaii.

Figure 1, branch and two inflorescences of unopened flowers; figure 2, opening flower bud; figure 3, flower; figure 4, branch with a fruit (the red fleshy aril below the black fruit is morphologically the top of the flower stalk); figure 5, bisected fruit and aril; Figure 6, embryo, removed from the top of the seed. (From Flora Novae-Zelandiae.)

The painting shows nearly mature flower buds. Each flower has four, fused, petaloid, perianth segments, free only at their tips. At flowering they split apart and each becomes curled up near the base of the flower. Inside are four pollen-bearing stamens and a central carpel, which becomes the fruit. The buds are clothed with reddish-brown hairs, giving a velvety appearance, difficult to illustrate but nicely shown in this painting. Rewarewa is found in lowland and lower montane forests up to 1,000 metres in altitude throughout much of the North Island. It reaches as far south as the Marlborough Sounds in the South Island. The trees are tall, slender, spire-like and reach up to thirty metres high. Young plants have juvenile leaves longer and narrower than those found on adult plants. Rewarewa and toru (Tectaria toru) are the only New Zealand members of the protea family (Proteaceae), which is abundant in Australia and South Africa.

Courtesy of the Alexander Turnbull Library, Wellington, New Zealand
The Antarctic voyage

Two ships, the Erebus and Terror, strengthened to withstand polar ice, had already taken part in previous Arctic expeditions with Ross. Each vessel had a crew of sixty-four. One of the main objects of the Antarctic expedition was to determine the South Magnetic Pole, the exact position of which was a matter of controversy at the time. Previously Captain Ross had discovered the North Magnetic Pole, and the variations between true and magnetic south were of great importance to navigators. The British Government provided £100,000 for the expedition, a very large sum then. Joseph was appointed "Assistant Surgeon and Naturalist" to the Erebus. He later wrote:

When still a child, I was very fond of Voyages and Travels, and my great delight was to sit on my grandfather's knee and look at the pictures in Cook's 'Voyages'. The one that took my fancy most was the plate of Christmas Harbour, Kerguelen Land, with the arched rock standing out to sea, and the sailors killing penguins; and I thought I should be the happiest boy alive if ever I would see that wonderful arched rock, and knock penguins on the head.

By a singular coincidence, Christmas Harbour, Kerguelen Land, was one of the very first places of interest visited by me, in the Antarctic Expedition under Sir James Ross.

The expedition lasted four years. The Erebus and Terror left England on 25 September 1839 and returned on 7 September 1843. It can be divided in three phases.

The eleven-month journey to Tasmania and from there to the Great Ice Barrier

There were stops at various islands including Madeira, the first port-of-call, then a nine-week stay at the Cape of Good Hope and on to Kerguelen Island for a nine-week stay. Joseph Hooker studied its flora intensively and increased the number of plants known there to 150, which included lichens and seaweeds. The expedition made good use of the Kerguelen "cabbage", Pringlea antiscorbutica, which Cook had found to be effective in preventing scurvy. It was abundant there and was used as the sole vegetable for the crew for four months. Joseph Hooker's Flora Antarctica contains the first published description of the Kerguelen cabbage, which, like the true cabbage, Brassica oleracea, is in the family Cruciferae. From Kerguelen Island to Tasmania they encountered atrocious weather, and one of the crew was swept overboard. After a three-month stay in Tasmania, where Joseph learnt that his brother William, a doctor, had died of yellow fever in Jamaica, the ships headed south. They visited Auckland Island, which Joseph had time to thoroughly botanise, and then made a brief call at Campbell Island.

Finally, they reached Victoria Land in Antarctica and located the precise bearing of the South Magnetic Pole (160 miles inland). They discovered Mt Erebus (3,798 metres) on the fringes of what is now the Ross Sea. As Joseph wrote to his father:

To see the dark cloud of smoke rising with flame rising from the volcano in one column, one side jet black and the other reflecting the colors [sic] of the sun, turning off at a right angle by some current of wind and extending many miles to leeward; it is a sight far exceeding anything I could imagine and which is very much heightened by the idea that we have penetrated far farther
The ships reached Paiaia in the Bay of Islands on 16 August 1841. There Hooker met William Colenso (1811-99), printer, missionary, school inspector and botanist. Colenso was of considerable help to Hooker in his botanical trips and himself benefited from Joseph's advice and encouragement. Joseph named Colensoa physaloides after him, but this plant is now known as Pratia physaloides (PLATE 29). The expedition remained in the Bay of Islands throughout their New Zealand visit, and a considerable amount of time was spent in obtaining suitable spars for the ships. Just before they left New Zealand, Joseph received a letter from his father informing him of his appointment to Kew, a fact that Joseph had read in a newspaper in Sydney three months before. Ross and his crews then went south to the Chatham Islands and on to the pack ice, where they struggled for forty-six days to get clear of it. Both ships were damaged, not only by ice, for they collided and were locked together for a time. The Terror was in the worst condition, for a fire broke out and was only extinguished by partly flooding the hold. Eventually they reached the Falkland Islands in April 1842.

The ships were soon hauled ashore for repairs. Intensive botanising on the Falklands yielded only some 100 species of flowering plants for Joseph. Seeds of a tussock grass he collected and sent to Kew later proved useful, as the grass was successfully introduced to the Shetland Islands for animal fodder. The Erebus and Terror visited Hermite Island, part of Tierra del Fuego, near Cape Horn, which Joseph was particularly interested in seeing, for Charles Darwin had been there on the Beagle. Joseph met Darwin not long before the Antarctic voyage began and had a copy of his Journal of Researches into the Geology and Natural History of the Various Countries Visited by H.M.S. Beagle, which he often referred to, on board. The two men subsequently became life-long friends. Darwin's surviving letters to Hooker, when typed out, ran to over 800 pages. After the voyage, Joseph had been fully informed of Darwin's ideas on evolution and natural selection and had faithfully kept them secret many years before the publication in 1859 of The Origin of Species by Means of Natural Selection, or the Preservation of Favoured Races in the Struggle for Life.

Hermite Island proved to be richer in mosses than any comparably sized region Joseph ever visited, and he collected more than 100 different species. Tierra del Fuego had an interesting flora, with some flowering plants very similar to English ones and many lichens identical to those found in Britain. This region seemed to him the "great botanical centre of the Antarctic Ocean", and many of his ideas on geographical plant distribution and dispersal were fostered by this visit. In December 1842 they left the
Falklands and headed south once more. The ships narrowly escaped being frozen in the ice. Joseph Hooker found on one of the Antarctic islands a lichen, which he found again high in the Himalayas. James Ross was able to confirm that there was only one South Magnetic Pole, and by April 1843 the ships had reached the Cape of Good Hope. In September the voyage was over.

**Botany of the Antarctic voyage**

The botanical results of the voyage were published in Joseph Hooker’s six-volume *The Botany of the Antarctic Voyage*. He worked on this at Kew, receiving pay as assistant surgeon (£136.10s. a year) and a grant of £1,000 from the Admiralty towards the cost of its publication. Publication was not completed until 1860. During this time Joseph had spent three and a half years in India. It has been stated that *The Botany of the Antarctic Voyage* benefited from this, for the important introductory essays to the various sections were improved by the additional knowledge of plant variation and distribution that Hooker gained on his Indian travels.

The first two-volume section, *I. Flora Antarctica*, described, in part one, the botany of Auckland and Campbell Islands. It included descriptions of sixty-three new species and six new genera, although five of these genera were subsequently (in *Flora Novae-Zelandiae*) included within earlier-described genera. There were eighty hand-coloured plates. Part two described the botany of Tierra del Fuego, Hermite Island and the Strait of Magellan, the Falklands and Kerguelen Island. This part also had descriptions of plants not collected by Hooker, including those that Darwin had collected. There were 118 plates.

The second two-volume section, *II. Flora Novae-Zelandiae*, consisted of part one, “Flowering Plants” (with seventy plates), and part two, “Flowerless Plants” (with sixty plates). In the first part 730 species of flowering plants and conifers were described (eighty-three of these were illustrated) and in the second part, 1,037 species of non-flowering plants (algae, fungi, mosses, liverworts, lichens and ferns).

The third two-volume section, *III. Flora Tasmaniae*, dealt with the plants of Tasmania. Part one consisted of dicotyledonous flowering plants (with 100 hand-coloured plates), and part two consisted of monocotyledinous and non-flowering plants (also with 100 plates). As with *Flora Novae-Zelandiae*, the flora of Tasmania was the first published flora of that country.

*Flora Novae-Zelandiae* was published in two versions with either coloured or uncoloured plates. It seems that other parts of *The Botany of the Antarctic Voyage* were published with only coloured plates.

As Joseph Hooker did field work in only a small part of New Zealand, much of this flora is based on collections by William Colenso, Andrew Sinclair, David Lyall, and in particular the Banks and Solander collections from Cook’s first voyage. *Flora Novae-Zelandiae* was dedicated to Colenso, Lyall and Sinclair. Dr David Lyall (1817-95) was Joseph Hooker’s coun-

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After the voyage

While Joseph Hooker worked on *The Botany of the Antarctic Voyage*, he made good use of his father’s herbarium and library at Kew. In 1845 he lectured in botany at the University of Edinburgh, in place of the gravely ill professor of botany. It had seemed that he might succeed him when Professor Graham died in 1845, but John Balfour got the position. In 1846 Joseph was employed by the Geological Survey, which at the time was under the same administration as Kew, the Department of Woods and Forests. The appointment was for him to describe the British flora, living and fossil, in relation to geology and did not prevent him from continuing with the Antarctic voyage floras as well.

In July 1847 Joseph Hooker became engaged to Frances Henslow. As his father did, so was Joseph to marry the daughter of a botanist, for Frances’ father, the Rev. John Henslow, was professor of botany at Cambridge. The engagement was a long one. Joseph left in November 1847 on his botanical explorations of India and did not return until March 1851.
His travels were financed by the Geological Survey, the Admiralty and a grant from Treasury. His journey in India, especially in the Himalayas, and the large amount of material he collected, made an important contribution not only to botany but also zoology, geology, ethnology, meteorology, geography and cartography. The illustrated and lengthy account of his travels, *Himalayan Journals* (John Murray, 1854), which ran to several editions, was dedicated to Charles Darwin and has been described as one of the great travel books. One of the horticultural benefits of his journey was the discovery of many new species of *Rhododendron*, seeds of which were sent to Kew. They included the now widely cultivated species *R. dalhousiae*, *R. hodgsonii* and *R. thomsonii*. *The Rhododendrons of Sikkim — Himalaya* (1849-51) began to appear, edited by William Hooker, before Joseph returned to England. The plates, based on Joseph’s drawings, were “worked up” by Walter Fitch. A few months after his return, Joseph and Frances were married, in August 1851, and in January 1853 their first child, William Henslow Hooker, was born. For a time they existed on grants for arranging the Indian collections, then in May 1855 Joseph was appointed assistant director to his father at Kew.

*The Kew Years* Joseph and his family moved into what is now Herbarium House, Kew, where they lived for the next ten years. Joseph Hooker worked on a variety of topics and wrote important papers on the botany of the Galapagos Islands from specimens collected by Charles Darwin and others. *The Botany of the Antarctic Voyage* was completed and an incomplete *Flora Indica* (with T. Thomson) appeared. Much later (1875-97) the monumental seven-volume *The Flora of British India* was written by Hooker, assisted by others. In 1860 Joseph spent three months botanising with Daniel Hanbury in what is now Israel, Syria and the Lebanon. This led to several papers, including one on cedars (*Cedrus*).

*Genera Plantarum*, one of the greatest works in botany, was begun by Joseph Hooker with George Bentham, a botanist of independent means. Publication began in 1862 and was completed in 1883. This gigantic undertaking brought together the mass of information on seed plants in systematic order, down to the level of each genus. It was written entirely in Latin, and by the time it was completed Bentham had written over one million words and Hooker about half a million. An important event in New Zealand botany was the publication in 1864 of the first part of Hooker’s (unillustrated) *Handbook of the New Zealand Flora*. It covered ferns and their allies, conifers and flowering plants. The text contains, in addition to the description of each plant, references to the literature and keys to families, genera and species. The second part, describing algae, fungi, lichens, mosses and liverworts, appeared in 1867.

William Hooker died on 12 August 1865, aged eighty, after a few days’ illness, and within three months Joseph Hooker was appointed director of Kew. His work as assistant director had made him thoroughly familiar
with the work done at Kew and he brought great enthusiasm towards directing the gardens. Despite heavy administrative duties, which he conscientiously performed, and outside duties, such as those involved with being president of the Royal Society from 1873 to 1878, Joseph Hooker continued with his botanical studies and publications with little diminution of pace. In 1870 his Students’ Flora of the British Isles first appeared. It has been described by a Kew botanist, the late Dr W. B. Turrill, author of an interesting book on Hooker (Joseph Dalton Hooker — Botanist, Explorer, and Administrator), as “one of the best of British floras ever to have been published as a single volume”.

In 1871 Hooker and three others visited Morocco, and an account by Hooker and another member of the party, John Ball, appeared in 1878 as Journal of a Tour to Morocco [sic] and the Great Atlas. In 1881 an even bigger task than Genera Plantarum was begun under Joseph Hooker’s direction, with financial support from Charles Darwin. This was Index Kewensis, which is continued in the form of supplements today. The aim of the Index was to list all the names that had been used for plants, giving the author of each and the place of publication. At first a judgment was made as to which was the valid name for a plant, with those considered synonymous in brackets. This differentiation was dropped in 1913 so that Index Kewensis is now an index and not an authority for the botanical correctness of the name of a particular plant. The first four volumes appeared in 1892-95.

In 1874 Joseph’s wife, Frances, died. It had been a happy marriage and he was fortunate two years later to begin another happy marriage to Hyacinth, widow of Sir William Jardine. They produced two sons, born in 1877 and 1885. To Joseph’s disappointment, none of his children became botanists, though his sons did well in a variety of careers. In 1877, the year he was knighted in the Order of the Star of India, Joseph took part in his last major botanical expedition. The trip, which lasted some three months, was undertaken with his old friend Asa Gray (1810-88). Asa Gray, who first visited the Hookers in 1838, had been professor of natural history at Harvard (1842-73) and was then regent of the Smithsonian Institute, Washington DC. He was the foremost United States plant taxonomist of his time. Gray and Hooker were particularly interested in the relationships and history of the North American flora. They botanised extensively in the Rockies, on one occasion sleeping out at 13,000 feet (4,000 metres). During their travels they visited Salt Lake City, where they “had a chat” with Brigham Young, head of the Mormon Church, who reminded Joseph of “a stout, elderly and thoroughly respectable butler”, though his opinion of the sect was a very low one! He visited too the forests of the eastern United States, and several interesting paperts resulted from the US visit.

He retired as director of Kew near the end of 1885, aged sixty-nine, and his son-in-law, William Thistleton-Dyer, who had become assistant director in 1875, was made director. Retirement gave Joseph more time to
devote to his research. He had purchased a six-acre plot of land in Berkshire, where he built a large, comfortable house ("The Camp"). The surrounding woodlands contained many of the rhododendrons he had discovered in Sikkim. For many years he commuted to Kew three or four days a week to work in the herbarium and library. In his last years Joseph Hooker tackled the taxonomy of a difficult group of plants, the balsams (Impatiens), most of which occur in Asia. He described 303 new species and was still working on the group a few weeks before he died, aged ninety-four, on 10 December 1911.

An offer of burial in Westminster Abbey was made to his family, but in accordance with his wishes, Joseph was buried in the family grave beside his father in St Anne's Churchyard, Kew, a few yards from the director's house. One of his hobbies had been to collect Wedgwood china, especially medallions, a pursuit that had amused Charles Darwin, who, though related to the Wedgewoods by both descent and marriage, had little interest in the china. In 1865 Joseph had commissioned a Wedgwood memorial medallion of Sir William, a task that took the sculptor, Thomas Woolner, and Hooker's cousin, Reginald Palgrave, nearly two years. It was therefore appropriate that his own memorial plaque in Kew Church, where William's is located, was made of Wedgwood jasper ware. It was designed by his cousin Matilda Smith. Below the words on the plaque is a portrait of Joseph (from a model by Frank Bouchier), surrounded by five plants from five countries whose floras he had been interested in. One of them is Clematis verna from New Zealand. A marble bust of Joseph Hooker, also by Frank Bouchier, is in Westminster Abbey.

The Hookers have been dealt with at length, even though only Joseph visited New Zealand and then only for a few months. However, their influence on botany, including New Zealand botany and botanical illustration, has been profound. The artists they trained, Walter and John Fitch and Matilda Smith, devoted considerable time to illustrating New Zealand plants and set standards that served as models for others. William Hooker described many of our plants, especially the lower groups, for the first time, and laid the basis for Joseph Hooker to produce the first illustrated New Zealand flora in English (Flora Novae-Zelandiae) and then his Handbook of the New Zealand Flora, which was the foundation of all the floras that followed. Joseph Hooker also served as a catalyst to inspire others to collect and describe plants. This was especially true for botanists in New Zealand. As the distinguished botanist Leonard Cockayne noted in an obituary on Joseph Hooker (Transactions of the New Zealand Institute, 1911):

The indebtedness of New Zealand science does not end with Hooker's published work. To all serious investigators of the flora he was a friend, guide, and counsellor. There is, indeed, no name of moment in the later botany of the Dominion but is deeply indebted to Hooker's influence and assistance, generously given.
Plate 23  Hedycarya arborea J. R. et G. Forst. (pigeonwood)  Martha King
Plate 24

*Rhabdothamnus solandri* A. Cunn. (matata)

Martha King
Plate 25  
*Pseudowintera axillaris* J. R. et G. Forst.  
Dandy. (lowland horopito)  
Fanny Osborne
Plate 26

*Ehrharta stipoides* Labill. (meadow rice grass)

John Buchanan
PLATE 23  *Hedycarya arborea* (pigeonwood or porokaiwhiri)

This painting illustrates nearly mature fruits on a female tree. As the name suggests, the fruits are a favourite diet of the New Zealand pigeon, and the Maori name porokaiwhiri means "pigeon-food" tree. When fruits are fully mature they are a deeper orange. The coarsely toothed leaves are arranged in pairs, with each pair at right angles to the preceding pair. Pigeonwood is a medium-sized tree up to fifteen metres high, which occurs up to 800 metres altitude in the North Island, and reaches Banks Peninsula on the east coast and Milford Sound on the west coast of the South Island.

*Courtesy of the Alexander Turnbull Library, Wellington, New Zealand*

PLATE 24  *Rhabdotheramnus solandri* (matata)

This is a slender, branching shrub reaching two metres high, found near streams in lowland forest. Especially common in the Auckland district, it reaches as far south as Wellington. Flower colour varies from yellow to orange to red, with darker stripes. The genus *Rhabdotheramnus* consists of a single species restricted to New Zealand and is a member of the mostly tropical and subtropical family Gesneriaceae, which includes the African violer (*Streptocarpus*). As shown in the separate illustration at left, the petals form a cylindrical tube, which has a five-lobed tip. The five stamens are fused at their bases to the petal tube and curve to meet at their tips so that their pollen-bearing anthers are fused together. Martha King has illustrated, to the right of the dissected petal-tube, a flower after the stamens and tube have fallen. It shows five green sepals and a central ovary with a terminal, hair-like style.

*Courtesy of the Alexander Turnbull Library, Wellington, New Zealand*

PLATE 25  *Pseudowintera axillaris* (lowland horopito)

I have chosen a painting by Fanny Osborne that has not been illustrated in Jeanne Goulding’s book. Lowland horopito is a member of the Winteraceae, which is generally considered to contain more primitive features than any other extant family of flowering plants. Pollen grains of this group, which are usually grouped together in permanent fours, have been found as fossils in New Zealand and Australia as far back as the Cretaceous. This period, which began about 155 million years ago, is the one in which flowering plants are thought to have first evolved. Primitive features in the Winteraceae include the nature of the flowers and of the wood — which lacks vessels, the specialised, water-conducting, cellular tubes found in all but about 100 of the approximately 250,000 species of flowering plants.

Lowland horopito is a small tree, up to ten metres tall, which grows in the forest understorey. It occurs from just south of North Cape to northern Marlborough and Nelson. Although it can grow from sea level to 850 metres altitude, it is uncommon above 600 metres. The elliptical leaves are a glossy, dark green above and greyish-green to greyish-white underneath. Leaves have a pungent, spicy taste and a camphor-like odour when crushed. They are unpalatable to deer, goats, pigs and oppossums. Consequently, in forests that have been heavily browsed by these introduced mammals, lowland horopito can be very abundant.

As the painting shows, one to several flowers are situated in the axil of a leaf or leaf scar. Each flower consists of a small, green cup of fused sepals (visible on the flower shown from underneath near the centre of the illustration), which enclose the base of a ring of four to ten greenish-white or white petals. There are eight to twenty broad, short stamens, each with four terminal pollen sacs. In the centre of the flower are one to five yellow-green or reddish carpels, which ripen into fruits. Mature fruits
are reddish-orange berries up to eight millimetres in diameter, which are eaten by tuis (Prosthemadera novaezelandiae), bellbirds (Anthornis melanura), waxeyes (Zosterops lateralis) and yellow-crowned parakeets (Cyanoramphus auriceps). Recently, it was observed that the ripe fruits of lowland horopito were eaten by the stitchbird (Notiomystis cincta), an endangered species now restricted to Little Barrier Island.

Lowland horopito occurs naturally on Great Barrier Island, and Penny Osborne's painting is presumably of a plant collected there. Pseudowintera is endemic to New Zealand. There are two other species: mountain horopito, *Pseudowintera colorata*, which has characteristic light-green or yellow leaves with reddish spots or blotches and red margins, and *Pseudowintera traversii*, a small-leaved (one to three centimetres) shrub, confined to forest and scrub at 700 to 1,000 metres altitude in a small region of the northwest of the South Island.

Courtesy of the Director of the Auckland Institute and Museum

PLATE 26  *Ehrharta stipoides* (*Microlaena stipoides*) (meadow rice grass)

This slender perennial grass occurs in lowland regions of the North Island and in localised parts of the South Island, chiefly near the sea, and in Stewart Island. It is widely distributed in Australia and Tasmania. John Buchanan noted that it is a valuable pasture grass, "closely cropped by horses, cattle and sheep". It has the ability to withstand considerable drought. A related species with larger leaves, *Ehrharta diploxa* (*Microlaena meyeniana*), is probably the most abundant forest grass in New Zealand.

Figure 1, the grass with inflorescences, natural size; figure 2, an enlarged spikelet; figure 3, an enlarged floret (flower) from a spikelet; figures 4 to 7, enlarged non-reproductive parts of spikelets; figure 8, enlarged female part of flower (ovary and paired stigmas); figure 9, the enlarged grain (fruit).
VII

Martha King—First Resident Botanical Artist

Little is known of the early life of Martha King, who arrived in Wellington on board the New Zealand Company's immigrant ship, London, in December 1840, aged thirty-seven. She was accompanied by her older sister, Maria, and her brother, Samuel Popham King, and his wife, Mary Jane. The Kings were Irish Socinians, a sect that held to the views of two sixteenth-century Italian rationalist theologians named Socinus, who denied the existence of the Trinity and the divinity of Christ. The King family had purchased land in Wanganui, which had been acquired by Colonel William Wakefield, and in February 1842 they boarded the Elizabeth to travel from Wellington to Wanganui.

For a time the family lived in tents while Samuel built two whare-style houses. Within a year of their arrival, the two sisters opened the first primary school in Wanganui in one of these houses. Maria and Martha's school was popular, and the sisters tempered a determined teaching approach with kindness. They were obviously well educated and instilled in their pupils a taste for reading.

Martha King's abilities as a botanical artist must have been apparent soon after her arrival in New Zealand, for in September 1842 the Wellington Horticultural and Botanical Society commissioned her, for "a sum not exceeding £10", to prepare "two sets of drawings of the most interesting indigenous botanical specimens". One set was for the directors of the New Zealand Company and the other for the London Horticultural Society. Martha was clearly a swift and highly skilled artist, and by January 1843 the two sets of forty drawings were completed. The New Zealand Company's set reached London in September 1843 and "excited universal admiration".

Five of the paintings were reproduced as lithographs in Edward Jer-ningham Wakefield's Illustrations to Adventure in New Zealand, published by Smith, Elder & Co., London, in 1845. The lithographs were prepared by the firm of Day & Haghe, "lithographers to the Queen". The Illustrations shortly preceded Wakefield's Adventure in New Zealand (John Murray, London, 1845), which has been described as still the most readable and spontaneous narrative of English settlement in New Zealand. Some copies
of the *Illustrations* were sold uncoloured, and other more expensive copies had hand-coloured lithographs. Some of the latter had only Martha King’s botanical plates in colour. A facsimile of the fully coloured work, in an edition of 500 copies, was published by Reed, Wellington, in 1968. The botanical paintings consisted of the titoki (*Alectryon excelsus*) in fruit, tawa (*Beilschmiedia tawa*) in bud and fruit, and rata (*Coriaria arborescens*), rata (*Metrosideros robusta*) and flax (*Phormium tenax*), all in flower. The illustrations are beautifully executed; the colours are surprisingly accurate and the flax, in particular, is extremely lifelike.

In December 1847 the Kings left Wanganui for New Plymouth. Samuel was appointed registrar of births, deaths and marriages and later postmaster in New Plymouth, and Maria, Martha and their sister-in-law Mary established a school. The King family became prominent members of New Plymouth society and were noted for their sociability. The parties and dances they organised were very popular, and Mary King was an accomplished pianist at these functions. Samuel King was active in public matters, being a foundation member of the committee of the Taranaki Institute and a trustee of the New Plymouth Savings Bank.

Martha King was a talented gardener and on her death in 1897 their garden was given to the New Plymouth Recreation Grounds Board.

In 1981 the set of forty watercolours (and one leaf print) that had been sent to the New Zealand Company in 1843 returned to New Zealand. It was purchased by the Alexander Turnbull Library, Wellington, from the Library of the Royal Commonwealth Society in London. The paintings had become the possession of one of the directors of the New Zealand Company, George Frederick Young, who passed them on to his son, Sir Frederick Young. He donated them to the Royal Colonial Institute, now the Royal Commonwealth Society. Martha King had not signed the paintings and it was not until photographs of the works were sent to the Turnbull Library that the identity of the artist was established. Identification was possible because the paintings included the originals of four of the five plants depicted in Wakefield’s *Illustrations*. The forty paintings and sixteen pencil sketches of scenes of Wellington, Wanganui and New Plymouth, dated from 1841 to 1859, also in the Turnbull Library, are the only known surviving examples of Martha King’s work.

As the plates demonstrate, Martha King was a superb botanical artist. It is not known whether she received formal art training, but her paintings are clearly not the work of a neophyte. They are well balanced, accurate in detail and colour, and clean and uncluttered. The high standards they set have not been eclipsed by any subsequent resident botanical artist.

Ten other botanical paintings by Martha King have been recently reproduced and these accompany Moira Long’s article “Martha King, Botanical Artist” in *The Summer Book 2: A New Zealand Miscellany* (1983). I am greatly indebted to Moira Long for permitting me to make use of material in her article for this chapter.
Fanny Osborne (1852-1933) was born in Auckland, the second of thirteen children of Neill and Emilie Malcolm. She spent most of her life on Great Barrier Island and, like her mother, had thirteen children, all born on the island without medical aid. Her husband, Alfred, who was educated in Leeds and studied music and languages for four years in Germany, became interested in the plants of Great Barrier Island. He encouraged Fanny, who had been painting since a child, to illustrate the specimens he collected. Most of her paintings were done in the early 1900s, by which time her children had all been born. Early in the century she was selling sets of paintings of the native flowers of Great Barrier Island. One of her paintings appeared as a colour supplement to Brett's Christmas Annual (1915), but this enlarged, over-coloured reproduction did not do justice to the original painting. Fanny’s five daughters painted plants too. The eldest, Lilian, married Thomas Gibbard, a tutor employed by the Osbornes, and moved to England. There she painted ornamentals, wildflowers and fungi until she was well into her nineties and won several awards for them from the Royal Horticultural Society.

This section on Fanny Osborne has been kept brief because a recent book has been devoted to her life and paintings. Fanny Osborne’s Flower Paintings by Jeanne H. Goulding (1983) contains colour reproductions of forty-eight of her flower paintings as well as a vivid account of the lives of the Malcolms and Osbornes.

Fanny Osborne’s paintings have a delicate softness somewhat reminiscent of the paintings of Emily Harris. They are accurate, though lacking in the finest detail. She used colour very carefully, but unfortunately the colours in some of her paintings have faded with time.
John Buchanan
and Nature Printing

JOHN Buchanan (1819-98) was born in Dumbartonshire, Scotland, on 13 October 1819. He attended the parish school and was then apprenticed to a pattern designer at a print and dye works. This led him to study plants as a source for design material, and botany became a life-long interest. Buchanan moved to Glasgow, then at the age of thirty-two he left for New Zealand. He arrived at Port Chalmers, Dunedin, on the Columbus on 7 February 1852.

Employment opportunities were few in the early years in Dunedin, and for a short time John Buchanan tried his luck in the goldfields of Victoria, Australia. By 1856, however, he had purchased a small farm of twelve acres on Mt Cargill and within a year he was employed by J. T. Thomson, the Provincial Surveyor, on a reconnaissance survey. The object of the survey was to provide a general map as a starting point for farm settlement. A pencil sketch, "Tateri bush at Saddle hill", now in the Alexander Turnbull Library, is one of several sketches he made of inland Otago during the survey. In 1858 John Buchanan found gold in the Manuherikia River, which runs through Alexandra, and, a few weeks later, in the Tuapeka region, but he was unsuccessful in securing a share of the reward for the first discovery of gold in Otago.

John Buchanan's subsequent career is linked with that of Dr (later Sir) James Hector (1834-1907). Hector completed a degree in medicine at Edinburgh University (1856), where he also attended lectures in natural science. For several years he worked as a surgeon and geologist on a British Government expedition under Captain John Palliser, which had the task of exploring and mapping western Canada and seeking passes over the Rockies. James Hector discovered Kicking Horse Pass, which the Canadian Pacific Railway crosses. The pass was named after an accident which nearly killed Hector. In fact, it was said that his men were about to bury him when he blinked. Ironically, when James Hector returned to Canada in 1905, for the unveiling of a monument in his honour, his son died at Kicking Horse Pass from pneumonia.

After completing his work in Canada (for which he received the

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C.M.G.), Hector accepted the position of geologist to the Provincial Government of Otago and arrived in New Zealand in April 1862. Before James Hector left England, Sir Joseph D. Hooker, who succeeded his father as director of the Royal Botanic Gardens, Kew, asked him to "look out for a man called John Buchanan, who sent home to the herbarium at Kew the best collection of plants that were received from Australasia". Buchanan's collections were of considerable value to Hooker for the preparation of his *Handbook of the New Zealand Flora* (1867). Hooker told Hector that he considered John Buchanan would be an ideal person for him to employ for his geological survey work. Soon after arriving in Dunedin, Hector therefore advertised for Buchanan, they met, and he appointed him draughtsman and botanist.

John Buchanan was certainly ideally suited to the position. Although he had received little formal education, he was intelligent, resourceful, a very talented artist, and a strong man with an ability to handle horses, which was so important to the work of the Geological Survey of Otago. Early in 1863 Hector, Buchanan and four other men made their famous journey westwards to Lake Wānaka. In May of that year Hector and eight others left Dunedin on the *Matilda Hayes* and explored the sounds of the southwest coast of the South Island. Then, north of the sounds, they anchored in Lake McKerrow, a short distance up-river from the sea. Hector's party travelled inland to Lake Wakatipu. In the meantime John Buchanan had journeyed overland from the east coast and he joined Hector's party in Queenstown. They travelled through the Hollyford region and Lake McKerrow, then boarded the *Matilda Hayes* for the return trip. John Buchanan spent two very significant days in Milford Sound and made several pencil sketches and a watercolour. From some of these he later painted his now-famous watercolour "Milford Sound looking North-West from the Freshwater Basin", which has been described as an early masterpiece in New Zealand landscape painting and is now in the Hocken Library, Dunedin. John Buchanan did not gain recognition as a landscape painter in his lifetime.

As well as sketching the landscape, drawing maps, geological sections, animal and plant fossils, John Buchanan sketched plants and made herbarium specimens. The results of his botanical work were summarised in an essay, "A Sketch of the Botany of Otago", which, together with the plant specimens he had collected, were displayed as part of the work of the Geological Survey of Otago at the 1865 New Zealand Exhibition in Dunedin. A second edition of "Sketch of the Botany of Otago" was published in the first volume of the *Transactions of the New Zealand Institute* (1868).

When James Hector's three-year appointment as provincial geologist expired in April 1865, he accepted the joint appointments of first director of the New Zealand Geological Survey and director of the newly formed Colonial Museum (now the National Museum) and Colonial Laboratory in Wellington. The establishment of these positions followed the change of the
sear of government from Auckland to Wellington in late 1864. Hector's duties included being in charge of the Wellington Botanical Gardens (until 1891), meteorological observations and an astronomical observatory (established later), as well as being custodian of weights and measures and head of the Patent Office library! At the time he was the only qualified government scientist, and for a considerable time, he was the only medical doctor in government employment. He brought most of the Otago Geological Survey staff, including John Buchanan, to Wellington. By September 1865 the Colonial Museum building, which occupied land on Museum Street behind Parliament Buildings, was completed. In 1867 the New Zealand Institute Act set up an institute for the advancement of science and art, to which the Colonial Museum and Laboratory were transferred. James Hector became manager of the institute, as well as retaining his other positions. For thirty-five years he edited the Transactions of the New Zealand Institute (now Transactions of the Royal Society of New Zealand). John Buchanan served as artist and lithographer, and illustrated many papers in the first nineteen annual volumes.

**PLATE 27  *Colmisia walkeri* (an alpine daisy)**

John Buchanan made this drawing and lithograph for a paper by Thomas Kirk, in which this alpine daisy is described for the first time (Transactions of the New Zealand Institute vol. 9, 1876). *Colmisia* is one of the largest genera of native plants, with some sixty New Zealand species. *Colmisia walkeri* was named after Captain J. Campbell Walker, who was with Kirk on the dividing range above Lake Harris, Otago, when he discovered the plant. It is restricted to rocky alpine regions and fellfields (900 to 1,600 metres altitude) of the South Island, mainly to the west of the main divide, in regions of high rainfall from southern Nelson to Fiordland. The illustration does not show the complete plant, which is a springly branched, sprawling shrub with slightly sticky leaves that are green above and white below because of the presence of soft woolly hairs. The centre of the "flower" is yellow and the surrounding petals are white. Another South Island alpine daisy is illustrated in PLATE 46.

**PLATE 28  *Sicyos angulata* (mawhai)**

This is probably the best of Mrs Featon's paintings for the unpublished volumes of the Art Album. In this instance the painting is on a grey background. Many of the chromolithographs in volume one, although possessing a grey background, lack this in the original watercolours (for example, plates 14 and 24). Mawhai, a member of the family Cucurbitaceae, which includes the gourds and pumpkin, is a climbing plant. It climbs by means of tendrils at the bases of the leaf stalks and occurs in coastal scrub north of latitude 37° S, especially on the islands of the Hauraki Gulf. This species is also widespread in the tropics. Mawhai has separate male and female flowers on the same plant.

*Courtesy of the Director, National Museum, Wellington*
Plate 30

_Dysoxylum spectabile_ (Forst. f.) Hook. f. (kohekohe)

Sarah Fearon
Hector and Buchanan continued with field work, spending New Year 1866 at Russell, and the following summer in the Kaikoura mountains and on Mount Egmont. A paper, "Botanical notes on the Kaikoura mountains and Mount Egmont", appeared in 1867. In it, Buchanan was critical of the policy of burning in Marlborough: "Repeated burnings are evidently reducing the number of species of plants, and a country naturally arid from its geological nature, will by this treatment become, in time, positively barren." As for Mt Egmont:

Although all who go up do not collect plants, still many do, and probably no locality in New Zealand has been better searched. Plants have been passing to Britain from there through various channels for many years. All idea, therefore, of finding much novelty may be dismissed, and the result of the present expedition has proved that the botany of this isolated mountain was well ascertained previous to my visit.

Next summer there were exhausting and hazardous visits to fossil beds and coal deposits in Otago and Southland. After that most of Buchanan's field trips were less arduous. He became very familiar with the plants of the Wellington district, the Wairarapa and Nelson, and became the first botanist to observe the vegetation of the Three Kings Islands. Later he visited Campbell and Auckland Islands.

**PLATE 29 Praia physaloides (Calliandra physaloides) (koru)**

The koru is considerably larger than the other four native species of Praia. A sprawling herb up to one metre high, it grows north of Whangarei and on the Three Kings and Poor Knights Islands. Koru is a member of the lobelia family (Lobeliaceae). The violet to dark-blue flowers are up to five centimetres long, and the blue-to-whitish berries reach one and a half centimetres in diameter. This plate is also one of the unpublished watercolours.

*Courtesy of the Director, National Museum, Wellington*

**PLATE 30 Dysoxylum spectabile (kohekohe)**

Kohekohe is shown as it appears in plate 18 of the *Art Album*. The colours in this chromolithograph are very similar to those of the original watercolour. One of our most attractive trees, kohekohe is the only New Zealand member of the mahogany family (Meliaceae). It is abundant in coastal and lowland forest throughout the North Island, but is confined to the northeastern part of the South Island in the Nelson-Marlborough Sounds region. A single leaf is illustrated, consisting of three to six pairs of oppositely arranged leaflets and a terminal one. Kohekohe is unusual in that flowering occurs in winter, between April and August. Another unusual feature is that the flower clusters arise from the trunk or from bare parts of branches below the leaves. This type of flowering is known as cauliflory and is particularly common in tropical plants. Most of the approximately 150 species of *Dysoxylum* grow in tropical or subtropical forests. Hundreds of flowers are formed on each tree, and if winds are strong the forest becomes carpeted with fallen kohekohe flowers. Fruits have thin, papery skins and split into several segments to expose up to eight seeds, which have a bright red-orange covering known as an aril. They are eaten by the native pigeon.
Buchanan wrote many papers on New Zealand botany. Some were published in the Journal of the Linnean Society (London), and in 1880 he was elected a fellow of the Linnean Society. He wrote some thirty botanical papers for the Transactions of the New Zealand Institute. Most described, in concise terms, new species of native plants. Others dealt with plants in particular regions, for example, the floras of the Wellington region, Kaua Island and Campbell Island. He was interested in native timbers, as a paper "On the durability of New Zealand timber, with suggestions for its preservation" indicates. Another paper, "On the Wanganui beds (Upper Tertiary)", compared fossil shells. He even contributed an article "On pseudo-scab and lung-worm in sheep".

The lithographs he made for early volumes of the Transactions covered a wide variety of topics. Volume two, for example, contains illustrations of whales, an eel, birds' nests, stones, whitebait, ships, plants, leaf anatomy of flax (Phormium tenax), maps and geological sections. In many instances he made lithographs from the drawings of others. His own botanical drawings were superb, the earlier ones in particular. Illustrations pasted in his scrapbooks, culled from British publications, indicate that he admired the work of Walter and John Fitch (see chapters V, VI and XV) and his best work shares the fine qualities of these illustrators.

When John Buchanan retired in June 1885, he was awarded a year's leave on full pay. Dr Hector (who received a knighthood in 1887) presented him with a diploma of life membership of the New Zealand Institute, which was "handsomely illuminated by Messrs Bock and Cousins", publishers of the Peatons's Art Album (chapter X). John Buchanan "was quite taken by surprise, and was in consequence too much moved to answer at any depth."

He retired to North East Valley, Dunedin, for to him nothing could compare with the Otago vegetation for "brilliant freshness or varied colouring". Fourteen years later he died, on 18 October 1898, aged seventy-nine. A bachelor, he left his property to his brother Peter in Sydney. Sir James Hector, in a tribute, spoke of his valuable contributions to New Zealand botany and of his talents as "a great explorer, or, rather, wanderer", who had endured "much hardship in collecting specimens of geological interest, minerals, birds even, and certainly, above all things, plants." He referred to Buchanan's large collection of specimens, books, drawings and manuscript notes in Dunedin and added the hope that "a little better care would be taken of the collection until they reached a more enlightened age".

Nature printing and lithography

In 1876 Sir George Grey, who became Prime Minister in the following year, obtained the approval of the House of Representatives for funds to be spent on the production of a book on the native grasses of New Zealand, "with nature-printed plates and descriptions of each species." It was originally planned that the book would include "an essay on the grasses and forage plants likely to prove useful in New Zealand" and that this essay
would be chosen from those submitted to a competition for which prizes would be awarded. However, it was pointed out that until an illustrated work on grasses was published “many would be precluded from joining in the competition” because they would be unable to accurately identify many grass species. James Hector, as director of the Colonial Museum, was given the task of supervising the production of the book, and he instructed John Buchanan to illustrate the grasses, natural size, by means of the technique of nature printing, and to prepare enlarged drawings of floral parts by means of dissections under the microscope. He was also asked to prepare a brief text to accompany each plate.

Nature printing resulted from experiments at the Imperial Printing Office, Vienna, and the first book to describe the process was published in 1853. It was based on the principle that if a rather flat object is placed between two flat surfaces, one harder than the other, and subjected to pressure, the object will become embedded in the softer one. With plant specimens, plates of lead and steel were used, and the plant remains were carefully removed from the lead, sometimes with the aid of a blowtorch. From this “negative” plate, with its impressed image of the plant, a “positive” plate could be cast as an “electrotype”. This had the outlines of the plant standing in relief above the general surface of the plate, forming the actual printing plate. A less sophisticated method was used by Buchanan for the plates of The Indigenous Grasses of New Zealand. The specimens of the various grasses were lightly inked and faintly impressed on the prepared surface of a lithographic stone. Details were filled in by hand. There was some delay in the preparation of the plates, “owing to the want of proper lithographic stones and other appliances, which could not be procured in the Colony”. Buchanan’s inked grasses still exist in the herbarium of the National Museum.

Lithography is a process that depends for its effect on the repellence between grease and water. A greasy image on the surface of a smooth plate of limestone is first moistened and then inked. The image accepts the ink but repels the water, but those parts of the stone where the image is absent accept water and consequently repel the ink. The image can then be printed on paper by passing stone and paper through a press, which gives a picture in black on a white background. It became common practice to add the impression of another stone printed in straw colour to give a tinted background. Such a background was used in the first issue of Indigenous Grasses. The plates are of very high quality indeed — a tribute to John Buchanan’s skill and to supervision by J. Earle, the Government Lithographer.

Indigenous Grasses

The Indigenous Grasses of New Zealand has been described as the first major botanical work by a resident botanist. It was published “by command” for the Colonial Museum by George Didsbury, Government Printer, Wellington. Although the title page of the first volume (containing parts one and
two), issued in 1878, indicated it would be in five parts, it was published in six. The reason for this was to allow inclusion of "new species of grasses that have been discovered during the period that has been occupied in preparing this volume". Volume two, containing parts three and four, appeared in 1879, and volume three (parts five and six) was published in 1880. In that year it was issued as a single volume, in which the tinted background was omitted in the plates. Indigenous Grasses contains sixty-four plates and ninety pages of descriptive text. A total of eighty-seven grasses are illustrated. Subsequent work has shown that a few of these are introduced species. In 1880 a smaller (octavo) and cheaper edition appeared also, with the slightly different title Manual of the Indigenous Grasses of New Zealand. This had a reset text and plates that were reduced in size by photolithography and printed in olive-green ink.
Mr and Mrs Featon's Art Album

When Mr and Mrs E. H. Featon's The Art Album of New Zealand Flora, being a systematic and popular description of the native flowering plants of New Zealand and the adjacent islands was published (1887-9), it made history. It was the first fully coloured art book to be printed in New Zealand. Printers and publishers were the Wellington firm Bock and Cousins. The quality of the chromolithographs was high and, as the Featons proudly noted in their preface, demonstrated that "New Zealand is not behindhand in the production of the highest class of chromo-lithographic work, and that the possibility of competing with the older countries in the issue of works of excellence is more than assured." William R. Bock (1847-1932), the son of a well-known engraver and portrait painter, was born in Hobart and came to New Zealand in 1868. He became manager of Lyon and Blair, a large Wellington firm of booksellers and printers. In 1878 he founded his own printing business, first with Henry Elliot and then with Alfred Cousins. The partnership was dissolved soon after publication of the Art Album. Bock was a skilled engraver and designer of crests, and the designs, formed by assembling a wide range of type ornaments, that adorn chapter headings and so on are examples of his work.

The Art Album contains thirty-nine plates and a frontispiece. Most plates illustrate a single species, but some, especially those depicting herbs, show several different plants; one plate illustrates ten different species. With a few exceptions, illustrations are natural size. The frontispiece is a striking garland of ferns, grasses, foliage, flowers and fruits. Sarah Ann Featon painted the watercolours for the plates, and her husband, Edward Henry Featon, wrote the text. Some seventy genera of native dicotyledonous flowering plants are described and fifty-three of these are illustrated.

Characteristic features of the plant are quoted from J. D. Hooker's Handbook of the New Zealand Flora (1864, 1867). Edward Featon's descriptions of each plant and its distribution are written in an enthusiastic manner, but the extravagant style seems old-fashioned today. The large-flowered Clematis, for example, "climbs the loftiest trees... garlands them with its chaste flowers... gladdens the Spring... defy all attempts, at the
hands of the covetous ones below to possess them”. Although the widespread use of New Zealand native plants in home gardens is a fairly recent event, it is clear, from the Featons’ book, that by the 1880s they were being cultivated and sold by nurserymen.

Originally the Art Album was issued in three parts (1887, 1888, 1888). These parts were then issued as a single work (1889), which was labelled as volume one. Two further volumes were planned but did not eventuate. They were to include a considerable number of dicotyledonous families not in the first volume — for example, the daisy family (Compositae), the carrot family (Umbelliferae), coprosmas (Rubiaceae) and hebes (Scrophulariaceae) — as well as monocotyledonous groups (e.g. orchids) and non-flowering seed plants (conifers).

It has been written that these two additional volumes were to have been published by the Government Printer (the firm of Bock and Cousins was by then out of business), but that Sarah Featon’s paintings were destroyed by a flood in the basement of the Government Printing Office, Wellington. In fact, all the original paintings used for volume one (excluding the frontispiece), and a further ninety-three plates are now in the National Museum, Wellington. These were, judging by the pencilled plate numbers on many, clearly destined for the other two volumes. The watercolours are in good condition, with no signs of water damage. As they total more than twice the number used in volume one, it would seem that few, if any, are missing. Surprisingly, none of the plates include illustrations of grasses.

It is a mystery why the other volumes were unpublished. From letters in the National Museum, it seems that Edward Featon was the dominant partner, and it may well be that after his death in 1909 his wife did not persevere with publication plans. Also, the Government Printer may have been reluctant to undertake the enormous work involved in making the chromolithographs, a process that involved using a separate printing stone (special limestone imported from Bavaria) for each colour used in each plate.

Critics of the time were enthusiastic about the Art Album and considered it a worthy companion to Sir Walter Bullock’s Birds of New Zealand (1873, 1888). The illustrations are reasonably accurate, although lacking in the finest details of floral structure. Colours are bright — one present-day art critic described them as gaudy — and many plants are more vividly coloured than in real life. Although chromolithography sometimes results in colour exaggeration, examination of the original watercolours reveals that Sarah Featon used very intense colours in which little solvent is added to the pigments. Her eye for colour was better than some of the plates indicate.

For example, the orange-tinted petals of a form of manuka (Leptospermum scoparium) in plate 34 are shown more accurately in shades of pink and purple in the original watercolour.

Edward Featon, who was born in London in 1840, arrived in Auckland in 1860. He served as a volunteer in the Naval Brigade on the Waikato River and became first captain of the Auckland Artillery Volunteers. In
1869, at short notice, he took this unit to Tauranga to defend the settlement against Te Kooti and his followers. He married Sarah Ann Porter in Auckland in 1870, and on the marriage certificate his occupation is given as "optician". In 1874 he joined the Lands and Survey Department as a draughtsman. A year later he was transferred to Gisborne, where he became, in time, the first District Land Officer. He retired in 1898 because of ill health, but rejoined the Department two years later and was employed until he reached the age limit (probably sixty-five). He died in Gisborne in June 1909, aged sixty-nine. While in Gisborne, Edward Feaston continued to serve as an officer in the volunteers. During the Te Kooti scare in 1889 he was in charge of arms and stores in the district. He was very interested in literature and art and, as a member of the Turanganui Public Library Committee, was instrumental in planning for the construction of the first library building in Lowe Street, Gisborne.

Sarah Feaston was educated by an uncle, who was interested in art. She continued to paint in later life and a grand-daughter remembered her as a tall, alert, elderly lady of determined character, who was continually occupied with painting, leaf pressing, sewing, the making of model Maori villages and other handicrafts. She died in 1927, aged seventy-nine. The Alexander Turnbull Library, Wellington, has a number of her later watercolours, some of which were painted within a year or two of her death. Although most are of New Zealand plants, a few are of exotics, including an attractive painting of rose flowers. The Feastons had a son and a daughter, and Mrs Feaston was survived by the son, Edwin.

A copy of the Aotearoa Album and some watercolours in a casket made of New Zealand woods were presented by the New Zealand Government to Queen Victoria in 1897 on the occasion of her diamond jubilee. This is now in the British Museum.
PLATE 31  *Ixerba brexioides* (tawari)

Tawari is shown in plate 31 of the *Art Album*. This illustration is of the original watercolour from which the chromolithographic plate was made. Tawari is a northern North Island tree, up to ten metres high, which has its southern limits near Walkaramu. Around the ovary in the centre of each flower is a nectar disc. Bees favour the flowers, and tawari honey is sometimes obtainable commercially. Before older leaves fall from the branches, they turn a bronze-red colour.

*Courtesy of the Director, National Museum, Wellington*

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PLATE 32  *Solanum aviculare* (poroporo)

This illustration is from *New Zealand Berries*. Poroporo occurs as a shrub or small tree, up to three metres high, in coastal and lowland forest margins and shrubland throughout the North Island and the north of the South Island. It has been recorded as far south as Canterbury but is commonest in the Marlborough Sounds and Karamaia coast regions. Poroporo occurs too in Australia and on the Kermadec, Three Kings and Chatham Islands. A member of the potato family (*Solanaceae*), it is a close relative of the potato itself (*Solanum tuberosum*). The variably shaped leaves are dark green and the berries, orange-yellow when mature, are poisonous when green. Fruits of a second native species, *Solanum laciniatum*, also known as poroporo, are poisonous too when green, but mature fruits of both species were used for jam-making by early settlers. *Solanum laciniatum* has lemon-yellow coloured berries that are somewhat more pear shaped, and occurs as far south as Dunedin. Both plants have been used for the synthesis of corrinoids, used in medicine and as a source of sex hormones for contraceptive pills.

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PLATE 33  *Leucogenes grandiceps* (South Island edelweiss)

This member of the daisy family (*Compositae*) is confined to subalpine and alpine regions in the South Island and Stewart Island. It is widespread on rocks at altitudes from 800 to 1,900 metres. The only other species of *Leucogenes*, the North Island edelweiss, *Leucogenes leontopodium*, is found in some alpine regions of the North Island from Mt Hukurangi southwards (it is absent on Mt Egmont) and reaches as far south as the north of the South Island (northwest Nelson and above the Wairau valley). The South Island edelweiss has a branching, semi-woody form. The silvery leaves are smaller and less pointed than those of the North Island plant. The European edelweiss, also a member of the *Compositae*, is *Leontopodium alpinum*.

*Courtesy of the Alexander Turnbull Library, Wellington, New Zealand*

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PLATE 34  *Rubus parvus* (creeping lawyer)

A member of the rose family (*Rosaceae*), *Rubus* is a cosmopolitan genus of some 250 species, which include raspberries, blackberries and loganberries. There are five New Zealand species. *Rubus parvus* differs from the other native species in having simple leaves rather than leaves consisting of several leaflets. Although Emily Harris included the creeping lawyer in her unpublished book on mountain plants, it actually occurs in lowland regions of western Nelson, Buller and Westland. However, it can extend into alpine forests up to about 1,000 metres altitude in these regions. It is a low-growing creeper with stems that root along the ground. Unlike the other native species, it bears only a few prickles on leaves and twigs. Generally, there are separate male and female flowers on different plants, but sometimes bisexual flowers are formed. The glossy, green leaves, frequently dappled with bronze, become reddish during the autumn and remain on the plants through the winter.

*Courtesy of the Alexander Turnbull Library, Wellington, New Zealand*
Plate 31

Izerna brexioide A. Cunn. (tawari)

Sarah Featon
Plate 33

*Leucogone grandiceps* (Hook. f.) Beauverd (South Island edelweiss)  

Emily Harris
Emily Harris's Flowers, Berries and Ferns

Emily Cumming Harris (1837-1925) was about four years old when she arrived in New Plymouth on 31 March 1841 on the 311-ton barque William Bryan. This was the first immigrant ship of the Plymouth Company (which merged with the New Zealand Company in 1842) to reach New Zealand. Emily's parents, Edwin and Sarah Harris, her brother Hugh, two years older than Emily, and another sister (Kate) accompanied her. Great-great grandparents of my own, and their six children, were among the 148 passengers on a voyage that lasted four and a half months. Prior to departure from Plymouth, England, each emigrant was promised a free section of land in New Plymouth. Edwin Harris's sketches of the first sight of New Zealand (west coast of the South Island) and the William Bryan near New Plymouth still survive. Described as one of the lesser New Zealand artists of the last half of the nineteenth century, he has a place in history as the first resident artist in Taranaki.

Within two months of their arrival, the Harris family lost most of their possessions when their house, made partly of raupo, burnt down. Fellow settlers subscribed generously to a fund for them. Edwin Harris, a civil engineer and surveyor, spent the first eighteen months as a surveyor, under the direction of Frederick Carrington, Chief Surveyor of the Plymouth Company and founder of the New Plymouth settlement. Within about a year they had another daughter, Frances, and six years later Ellen was born. Sarah Harris (née Hill) started a primary school close to the present site of the Frankley Road Primary School. A second school was opened in the "Hudden" (Primitive Methodist) Church, near the junction of Elliot and Cowling Roads, and Emily became, in time, assistant teacher there.

As a result of the Waikato War, the Harris family, like many other Taranaki residents, moved to Nelson in about 1860. Emily, however, was sent to Hobart to study art. After the battles were over, the family remained in Nelson. Edwin became an art teacher at Nelson College, then taught drawing at the Bishop of Nelson's School for nearly twenty years. In 1889, by which time he was eighty-four, he agreed reluctantly to retire. The Bishop of Nelson confessed to Emily that her father’s teaching methods were
our dated and, at the school breakup in December, he presented Edwin with an easy chair and a quarter’s salary. Emily and her unmarried sisters, Frances and Ellen, ran a small private school in Nelson and also taught music, dancing and drawing. From 1885 to 1890 Emily kept a diary, which is now in the Taranaki Museum; typescripts are in the Alexander Turnbull Library. It is a fascinating journal, a commentary on colonial society and a well-educated family who lived a life of genteel poverty. Unfortunately, Emily burnt an earlier diary of her life in New Plymouth when she discovered her parents chuckling over it. She destroyed it before they had a chance to explain their amusement was not ridicule and that they thought it a very worthwhile document.

Emily took painting more seriously than Frances or Ellen, although they too were sometimes able to sell their work. Her greatest interest was in painting botanical subjects, especially native plants, but she also did landscapes and, as her diary recorded, some still life and bird life (for example, “Bellbird on Clematis”). She first painted with watercolours on white drawing paper, then Bristol board. After visiting the Melbourne Exhibition (1880), she began painting on satin and coloured paper, and later some of her paintings were in oils. Despite the cost involved in packing and shipping her art works, which included screens, table tops and mantle drapes, Emily Harris exhibited at the New Zealand court of the Melbourne Exhibition (1880), at the New Zealand Academy of Fine Arts (which was formed in 1882) in Wellington, at the Auckland Art Students’ Exhibition (1885) and the New Zealand Industrial Exhibition (Wellington, 1885). In 1885 she attended a public meeting when the organiser of the New Zealand court for the Indian and Colonial Exhibition (held in London in 1886), Dr Julius von Haast, visited Nelson to talk to potential exhibitors. It is an interesting reflection of the times that von Haast, the famous geologist and explorer of New Zealand, later noted that this was the first occasion that ladies had attended one of his meetings (Emily was accompanied by three other women).

The exhibits Emily sent to London gained favourable notices, and a black satin fire screen with white flowers painted on it, encased in a fine wooden fretwork surround, gained a first prize and silver medal at the New Zealand Industrial Exhibition. However, the recognition gained in such exhibitions did not lead to an increase in local sales or to more pupils. Emily recorded in her diary that 1885 had not been a good year,

as far as selling went the worst year I have had for some time — a great deal of expense with my exhibits and very little received, no sale for cards, our school much less, indeed if I do not get some drawing pupils, I shall be ruined, unless something else turns up. Ellen has been fortunate to get six music pupils or what would have happened I don’t know.

The Harris sisters were a well-known and well-liked family and their precarious financial position did not go unnoticed, for friends frequently gave tactful help. When Ellen had a long illness during the winter of 1886, friends
"kept us supplied with wine, brandy, porter [beer brewed from charred or browned malt], eggs, soup, jellies and many other things." The Harris sisters were kind — Emily recorded receiving a letter from a woman thanking her for teaching her daughter for so long without payment — and community minded. They frequently took part in fund-raising for such groups as their church and Dr Barnado Homes. When Emily, Frances and Ellen gave weeks of their time to preparing and rehearsing a tableau (theatrical entertainment), the cast, knowing of their needs and lack of funds, presented them with a new sewing machine.

In November 1889 Emily wrote, "I have added up all our accounts and find we cannot pay all we owe." So an exhibition was arranged in Nelson — admission: one shilling; season ticket: two shillings. Her father and sisters contributed paintings, sales were good and the bills were paid. Enough cash remained for Emily to board the S.S. Mabinapua for a trip to New Plymouth to visit Mary (probably a married sister) and to exhibit some of the family's paintings there. The sale of paintings in New Plymouth covered expenses only ("They tell me this is a musical place, not at all artistic"). Mrs Hetley saw the exhibition, Emily noted. Emily visited Mr Egmont and on the return journey:

When we emerged from the forest we found that our road lay through a bush clearing which had been on fire some days before and which had unhappily burnt some of the finest trees in the forest. We found that there were fires in many directions, it was the season for burning. To me it seemed dreadful to see the lovely forest so recklessly destroyed.

More paintings were sold when the Harris exhibition was held in Stratford, though sales were mostly to friends.

Another family exhibition was held in Nelson in August 1890, and sales were encouraging. This inspired Emily to send five cases of pictures to Wellington and arrange an exhibition there. During her visit she had tea with Thomas Kirk and his wife — "Mr Kirk showed me a lot of lovely pressed flowers from Campbell Island and lent me some to copy, he is coming tomorrow to show me over the Botanical Gardens." Although local newspapers had published favourable notices of the Harris exhibition, hardly anyone visited it. Emily sadly noted that the Wellington public had been so often taken in by worthless exhibitions "that they cannot imagine mine to be really good". It also coincided with the elections and the circus — "They go by the thousands to the circus."

In the hope of making some money, Emily Harris decided to have some of her botanical paintings of New Zealand plants published in book form. Through the agency of a Nelson bookseller and stationer, H. D. Jackson, she obtained a quotation from S. W. Walker & Co., London, but their estimate was too high. Mr H. D. Jackson kindly agreed to bear the cost of publishing in return for a share of any profits. In 1890 Emily Harris's three small books, New Zealand Flowers, New Zealand Berries and New Zealand Ferns, appeared. Prior to printing in England, sample paintings
were displayed, and Emily and her family and friends obtained subscriptions for about two-thirds of the number of sets that were to be printed. Each book contained twelve plates; some sets were uncoloured, others were hand-coloured by Emily. The subdued and delicate colours of the latter sets could not compete with the brightly coloured and larger volumes of the Featons and Mrs Hetley. Later, some copies of the book (in coloured and uncoloured versions) were sold in a single volume.

Emily Harris's work was highly regarded by artistic friends. The well-known painter John Gully and his family were close friends, and Gully, who died in 1888, gave constant encouragement and support to Emily. She wrote in her diary, after receiving praise from a school teacher, Miss Hamilton, for the fire screen she had exhibited in Wellington: "When she had gone I felt it was something to have the power to give such great pleasure to any one. It is a fact strange perhaps yet true, how little I think about and how seldom I remember compliments I receive, but this lady's was unusual."

The diary ended in 1890. Two years later Frances died and in 1895, both Ellen (aged forty-four) and then her father, the latter on 25 May.

A book entitled New Zealand Mountain Flora was completed in the 1890s but remained unpublished. It was purchased in London in 1970 by the Alexander Turnbull Library. Emily Harris illustrated a children's book, Fairyland in New Zealand: a Story of the Caves, by Mrs Ambrose Eyles Moore (Sarah Rebecca Moore), published by Brett Printing and Publishing Company, Auckland, in 1909. This fifty-eight page story is not lacking in incident, involving as it does an Austrian geologist, friendly Maoris (including a servant named Tekoori!), a fairy queen, a fairy godmother, smugglers and, to cap them all, a tuatara, that with a kiss from a fairy, becomes a handsome prince. There are six full-page, black-and-white illustrations with titles such as "The fairy queen of the cave finds a mortal child", "At the Maori Pah", "The smugglers find Payerre". Other drawings by Emily decorate the twelve chapter headings. New Zealand plants are not neglected, for the illustrations clearly include native raras (Metrosideros species), flax (Phormium), manuka (Leptospermum scoparium), Clematis and the Mt Cook lily (Ranunculus lyallii), one of her favourite subjects.

Emily continued to live in the family home at 24 Nile Street East, Nelson, and painted and sketched for the rest of her life. In 1924 the Alexander Turnbull Library purchased sixty-three of her watercolours of New Zealand plants for ten shillings each. A set of three prints from this collection was issued in 1968 in an edition of 2,500, and in 1979 a further edition of four different prints was issued. Each of the two sets contained a folder in which a further painting was illustrated (in black and white in the first set), as well as brief notes on the plants illustrated and biographical details of Emily Harris. The second set has two other paintings reproduced on the text sheet.

Emily Harris died in Nelson on 5 August 1925, aged eighty-eight.
The illustrations

As others have noted, Emily Harris's paintings vary considerably in quality and style. The lithographs in *New Zealand Flowers*, *New Zealand Berries* and *New Zealand Ferns* are very well composed and accurate. In the hand-coloured versions the colouring, though rather subdued, is reasonably true to life. However, these lack fine details of, for example, leaf venation and flower structure. The books lack a text except for the scientific and Maori or popular names of each plant and a sentence or two about the plant and its distribution. This information is printed below each illustration. *New Zealand Berries* should have been titled *New Zealand Fruits*, for several of the fruits illustrated are not, strictly speaking, berries.

Some of the watercolours in the Alexander Turnbull collection are fine works of art, rather than good examples of scientific botanical illustration. Janet Paul, well-known art historian, (in *Women in New Zealand Society*, edited by Phillida Bunkle and Beryl Hughes, published by George Allen & Unwin, 1980) described the watercolours as "poetic realisations which try to evoke the essence of a particular plant in a way more akin to a Chinese brush drawing than to the precise elegance of the French botanical engravings".

The pen, ink and watercolour originals for the unpublished *New Zealand Mountain Flora* (PLATES 33 and 34) are superb examples of botanical illustration. They are quite finely detailed, especially the creeping lawyer (PLATE 34), and vividly and accurately coloured. The plants are shown in their environments, and this represents an advance on most of the botanical illustrations of predecessors and contemporaries. It may be that in some instances, where the plants seem to fit "uneasily" into their background, that Emily Harris did not see them in their natural habitat. In such cases the background seems to have been painted from a photograph. The twenty-nine illustrations (which include a frontispiece) are on paper about 25 x 31 centimetres and are watercolours with outlines in Indian ink. Each illustration is accompanied by a brief text, giving some details of the plants and their distribution. As was fashionable in the Victorian age, some plants are the subject of "delightfully awful" poems, written by the artist. Thus the edelweiss (PLATE 33):

    Enwrapped in garments soft and warm,  
    As robes of eider down,  
    And velvet capes, all starred with gold, 
    Serve for a royal crown.

    Straight to the skies their upward gaze, 
    Uncheck'd, unblushed they turn, 
    As if to reach some loftier plane, 
    These gentle flowerets yearn.
Mrs Hetley's Native Flowers

The Native Flowers of New Zealand. Illustrated in colours in the best style of modern chromo-litho art, from drawings coloured to nature, by Mrs Charles Hetley (Georgina B. Hetley), first appeared in three parts in 1887 and 1888. It is remarkable that three books of paintings of native plants by three resident women artists, each first published in three separate parts, then as single volumes, should appear within approximately a year of one another — one of them wholly printed and published in New Zealand (Featon), another printed in England but published in New Zealand (Harris), and the third printed and published in England (Hetley). Native Flowers was published by Sampson Low, Marston, Searle and Rivington of London. The chromolithographs were by Leighton Brothers, a London firm with a high reputation, who produced coloured illustrations for the Illustrated London News.

In 1888 the three parts were issued as a single volume. Some forty-five species of plants were illustrated (eighty species appeared in the Featons' Art Album and thirty-five species in Emily Harris's three books). It was noted earlier that a copy of Art Album was presented to Queen Victoria on her Jubilee in 1897. She received a copy of Native Flowers a decade earlier, "Dedicated by Special Permission to Her Most Gracious Majesty, Victoria, Queen of Great Britain & Ireland and Empress of India".

No other book on New Zealand plants can claim a French edition. Fleurs Sauvages et Bois Précieux de la Nouvelle-Zélande. Ouvrage illustré à profusion de magnifiques planches en couleur représentant 46 plantes en fleurs, presque toutes non figurées jusqu'à ce jour, plantes et fleurs dessinées et peintes d'après nature (Wild Flowers and Valuable Timbers of New Zealand. A work illustrated with a profusion of magnificent plates in colour representing 46 plants in flower, almost all not illustrated until now, plants and flowers drawn and painted from nature) appeared in 1889. It was co-authored by Edouard Francis Armand Raoul (1845-98). This edition was published jointly by Sampson-Low, etc., and Galignani's Library, Paris, under the editorship of Challamel and Company and Charles Bayle, Paris. The French edition must now have considerable monetary value, for, of fifty copies printed, only fifteen were for sale. Two copies are in the Alexander Turnbull Library. Edouard Raoul was a nephew (not a grandson as stated in A. G.
Bagnall's *New Zealand National Bibliography*, 1980) of Etienne Raoul (1815-52). He met Mrs Hetley when he visited New Zealand in 1886 and suggested the French edition. At that time he was a member of a scientific mission on a voyage around the world. The main purpose of the expedition was to introduce commercially important plants to French overseas territories. The French edition contains an extra plate illustrating the large common vegetable sheep, *Raoulia extima*. *Raoulia*, a member of the daisy family (Compositae), consists of twenty New Zealand species and a few New Guinean and Australian ones and was named after Etienne Raoul, which explains why it was included in the French edition. The plate was lithographed by A. Millot, Paris; the Leighton Brothers' lithographs were used for the other plates. Mrs Hetley's entertaining preface was omitted from this edition and replaced by one written by the French editors. At the end of the book some sixteen pages are devoted to a section on New Zealand trees ('Bois précieux de la Nouvelle-Zélande'), which is absent from the English version. Sixteen trees, mostly of economic importance, including rimu (*Dacrydium cupressinum*), kauri (*Agathis australis*), totara (*Podocarpus totara*), red beech (*Nothofagus fusca*) and putiri (*Vitex lucens*), are described, with information on wood density, tensile strength, and so on. Only two of these species are illustrated in the plates.

The French edition, on the other hand, does not contain the three pages of uncoloured sketches of flowers and floral dissections. It was suggested to Mrs Hetley, when she arrived in London to arrange for the publication of her book, that she should include floral sketches and dissections. She did this work at Kew Gardens; some sketches were traced from books in the Kew Library, others were made from dried specimens in Kew Herbarium. Most but not all species shown in the thirty-five plates are illustrated in these three pages.

The text of *Native Flowers* is, apart from the eight-page preface, brief; a page preceding each plate gives, in a few sentences, details of distribution, size, characteristic features and time of flowering.

Georgina Hetley was first inspired to paint plants "growing in their native state" after hearing a talk in Auckland by Thomas Cheeseman about a collecting trip he had made to mountains near Nelson, Arthur's Pass and the Otira Gorge, Canterbury. By 1884 she had made a start, and Cheeseman helped her to identify the plants she had painted. Thomas Kirk also gave assistance. The Government gave aid in the form of free travel passes on the railways, and the Union Steamship Company issued her with passes for their steamers. Sir Robert Stout, Premier and Minister of Education, promised to purchase copies of the book for public schools and libraries.

The trials and tribulations of travel around New Zealand in the 1880s are vividly described in the preface. "Every new flower was a delight and wonder; and the scenery, which I might otherwise have seen, and the delightful excursions with kind friends to help get flowers for 'The Book', was enough to repay all my fatigue."
PLATE 35 *Libertia ixioides*

This member of the iris family (Iridaceae) is widespread from Northland to Stewart Island, especially on banks, rocks and stream edges. With its rush-like form and regular white flowers, it has become a popular garden plant. In shaded situations leaves are green; when exposed to full sunlight they turn brownish-yellow. There are three other native species of *Libertia*. Although "ixioides" is incorrectly given as "exioides" on the plate, the correct spelling is used in Mrs Herley’s text.

PLATE 36 *Hebeeria lyallii* (mountain ribbonwood or lacebark)

*Hebeeria lyallii* (which has also been known as *Plagianthus lyallii*) is one of the few deciduous trees in the New Zealand flora. A member of the mallow family (Malvaceae), it is common in mountainous regions of the South Island. *Hebeeria lyallii* is closely related to another deciduous species, *Hebeeria glandulosa*, which occurs on the western western side of the Southern Alps and has darker green, less hairy leaves. Current opinion seems in favour combining the two species into one, *Hebeeria lyallii*, and regarding them as separate varieties. A few years ago mountain ribbonwood was discovered in the North Island on Mt Egmont. The terms "lacebark" and "ribbonwood" derive from the fact that the inner bark contains a lacework of fibres. These were used by the Maoris to make string, which could be plaited into a variety of articles. The three other species of *Hebeeria*, all evergreen, are restricted to New Zealand. The white flowers of mountain ribbonwood, some three centimetres in diameter, are formed in abundance in summer, when trees of mountain ribbonwood are easily recognisable at a considerable distance.

PLATE 37 *Metrosideros fulgens* (climbing rata)

In *Native Flowers* this species is labelled *Metrosideros floridus*. Under the international rules of botanical nomenclature, this name is invalid as *fulgens* has priority, being the first name to be used for the species. Another plant, northern rata, *Metrosideros robusta*, was once also termed *M. floridus*. *Metrosideros fulgens* occurs in coastal and lowland forests throughout the North Island and in parts of the South Island, where it reaches as far south as Westland. It is found also on the Three Kings Islands.

The artist has accurately depicted the yellow-green tinge that petals have in the bud stage (at top) and the characteristic woody capsules (lower right) of this species. The small, dried petals are compensated for by the scarlet stamens, with their terminal, yellow pollen sacs, and the single, scarlet style, which sits on top of a sunken ovary in the centre of each flower. *Metrosideros fulgens* is the only rata to flower over the winter. Flowering begins in February and continues into July or even August. In her description Mrs Herley stated, “it clothes the lower part of the tree and becomes a tree itself, killing the one which assisted it to climb.” This is incorrect, for this species remains a climber, with stems that do not exceed about ten centimetres in diameter.

PLATE 38 Ferns

The three preceding plates were taken from the chromolithographs in *Native Flowers*. This illustration is from a watercolour now in the Alexander Turnbull Library, Wellington. The four small ferns, *Hymenophyllum longicaudatum* (1), *Trichomanes (Cystopteris) reniforme* (2), *Blechnum membranaceum* (3) and *Hymenophyllum flabellatum* (4) are common in lowland forests throughout the North Island. They are, excluding *Blechnum membranaceum*, which is restricted to localised regions of the South Island, common too in lowland forests of the South Island and Stewart Island.

*Courtesy of the Alexander Turnbull Library, Wellington, New Zealand*
Libertia exioides
Plate 38

Hymenophyllum sanguinolentum (Forst. f.) Swartz;
Trichomanes reniforme Forst. f.; Blechnum membranaceum (Col.) Mett.;
Hymenophyllum flabellatum Labill.

Georgina Hetley
She deplored, as did Emily Harris, "the smoke of the burning 'bush'. The beautiful forest with its flowers and ferns is fast disappearing before the tide of cultivation, and many will only be known by their dried and shrivelled remains" — this with reference to Taranaki. On then to Wellington:

After a twelve hours' journey by train to Palmerston, I started at six the following morning on my overland journey by coach to Wellington, going through the famed Mangawatu Gorge, sleeping one night on the way, then starting at 4 o'clock a.m., and on through miles and miles of forest with some good bits of mountain scenery to Masterton, then by train to Wellington, zig-zag up the Rimutaka Mountain, with the great engines (from I think), puffing and snorting as if they hardly could get up. We looked down on the beautiful scenery, the trees red with Tetoki [sic] berries, passed the place where a train, engines and all, was blown down the hill by the wind, and then went through the tunnel and down the other side to the Hutt Valley.

The going got tougher in the South Island.

The roads ... are very narrow, with only just room for the coach, and no wall or anything to prevent one going over the precipice. Once as we were at the top of a mountain range, and had gone round a sharp curve, one of the traces broke. Some evil disposed men had wantonly set fire to the forest all along the road, burning whole sides of mountains and destroying some of the most magnificent scenery, we were several days in going through, it was still smoking and occasionally blazing up, and there was the risk of burnt trees falling on us. After leaving the coach we were driven by buggy twelve miles to the station, and had to pass over a burnt wooden bridge, which it was hoped would not give way.

Along the banks of the Buller River,

Your heart is in your mouth most of the way. At one place in particular, the road is built outside the cliff, and supported on piles, which are inserted somehow into the rock. The cliff rises perpendicularly above you, and there is only just room for the coach to pass round without touching, and there is hardly an inch to spare on the outside edge which has no wall or fence. If one of the horses shied or fell, coach and all would go over into the river, which rushes along two hundred feet below, and we saw all this from a turn in the road before we came to it, which made it worse. I kept my face turned to the cliff, but my niece, who was with me and had a stronger head, kept calling my attention to the magnificent scenery.

Then, at one river

we left the coach and entered a kind of wooden box, hung on a rope, which was wound up by a small steam engine on the other side. We slid down one side and up the other. It was not an unpleasant but a very curious sensation to find oneself suspended from one to two hundred feet above a broad rapid river. On one occasion the rope which pulled the cage on one side broke, and the passengers were dangling by the other over the roaring torrent until assistance came. When we landed at the opposite side we entered a bush tramcar drawn by one horse, a very primitive arrangement, on rails of wood.

On to Greymouth, then the bush tram again towards Hokitika

and enjoyed the quiet, smooth, plodding along through a narrow lane in the bush, always the same avenue stretching away in the distance, whether we
looked behind or ahead, there were tall forest trees, and masses of creepers, ferns, mosses, lichens and flowers, which I longed to gather, but we could not stop.

Heading towards the Otira Gorge,

We drove through beautiful scenery till we reached the Taipo, or Devil River, where we had to leave the coach and cross by a long narrow swinging bridge, which was rather a trial, as it oscillated so much. We got into the coach again on the other side, and to judge by the way the luggage was mixed up in the inside, it was well we had some other means of crossing.

They stayed at Arthur’s Pass for four days. Though it was late in the season, edelweiss (Leucogenes grandiceps) was found in flower and painted for the book. Georgina and her niece obtained “baskets full to overflowing with flowers, only a few of which I could paint at the time, others we packed in tins and took with us to Christchurch. Some we pressed, as well as the ferns.” They reached Christchurch and Mrs Hetley spent six weeks painting the flowers she had collected and then “some out of the native garden (the best in the colony), in the beautiful Botanical Gardens, where the Armstrungs, father and son, have cultivated the indigenous flora with great success, collecting the plants from the mountains, and also from Stewart’s and the Chatham Islands.” A two-day visit was made to Dunedin, where she met John Buchanain. “Mr. Buchanain, who, when he was the Government botanist, drew for the Transactions of the New Zealand Institute all the newly discovered plants” had by then retired, “a martyr to rheumatism, the usual result of exposure to our climate.” Buchanain, in fact, painted a plate for Native Flowers (plate 20) consisting of two senecios (Senecio robustus and S. bocori), both of which he had originally described.

Soon after her return to Auckland, Mrs Hetley sailed to England with her paintings to find a publisher. She spent some time at Kew then, while waiting to receive proofs to correct from the printer, she went to live in Madeira. She was able to make the corrections to proofs for part one, but parts two and three were sent to press before she could return corrected proofs. The reason for this was that Portuguese authorities in Lisbon had detained a parcel of proofs for two months (the Madeira Islands are Portuguese). The end result was, as Mrs Hetley noted in her preface, that the colouring in plates 18, 25 and 26 is not quite accurate.

Mrs Hetley’s husband, Charles, must have died some time before publication of Native Flowers, for there is no reference to him in the preface. Georgina Hetley acknowledged assistance from a brother, Henry, Secretary and Inspector of Customs, New Zealand, and a brother-in-law, Dr Hetley “of Norbury Lodge, Upper Norwood”. At Kew she had assistance from Sir J. D. Hooker, now retired, and the new director, his son-in-law, Sir W. T. Thiselton-Dyer.

It may seem strange that Georgina Hetley should have chosen to live in the Madeira Islands (the first port-of-call on Cook’s first and second voyages). The explanation is that she had, in fact, lived in Madeira with
her mother, older sister and four brothers before they (the McKellar family) had emigrated to New Zealand in 1852. They arrived in New Plymouth on 2 December — accompanied by two servants, Mr and Mrs Emmanuel De'Castro, who were, presumably, Portuguese — on board the St Michael. The ship had sailed from London, but called at Madeira to collect not only the McKellar family and servants but also another family (Mr and Mrs Mace and their eight children) and their two servants. Georgina’s father, Dugald McKellar, was a medical practitioner and, I presume, died before the family moved to New Zealand. Although Madeira was under British jurisdiction for only a few years early in the nineteenth century, trading contacts between the two countries had existed for many centuries. British expatriates had settled there, many hoping that the milder climate would improve their health. It could be then, although I have no evidence, that Dugald McKellar moved with his family to Madeira for health reasons and died there. Certainly, Georgina, who was about twenty when the family moved to New Zealand, had been born in London in about 1832.

In 1856(?), when she was twenty-four years old, Georgina Burne (some records spell this Barne or Barnes) McKellar married Charles Hetley. Hetley had arrived, without relatives, in New Plymouth in September 1853, on board the Joseph Fletcher from London. Charles and Georgina farmed in Taranaki, "where we went through the war and had houses burnt, and sheep, cattle, and horses carried off by the natives." They moved to Auckland, but I have been unable to discover exactly when. Georgina Hetley died there, aged sixty-six, of heart disease on 29 August 1899. She was survived by a son, aged forty-one.

The chromolithographs in Native Flowers are quite similar to those in Mrs Featon's Art Album, although many of the latter are more brightly coloured (or over-coloured). Most of Mrs Hetley's plates show the plants against a beige-coloured background, strengthening the resemblance to Mrs Featon's plates, which have, excluding the frontispiece, a grey or brownish-grey background. Some of Mrs Hetley's plates, however, have no background colour.

The general style of the two artists is very similar, but several critics have considered Mrs Hetley to be the better artist. Admittedly, the plants in some of her paintings do have a more natural appearance, but other illustrations could be taken for the work of either artist.

The Turnbull Library has, as well as watercolours of New Zealand plants (none of which appeared in Native Flowers), some botanical paintings that Georgina Hetley did when visiting Madeira and Australia. The Auckland Institute and Museum, The Hawke's Bay Art Gallery and Museum, Napier, and the Hocken Library, Dunedin, own some of her paintings too. Georgina Hetley exhibited at some of the same exhibitions as Emily Harris, including the Indian and Colonial Exhibition in London (1886), and won first prizes at the New Zealand Industrial Exhibition (Wellington, 1885) and Auckland Art Students' Exhibition (1885).
Georgina Hetley, Sarah Peaton and Emily Harris continued to paint native plants in the hope that public response would be encouraging enough for them to produce sequels, but further publications did not materialise.
Henry Field's
Ferns of New Zealand

The "Victorian fern craze" was at its height in England in the 1850s. Twenty years later this enthusiasm for ferns, which had been labelled "Pteridomania", became fashionable in New Zealand. The fern craze had its origin in the invention of the Wardian case. Nathaniel Ward, a London surgeon, discovered by accident that plants enclosed in nearly airtight glass cases can survive and grow almost indefinitely. Moisture that condenses on the inside of the glass when plants transpire in sunlight drips onto the soil at night. Today, bottle gardens use this principle. Wardian cases had considerable commercial application, because plants could be placed in them for long sea voyages and reach their destination in excellent condition, without needing attention en route.

Coupled with this desire to grow ferns in elaborate cases that could be displayed in drawing rooms was a craze for purchasing books on ferns. Publishers eagerly responded to the demand and many books were printed. Some of them were beautifully illustrated, for example, Walter Fitch's *A Popular History of the British Ferns*. Others had plates that were "nature printed" directly from fern fronds. Many fern enthusiasts made their own books of pressed ferns. By the late 1860s the fern craze was replaced by another fad in Britain — aquaria.

Joseph Hooker's *Flora Novae-Zelandiae* (1855) contained the first detailed descriptions of New Zealand ferns and these were updated in his *Handbook of the New Zealand Flora* (1864, 1867). In 1880 Herbert B. Dobbie's *New Zealand Ferns* appeared, first in two parts then in a single volume. Known as "Dobbie's Blue Book", and without text, it contained 104 pages of illustrations, sometimes with more than one species per page. The illustrations resemble blueprints and show natural-sized pieces of fern as white silhouettes against a garish blue background. Bagnall's *New Zealand National Bibliography* (1980) records that the illustrations were made from originals, which were mounted on glass and reproduced by dye process, a method Dobbie called "a simple form of photography or nature printing". Some of the illustrations were, it seems, made by his sister, Mary Beatrix Dobbie (1850-80). Herbert Dobbie gave his illustrations to Eric Craig.
(1829-1923), who reproduced them, after some rearrangement and the addition of a few new illustrations, in his own "Blue Books" (first edition ca. 1888, second edition ca. 1892). Eric Craig ran a shop in Auckland, where he catered to the "fern craze" and sold pressed ferns in elaborate wooden boxes, or mounted on cardboard or in books. The books were beautifully made with wooden ("mottled kauri") or leather covers. Some of these are still in excellent condition in the Auckland Museum. Craig also sold live ferns in Wardian cases, as well as Maori artefacts, carvings, shells, kauri gum and greenstone ornaments. Herbert Boucher Dobbie went on to write the most comprehensive books to date on the ferns, in which each species was illustrated by one or more photographs (New Zealand Ferns, 2nd edition, 1921; 3rd edition, 1931; 4th (1951), 5th (1952) and 6th (1963) editions, revised and edited by Marguerite Crookes).

Eight years before Field's Ferns appeared, Thomson's The Ferns and Fern Allies of New Zealand, with Instructions for their Collection and Hints on their Cultivation was published (1882). George Malcolm Thomson (1848-1903) was then a teacher at Otago High School, Dunedin. He became one of the most distinguished biologists of his time and made major contributions to the fields of pollination ecology of flowering plants, introduced plants and animals, and marine zoology. Through his efforts the Portobello Marine Biological Station was established in Otago. Thomson's 132-page book, with four plates and a frontispiece, contained descriptions of all species then known and was praised by Thomas Cheeseman for its accuracy and usefulness. The lithographic plates illustrate thirty-nine of the 145 species described in the text. Thomson's drawings are well done, but rather crowded on each plate.

**Field's Ferns of New Zealand**

H. C. Field's The Ferns of New Zealand and its Immediate Dependencies with Directions for their Collection and Cultivation was printed and published by A.D. Willis, Wanganui, in 1890, in conjunction with Griffith, Farren, Okeden and Welsh of London and Sydney. It is of a larger format than Thomson's work and has 164 pages of text and twenty-nine plates. However, Thomson's book was more comprehensive, for it included fern allies, such as club-mosses (lycopods), water ferns and psilophytes. Field's Ferns described 138 species as well as a number of varieties, some of which are now recognised as separate species. All but six species are illustrated. The author recognised several new species but did not formally name them, simply citing the generic name, followed by "new species" (for example, "Pteris New species"). A few introduced species, which had been found growing wild, were included.

Henry Field was, in the introductory section of Field's Ferns, critical of previous books on New Zealand ferns, noting, "a written description of a plant can hardly render it capable of identification by a non-scientific reader unless it is illustrated by a drawing." Thomson's book was, he conceded, the best
book on the subject, but the plates "were only of portions of fronds, showing their fructification, and this seems to have been regarded as insufficient to enable identification of the plants. The price has now been lowered, and I learn that it is selling far better in consequence." The plates in Dobbie's *New Zealand Ferns* were "so roughly got up that few people seemed to care to buy them: in fact, as the fructification of the ferns was not shown, it would have been almost impossible to identify some of them."

Field's text is written in a clear style and has dated little. He has interesting things to say about what constitutes a fern, the parts of ferns, collecting, pressing and classifying them. A chapter on cultivation of ferns gives straightforward advice:

If you want to get a fern to grow, you must note the conditions under which it naturally occurs, and imitate these conditions as closely as you can... The best material in which to plant ordinary bush ferns is the mound formed by the utter decay of a large tree-stump. This is often to be met with in the bush, forming a mound, and is well worth the trouble of carrying it home. It is a good plan, in potting a fern brought from the bush, to cut away most of the fronds. This prevents the strength of the plant being exhausted, in the effort to keep the fronds alive, before the roots have got a proper hold of the soil, so as to draw nourishment from it; and when they have done so, fresh fronds will be produced... What most ferns want is an atmosphere so highly saturated with moisture that it will condense on their fronds like dew. Then they are in their glory... A very cheap and yet effective fernery, however, may be constructed with walls of closely packed manuka-scrub, secured to a wooden framework and a roof of similar scrub, left sufficiently open to admit a moderate amount of light.

As one might anticipate, with such a small botanical community in New Zealand, people whose assistance Field acknowledged included Thomas Cheeseman, William Colenso, George Thomson and Thomas Kirk. An interesting reflection of prevailing ideas on the place of women in New Zealand society is seen in Field's acknowledgement of assistance from "several ladies in various parts of the colony who might not care to see their names in print".

**Henry Field’s life**

Henry Claylands Field was born in Holybourne, Hampshire, England, in 1825. He was educated at Stockwell Grammar School, the City of London School, and at King’s College, London. He chose civil engineering for a career and was an articled pupil of Sir John Rennie, a famous engineer who completed the construction of the new London Bridge, which his father had designed. In 1845 Henry Field began working for an English railway company, then in 1851 he emigrated to New Zealand on the *Simla*. He was appointed clerk and engineer to the Wanganui Town Board, and subsequently acted as engineer or consulting engineer for a number of roads boards, being responsible for the construction of 2,000 miles (3,200 kilometres) of roads, including the Parapara Road between Wanganui and Taupo.
Field played an active part in public life and was for many years vice-president of the Wanganui Horticultural Society, president of the Wanganui Harmonic Society and a member of the Anglican Diocesan Synod and General Synod. He retired from active engineering work in 1884. Information is not readily available on Henry Field's wife, who bore him five daughters and six sons. Field noted in his book that four of his sons were, or had been, employed as government surveyors and that they, and his two other sons, collected many ferns for him. He himself had hunted ferns from north of Auckland to the Otago goldfields.

Following the publication of his book, Henry Field wrote five brief papers on ferns, which were published in the Transactions of the New Zealand Institute. They were based mostly on material sent by readers of his book. Although he commented on what he considered to be new species, he did not formally describe them in these papers. Field also wrote articles on astronomy and biology for the Wanganui Chronicle. His last paper for the Transactions was in 1905, and in this he mentioned that he had become blind.

PLATE 39  Blechnum, Gleichenia, Trichomanes and Phymatosorus

1. 1A  Vegetative and reproductive leaves of Blechnum capense (named as Lomatia procera in Field's book) are depicted here. Blechnum is the only genus of higher ferns in New Zealand to have markedly different, large, green, sterile leaves and brown fertile ones. Blechnum capense, the kiokio, is abundantly distributed in lowland to alpine forest in North, South and Stewart Islands, the Kermadec, Chatham, Auckland, Campbell and Antipodes Islands. It is a complex species, consisting of at least four separate forms. The kiokio occurs too in Australia, Tasmania, the Pacific Islands, Malaysia, South Africa, South America and the West Indies.

2.  Gleichenia discarpa (Gleichenia circinata), the swamp umbrella fern, is common throughout New Zealand in open scrublands. A small-leaved alpine form, variety alpina, thrives in mountain swamps, although it descends to sea level in the south of the South Island. Swamp umbrella fern occurs too in Australia, New Caledonia and Malaysia.

3.  Trichomanes (Cardiomanes) reniforme, the kidney fern, is shown also in Georgina Hedley's watercolour (PLATE 38). It is abundant in lowland forest throughout New Zealand. The common name derives, of course, from the shape of the leaves. The sporangia are borne in vase-like structures around the upper semi-circular margin of each leaf.

4.  Phymatosorus (Phymatodes) diversifolius. This too is a very common fern. It has a creeping stem (rhizome), which lies on the surface of the ground or on tree trunks. A fern that has been subjected to many name changes, it is known as Polypodium billiardieri in Field's book. The specific name diversifolius refers to the varied shape of the leaves, as indicated in the plate. The dark rounded spots on two of the leaves (4 and 4B) show the position of hemispherical clusters of sporangia. As well as occupying a wide range of altitude throughout New Zealand, this fern is found in Australia, Tasmania and Polynesia.

The illustrations in this plate are, as in Field's book, two-thirds actual size.
Henry Field had previously written another book, but on quite a
different topic — Modern Light on Christianity. Being a criticism of the
principal legends, and notes on modern religious knowledge, and on the Christian thought of the present day appeared in 1903, published by the author
and printed by A. D. Willis.

Henry Field died in 1911, aged eighty-seven.

The illustrations

The firm of A. D. Willis, publishers and printers of Field's Ferns, had a
high reputation, both for the quality of their letterpress and for their li-
thography, especially chromolithography. It was an enterprising firm, whose
postcards featuring views of New Zealand cities, Christmas cards and playing
cards were well known. A. D. Willis held a patent on a method for cutting
circular-cornered playing cards, which were sold for a shilling a pack and
were "equal to any imported" and considerably cheaper because of high
duty on English cards.

PLATE 40  Doodia, Lastrospis, Nephrolepis, Botrychium and Hymen-
ophyllum

1. *Doodia media* is a common fern found on dry banks in clearings and forest
margins in lowland parts of the southern North Island. It is uncommon south of
Rotorua but does reach Nelson and Marlborough. Young leaves are a characteristic
rose-pink colour. This species occurs also on Norfolk Island and Pacific Islands as
far east as Hawaii.

2. *Lastrospis (Ctenitis) velutina* lives in lowland forests in the North and South
Islands but is uncommon near its southern limits. The fronds, especially the stripes,
are covered with red-brown hairs. In Field's book the plant is named as *Nephrodium
velutinum*.

3. *Nephrolepis cordifolia*, known as "leather fern" or "sword fern", is restricted in
New Zealand to thermal areas in the Rotorua-Taupo district, but occurs also on the
Kermadec Islands and in many tropical regions.

4. *Doodia caudata* grows in Australia and discontinuously in the North Island of
New Zealand from Kahurangi southwards.

5. SA. *Botrychium austral* (Botrychium ternatum in Field's Ferns), the "parsley
fern", is scattered throughout the North and South Islands and usually grows in
lowland to montane forest margins and clearings. Although it may seem, from the
illustration, that there are separate vegetative (5) and reproductive (SA) leaves, both
appendages are generally considered to be morphologically part of a single leaf.
*Botrychium* belongs to a group, the Ophioglossales, that is believed to be rather
distant and more primitive than "higher" ferns.

6. *Hymenophyllum pulcherrimum*. The specific name of this species of filmy fern
means "most beautiful". A small, tufted fern with leaves up to twenty-five centimetres
or more long, it occurs mostly on tree trunks in lowland to montane forest. *Hymeno-
phyllum pulcherrimum* is found in the North Island (south of Auckland), South
Island, Stewart Island and the Auckland Islands.

In this plate the plants are shown two-thirds their natural size.
Plate 39

Blechnum capense (L) Schlecht.; Gleichenia dicarpa R. Br.;
Trichomanes reniforme Forst. f.;
Phymatosorus diversifolius (Willd.) Pichi Serm.

Henry Field
Plate 40

Archibald Willis had, like Emily Harris and Georgina Herley, exhibited at the New Zealand Industrial Exhibition (Wellington, 1885) and received the silver medal for chromolithographic printing. Dr T. M. Hocken, well-known surgeon, ethnologist, historian, bibliographer and founder of the Hocken Library, Dunedin, visited Wanganui in 1889 and toured Willis's establishment, which had approximately twenty-six employees. He expressed surprise and pleasure "at the perfection of Mr Willis's plant and apparatus for lithographic printing".

The lithographs for Field's *Ferns* were probably made by William ("Billy") Potts, a highly skilled technician whom Willis brought to New Zealand, probably in 1881, and who worked for him for nearly twenty years. Potts was a quiet retiring bachelor who lived in lodgings and took little part in community affairs.

The ferns illustrated do not follow the same order as they do in the text. Henry Field had hoped to use chromolithography "to print the ferns in their natural colours, and they were arranged according to those colours". This would have made the book "too costly for ordinary readers" and he had to be content with "a style of lithography which, though new and of a high class character, is less expensive".

As PLATES 39 and 40 demonstrate, the lithographs are unusual and more elaborate than normal monochrome ones. The first step in printing each plate was to give it a light buff-grey background colour, commonly used in chromolithography. Two other colours — medium grey for the bulk of each fern and dark grey for arrangement of sporangia, veins, and so on — were then printed over the background colour. Microscopic examination of the plates shows that the dark grey is overprinted on the medium grey. A separate stone was probably needed for each of these colours. In some plates (PLATE 40, 5A) a third colour, medium brown, was used to highlight a small part of the illustration. This colour was printed before the greys. Such a form of lithography certainly has some of the virtues of chromolithography, but at a lower cost. The first of the twenty-nine plates has thirty-four figures, illustrating the different types of fructifications (sporangia and their arrangement) in the ferns.
Thomas Kirk's Forest Flora of New Zealand

This book, commissioned by the New Zealand Government, was published in 1889. It contains 159 lithographic plates, of which seven are from photos, and illustrates 108 currently recognised species of trees and shrubs, including conifers. A good feature of the book is that any distinctive juvenile forms are illustrated. Most plants are depicted their natural size, but enlarged figures of flowers and fruits are frequently included. A less attractive feature is that "no attempt was made to arrange the species in systematic order", as it was intended that the work would be published in parts.

The plants chosen were all of economic or potentially economic value. Kirk's text describes each plant, its cultivation, properties, uses and distribution, and comments on each plate. His style of writing is superb, and the book makes fascinating reading, especially in its historical detail. One reads, for instance, that the heartwood of ake-ake (Dodonaea viscosa) is so tough that it was used, with good results, as a substitute for brass in machine bearings.

At least one copy of Forest Flora has (hand) coloured plates, and this is in the Turnbull Library, Wellington. Forest Flora sold for twelve shillings and sixpence, "in order to bring this valuable work within the reach of all" (George Didsbury, Government Printer).

Thomas Kirk’s life

As Thomas Cheeseman and Leonard Cockayne noted, Thomas Kirk (1828-98) was New Zealand’s most important botanist in the decades following publication of Joseph D. Hooker’s Handbook of the New Zealand Flora (1864-7). He wrote some 150 papers on the New Zealand flora, most published in Transactions of the New Zealand Institute. Thomas Kirk was born in Coventry (18 January 1828). He received no official schooling but was well educated by his parents. He worked first in the family nursery and landscaping business. His great interest in natural science was fostered at an early age, and his first paper, on ferns, was published when he was nineteen. At twenty-two he married and on the death of his father managed the
nursery business for a time. However, the hard work involved affected his health and he developed a permanent chest weakness, possibly tuberculosis. He therefore sought less physically demanding work and became bookkeeper, and in time partner, at Newark's, a large timber mill in Coventry. Continuing health problems and hard economic times persuaded him to emigrate to New Zealand with his wife and their four children in 1862.

On arriving in Auckland, his first employment was, it seems, breaking rocks at Mount Eden, hardly an ideal way to recover from the effects of acute seasickness. He then became a timber merchant in Auckland. Soon after arriving, he began his botanical explorations. In 1866, with Frederick Hutton, a trained geologist and later professor of biology at Canterbury University College, he explored Little Barrier and Great Barrier Islands. Their suggestion that Little Barrier Island be made a plant and animal sanctuary produced no immediate results. In 1868, on the recommendation of Hutton, Thomas Kirk became curator and secretary of the Auckland Institute and Museum, and was also in charge of the Meteorological Observatory. During this time he explored much of the North Island and published descriptions of new plant species. Today, some 200 of the names he gave to what he considered to be new species are still valid (Moore, 1973).

As a former timber merchant, Kirk deplored the "wantoness" whereby best-quality timber such as kauri (Agathis australis) was used "for purposes that would be equally well served by timber of an inferior quality". He drew attention to trees like rewarewa (Knightia excelsa), which were left to rot when forest was cleared for farmland because they were too perishable for external timber and "difficult of combustion" for firewood. Yet such timber, with its attractive and unusual grain, would, he noted, yield a handsome profit if exported to England for cabinetwork.

In 1874 Kirk was appointed professor of natural sciences at Wellington College (affiliated with the University of New Zealand). He later became a lecturer in biology and geology at Lincoln Agricultural College. While in Wellington, the Kirks lived in a small cottage in Tinakori Road, directly opposite the residence of the Premier, Julius Vogel. The cottage had no water laid on, and Thomas Kirk took the opportunity to discuss his ideas with the Premier when obtaining water from the Vogel residence. A result of this contact was the passing of the first New Zealand Forests Act (1874). Unfortunately, however, there were loopholes in the Act, and destruction of the forest continued. The second Forests Act of 1885, which was preceded by a report commissioned from Thomas Kirk, resulted in the setting aside of areas as state forest land under skilled management and control. The Act also provided for establishment of a school of forestry and agriculture. In that year Kirk was appointed chief conservator of forests in the newly formed forest and agriculture branch of the Lands Department. Within two years Kirk had some 800,000 acres proclaimed forest reserves. As chief conservator of forests he emphasised the increased employment and revenue that could be gained by the production of secondary forest products and deplored
the current practice “to export kauri resin to the United States and import it in the form of varnish, paying outward and inward freights, with the addition of a heavy duty, and allowing another country the profit arising from the manufacture”. Plans were made to establish a school of forestry, pomology and agriculture in Whangarei, but with the defeat of the Scout-Vogel Government in 1887, the new Atkinson Government cancelled these plans. Kirk pleaded vigorously and argued that it was sound economic sense to retain the forest and agriculture branch. However, his argument was unsuccessful and the branch was disbanded. The Government’s cost-cutting measures included the compulsory retirement of Kirk, aged sixty, at the end of February 1888. He was employed for a further three months to complete the Forest Flora, but in fact the task took an additional nine months. An application for the extra salary (£300) gained Kirk only £100, leaving him out of pocket. From then on the Kirks led a “hand-to-mouth” existence.

In 1894 Kirk was commissioned by the Government to write a student’s flora of New Zealand, which was to include all higher plants, rather than the common trees and shrubs covered in the Forest Flora. Work on this was incomplete when Thomas Kirk died, as the result of a burst pleural abscess, at Plimmerton on 8 March 1898. He was buried in a now-unmarked grave in Karori Cemetery, Wellington. The Student’s Flora of New Zealand and the Outlying Islands was published in 1899. It deals with most but not all dicotyledonous groups of flowering plants and includes plants from overseas that have become naturalised, for example, clovers (Trifolium species). Conifers and monocotyledonous plants (grasses, orchids, etc.) are not included. An anonymous “Introductory Notice” in the book, from the Education Department, Wellington, stated: “The Government have in view the necessity for making arrangements for the completion of the work”. A separate volume of illustrations was planned too, using the unpublished engraved copper plates that resulted from Cook’s first voyage. These were to be supplemented by republishing plates from Sir Joseph Hooker’s Flora Antarctica, Flora Novae Zelandiae and Flora Tasmaniae, but none of these plans materialised.

Thomas and Sarah Kirk had nine children, of whom five survived to adulthood. Kirk’s two sons also had biological interests. Thomas William Kirk became head of the biological and horticultural divisions of the Department of Agriculture, and Harry Borrer Kirk was appointed the first professor of biology at Victoria University College (now Victoria University of Wellington) in 1903, retiring in 1944 at the age of 85!

*Forest Flora* illustrations

Although Thomas Kirk did not personally prepare any illustrations for the Forest Flora, they were made under his supervision. He stated in the preface that most “of the drawings were made by draughtsmen of the Survey Department and a few by Mr. D. Blair and Mr. A. Hamilton”. The draughtsmen received scant recognition for their work, as their names were not
mentioned by Kirk, but most of the illustrations are signed. It was an
understatement that "a few" drawings were by Blair and Hamilton, for
together they contributed twenty-six plates and, judging by their style, some
of the unsigned ones are by Hamilton too. Kirk noted that as some of the
plates were drawn "during the absence of the author from Wellington a
few slight errors have crept into the works, but happily they are not of
sufficient importance to cause inconvenience".

Two members of the Survey Department, Hugh McKean and Hugh
Boscawen, each contributed thirty-eight signed illustrations, totalling exactly
half of the plates. Other contributors were E. J. Graham (twenty-nine plates)
and W. de R. Barclay (one plate). Of the twenty unsigned plates, most
seem to be the work of Boscawen or Hamilton.

As one would anticipate with so many illustrators, the quality of the
work is uneven. This unevenness can sometimes be found in the work of
individual illustrators, especially McKean and Graham. The most outstand-
ing plates are those by Boscawen and Blair. Hugh Boscawen used heavy
shading to good effect (PLATE 42). The best drawings by E. J. Graham
are almost on a par with the best of Boscawen and Blair. In some illustrations
Graham seems clearly to be influenced by the distinctive style of Boscawen.
In fact, one plate illustrating the wharangi (Melicope ternata) contains draw-
ings by Boscawen and Graham that, in the absence of signatures, one would
assume to be the work of a single artist. Hugh McKean's illustrations do
not attain quite the standard of these three illustrators, but overall his
drawings are very good, if at times somewhat "mechanical". A. Hamilton's
drawings are generally less detailed and not as good as the others. Judging
by the "del et lith" on some plates and the fact that Blair, Boscawen and
Graham prepared lithographs from photographs taken by professional pho-
tographers, it seems that each illustrator prepared his own lithographs.

David Blair, a Scotsman, came to New Zealand in 1881 and was the
first master of the Canterbury School of Art. He resigned from this position
in 1886 and moved to Wanganui.

John Hugh Boscawen (1851-1937) was born in Cornwall. He entered
the Royal Navy and visited New Zealand in 1869-70 on the Britannia, a
training ship. After leaving the navy, Boscawen came back to New Zealand
in 1876 and joined the Survey Department, in time becoming chief clerk.
He retired in 1919 and returned to Cornwall.

Augustus Hamilton (1853-1913) was born in Dorset and arrived
in New Zealand in 1873. He taught at schools in several districts before
becoming registrar of Otago University in 1900. He was a keen botanist,
zoologist, geologist and ethnologist, and wrote many articles for the Trans-
actions of the New Zealand Institute. In 1903 he succeeded Sir James Hector
as director of what is now the National Museum, Wellington.

It has not been possible to find biographical details of other Forest
Flora illustrators.
PLATE 41 *Coprosma repens* (taupata)

This common coastal plant is named as *Coprosma balearica* in *Forest Flora*. The species name *repens* meaning "creeping" is something of a misnomer. It received the name because it was described from a collection made by the French expedition of Dumont d'Urville in 1827, who found a prostrate form of *taupata* clinging to coastal rocks. It varies, depending largely on habitat, from a shrub to a tree up to eight metres high. There are separate male and female flowers, which are usually borne on different plants. The ripe "berries" (drupes) are orange-red and up to one centimetre in diameter. *Taupata* occurs in coastal regions of the North Island and as far south as Banks Peninsula in the South Island, and on Three Kings and Kermadec Islands.

Blake's illustration (from which rather distracting magnified drawings of flowers and fruits have been deleted) shows foliage with female (1) and male flowers and young flower buds (2). He has, with the minimum of shading, shown nicely the convexity of upper leaf surfaces. A characteristic feature of *Coprosma* (and some other unrelated native plant genera) not shown in the illustrations, although they would have been clearly visible, are leaf domatia. These are small pits, of unknown function, opening on the underside of the leaves. The opening to each domatium is located in the acute angle formed above the junction of the mid-rib and a lateral vein. *Taupata* is a popular hedge plant in coastal areas.

PLATE 42 *Agathis australis* (kauri)

The kauri is named as *Dacrydium australis* in *Forest Flora*. Hugh Boscawen's illustrations show foliage and two immature (top) and mature female cones. Kauri, the largest tree in the New Zealand flora, occurs naturally in the north of the North Island, with its southern limits near Kawhia and Tauranga.

PLATE 43 *Podocarpus ferrugineus* (miro)

The illustration shows male cones (1) and female fructifications (2). An unattractive feature of this place, which occurs in some of E. J. Graham's other ones, is that in pasts (for example, upper left) background stripping is used instead of showing leaves that are partly obscured by leaves lying above. Miro is a widely distributed lowland forest tree, up to thirty metres in height, occurring throughout North, South and Stewart Islands. Some authorities consider that *Prumnopitys ferruginea* is the valid name for the miro.

PLATE 44 *Geum uniflorum*

The plant shown was collected from the mountains above Arthur's Pass, Canterbury, at 1,200 metres. A member of the rose family (Rosaceae), *Geum uniflorum* is confined to alpine regions of the South Island from the Nelson district southwards at altitudes of 900 to 1,700 metres. Professor W. R. Phillipson (*Rock Garden Plants of the Southern Alps*, 1962) considered it among the best alpine plants we have to offer. It flourishes in wet habitats — peaty herbfields and damp rocky ledges. It has creeping stems that end in a rosette of leaves with hairy margins. The leaves are a glossy green when young and often turn a deep crimson as they age. Each flower is borne singly on a long stalk and has white petals, red stamens and a crimson mass of carpels in the centre.

Figure 1, petal (x2); figures 2 and 3 are internal and external views of a stamen (x6); figure 4, a carpel (x6); figure 5, side view of a flower after the petals have fallen (x2); figure 6, a fruit (x8) and figure 7, a longitudinally halved fruit, showing the single, basally attached seed within (x8).
PLATE 45  *Pachystegia insignis* (Marlborough rock daisy)

At the time of the *Illustrations*, this shrub was known as *Olearia insignis*. The name was changed to *Pachystegia* by Cheeseman when he prepared the second edition of *Manual of the New Zealand Flora*. *Pachystegia* means "thick covering" and refers to the large number of regularly arranged bracts that clothe the bud (shown at centre). It is one of our most attractive shrubs and is widely cultivated. It is restricted to the northeast of the South Island from the Waitau River in Marlborough to Waitau in Canterbury. Although *Pachystegia* is common on limestone cliffs in the Kaikoura region, it also occurs inland. Recent work has indicated that there are at least six different forms of *Pachystegia*, and further studies may result in several species being recognised. *Pachystegia* reaches two metres in height.

An unusual feature of this plate is the inclusion of a sketch of an entire plant, made from a photograph by Cheeseman sent to Matilda Smith. The specimen was obtained from the Awatere Valley, Marlborough. Leaves are leathery, glossy, dark-green above and white below. Each "flower", as in all Compositae, is actually an aggregation of many flowers (florets). The "flowers" have white spreading rays, forming large outer petals around a yellow centre.

Figure 1, outer ray floret (*x*3); figure 2, a more central disc floret (*x*3); figures 3 and 4, a pappus hair from the outside of a ray floret and a disc floret, respectively; figure 5, three stamens (*x*8); figure 6, stigmatic region to which pollen adheres at the centre of each floret (*x*8); and figure 7, a young plant, reduced from a photograph.

PLATE 46  *Celmsia Hectori* (alpine daisy)

This plant is confined to alpine regions (1,300 to 2,000 metres in altitude) of the southern half of the South Island. The prostrate stems branch profusely and bend upwards to end in tight masses of densely hairy leaves, silver above and whitish below. A single plant can be a metre or more in diameter. The "flowers" resemble *Pachystegia* in having white petals and a yellow centre. The plate is a fine example of the lithographer's skill. Flowers and lowermost leaves have been given a bolder outline to emphasise the fine hairy upper leaves and flower stalks.

Figure 1, bract from underneath the "flower" (*x*3); figure 2, an outer ray floret (*x*3); figure 3, a pappus hair from the outside of a ray floret (enlarged considerably from figure 2 but magnification not stated); figures 4 and 5, disc florets (*x*3, *x*4); figure 6, three stamens; figure 7, stigmatic region from the centre of a floret (*x*8). The specimen was obtained from Mr Ollivier, in the Mt Cook district, at an altitude of 1,800 metres.

PLATE 47  *Dracephyllum recurvum*

There are thirty-five native species of *Dracephyllum*, members of the Ericaceae, related to the true heath family (*Ericaceae*). *Dracephyllum recurvum* is a low prostrate or semi-erect shrub, about a metre in diameter, with distinctive, recurved, bluish-green leaves, which are crowded at the tips of branches. Confined to the North Island in subalpine to alpine regions at 900 to 1,500 metres, it is particularly common in Tongariro National Park but occurs too on Mt Hikurangi and the Kaimanawa and Ruahine Ranges. The small white flowers are in groups of four to ten. Cheeseman obtained this specimen from the base of Mt Ruapehu at 1,050 metres.

Figure 1, leaf (*x*2); figure 2, flower (*x*5); figure 3, an internal view of an opened petal tube (corolla) to which the five stamens are attached (*x*5); figure 4, centre of flower with petals removed (*x*5); figure 5, one of the scales (nectary?) that surround the ovary — see figure 4 — (*x*7); figure 6, a sectioned ovary showing how the ovules (potential seeds) are arranged like bunches of grapes (*x*5); figure 7, a ripe capsule, formed from the ovary (*x*3); figure 8, seed (*x*8).
Plate 41

Coprosma repens A. Rich. (taupara)  
David Blair  
(in Kirk's Forest Flora)
Plate 42

Agathis australis Salisb. (kauri)

Hugh Boscawen
(in Kirk's Forest Flora)
Plate 43

*Podocarpus ferrugineus* G. Benn. ex D. Don.

E. J. Graham
(in Kirk's *Forest Flora*)
Plate 44

*Geum uniflorum* Buchan.

Matilda Smith
(in Cheeseman's *Illustrations*)
Plate 45

Pachystegia insignis (Hook. f.) Cheesem.
(Marlborough rock daisy)

Matilda Smith
(in Cheeseman's Illustrations)
Plate 46

*Celmisia hectori* Hook. f.

Matilda Smith
(in Cheeseman's *Illustrations*)
Plate 47

*Dracophyllum recurvum* Hook. f.

Matilda Smith (in Cheeseman's *Illustrations*)
Plate 48

Anarthropteris lanceolata (J. Smith) L. B. Moore

Matilda Smith
(in Cheeseman's Illustrations)
Thomas Cheeseman's Illustrations of the New Zealand Flora

This two-volume work was published by the New Zealand Government Printer in 1914. It contains 251 uncoloured lithographic plates, illustrating 268 species of native flowering plants, conifers, ferns and fern allies. At the time of its appearance, Thomas Cheeseman was the most notable botanical taxonomist in New Zealand. Illustrations was preceded by his unillustrated Manual of the New Zealand Flora (Government Printer, 1906). In fact, Cheeseman's Manual, a second edition of which appeared in 1923, two years after he died, remained the 'official' New Zealand flora until the appearance in 1961 of volume I of Flora of New Zealand by H. H. Allan.

Planning the Illustrations

Originally it was envisaged that the Illustrations would appear simultaneously with the Manual, but this would have led to a delay in the appearance of the latter. Originally, too, it was suggested that the Illustrations would comprise, on a reduced scale, reproductions of the unpublished engravings resulting from Cook's first voyage, in which case this book would have gone full circle.

Plate 48 Anarthropteris lanceolata (fern)

This fern has suffered numerous name changes; in the Illustrations it is known as Polypodium dictyopoteris. A distinctive fern, with leaves from five to twenty-five centimetres long, it is common as an epiphyte on tree trunks but occurs too on rocks or banks in lowland forest. The fern has a condensed rhizome (stem) to which woolly roots are attached. Sporangia are grouped in hemispherical clusters in two rows, one on each side of the midrib, on the underside of the leaves. The presence of each group of sporangia is indicated by a bulge on the upper surface of the leaf. Anarthropteris occurs throughout the North Island and the north and west of the South Island as far as Greymouth.

Figure 1, two clusters (sori) of sporangia (×3); Figure 2, two sporangia that contain the spores by which ferns reproduce, and three associated multicellular hairs (considerably enlarged but magnification not stated).
The trustees of the British Museum, owners of the plates, were willing to give permission. However, the plants collected on that voyage were obtained from just a few coastal localities in the North Island and the north of the South Island. They would therefore give a very incomplete picture of the flora. Cheeseman noted too: “the plates themselves, although accurate, and undoubtedly of great historic value, were of somewhat antiquated style, and were deficient in the microscopic analyses now considered essential in all really good botanical drawings.”

A second suggestion was that the plates in J. D. Hooker’s *Flora Novae-Zelandiae* (1852-5) and *Flora Tasmaniae* (1855-60) might be reproduced by photolithography, supplemented perhaps with illustrations of New Zealand plants that had been published in *Curtis’s Botanical Magazine* and *Icones Plantarum*. Cheeseman pointed out that, although one could not object to the style and character of these plates, they did not give an all-round view of the flora.

Few alpine plants were included and important genera, such as *Coprosma*, were inadequately represented. Some new illustrations could have been prepared to “fill up the blanks”, but “the two classes of plates — old and new — would not form a harmonious whole”. He therefore recommended to the Education Department that all the plates should be specially drawn up for the work, and this was accepted. Thomas Cheeseman noted in the preface:

I took it for granted that the Government had no desire to trouble with the preparation of plates of a character capable of being undertaken by an enterprising publisher, and treated in a sufficiently popular manner to command a remunerative sale, or, in other words, that there was no intention of producing a series of drawings selected mainly on account of the beauty and attractiveness of the plants portrayed. I assumed that the true object of the work was to issue plates of an educational character, so selected as to present an accurate and comprehensive idea of the main features of the flora, and so designed and executed as to be of real use in the study and identification of the plants of the Dominion. Furthermore, as the work would be issued under the auspices of the Government of the Dominion, it was felt that there would be no necessity to sacrifice scientific accuracy and excellence of design for the sake of cheap production.

The next task was to select an artist. Although there were competent botanical artists living in New Zealand, as many of the foregoing plates have illustrated, Cheeseman was not happy to use any of them. He stated that it

would have been a satisfaction, both to the Government and myself, if there had been some competent botanical artist resident in New Zealand to whom the work could have been entrusted, but no person possessing the necessary qualifications could be found. Nor is this all surprising, for botanical drawing, together with a knowledge of how to prepare the microscopical analyses required, is an art in itself; and the number of good botanical artists in England even is small. I was therefore compelled to seek for a competent person outside the Dominion, and after some negotiation it was decided to offer the work to Miss Matilda Smith, of the Royal Herbarium, Kew.
Matilda Smith was certainly well qualified. For some time previously she had been sole artist for Curtis's Botanical Magazine and J. D. Hooker's Icones Plantarum, and had illustrated a number of floras including Aitchinson's Botany of the Afghanistan Delimitation Commission (1888), Collet's Flora Simulantis (1902) and Johnston's Liberia (1906). Nearly 5,000 of her drawings had been published before Illustrations of the New Zealand Flora appeared. The lithographs were made by J. N. Fitch, nephew of W. H. Fitch, the latter of whom has been described as the most prolific of all botanical artists. The plates were printed in London by West, Newman and Company, and the text by John Mackay, Government Printer, Wellington.

Matilda Smith remained in England, and plants were collected (mostly by Cheeseman), pressed, dried and despatched to Kew. Fresh specimens were photographed, and flowers and fruits preserved in fluid and forwarded to her so that the drawings could be as lifelike as circumstances permitted. To avoid the delays that would be involved in sending proofs of the drawings and lithographs to and from England and New Zealand, Mr W. B. Hemsley, late assistant director of Kew, acted as supervisor. He guided the artist in the dissection of flowers and fruits, indicated which parts were to be shown as separate enlargements on each plate, examined proofs and gave final approval for printing.

Thomas Frederic (sometimes incorrectly spelt as Frederick) Cheeseman was born at Hull, Yorkshire, in 1846. His father, the Rev. Thomas Cheeseman, was a popular Methodist minister. He took his family to New Zealand in 1854 in the hope that a throat ailment, aggravated by preaching, might be cured in the better climate that his brother-in-law assured him existed in Auckland. Cheeseman's daughter, who was interviewed by Rewa Glenn in The Botanical Explorers of New Zealand (1950), stated that her father, who was eight years old when the voyage was made, probably saved the ship, the Artemisia, from being wrecked near North Cape. He noticed a groaning sound while lying in his bunk in the bow of the ship and immediately alerted the captain, who found they had hit a reef. Thomas Cheeseman's interest in botany is said to have shown itself on the very day of arrival in Auckland, for he rushed to a tree fern growing on the foreshore, removed a frond and insisted on taking it to his uncle's house in Panmure, where the family stayed for a time.

The Rev. Thomas Cheeseman, who has been described as a "dissenting minister" and is not listed in the archives of the Methodist Church of New Zealand, took a prominent part in public life and was, for a time, a member of the Auckland Provincial Council. He was president of a committee that initiated the railways but was later taken over by the Government. A keen astronomer, he had his own observatory in Remuera. Thomas Cheeseman was educated at Parnell Grammar School, and later, when the family moved to Meadowbank, he attended St John's College until he was nineteen. On
leaving college he worked on a farm his father had purchased. His interest in natural history, especially botany, was kindled by the appearance of Sir Joseph D. Hooker’s *Handbook of the New Zealand Flora* (1864, 1867). The New Zealand Institute (which later became the Royal Society of New Zealand) was founded in 1867 and this would have provided further stimulus.

Thomas started what became a popular field club with his three sisters, Emma, Nelly and Clara. As a result of his numerous excursions in the Auckland region, Cheeseman published his first paper, “On the Botany of the Titirangi District of the Province of Auckland”, in the *Transactions of the New Zealand Institute*, volume 4, 1872. This remains the only account of the vegetation of the Waitakere ranges before it was drastically modified by settlers. Dr Leonard Cockayne, New Zealand’s most famous plant ecologist, noted how accurate and comprehensive this account of plant life was and marvelled that Cheeseman’s botanical knowledge had been acquired “unaided in any way”.

Cheeseman became interested in orchids, prompted no doubt by the publication of Charles Darwin’s book *The Fertilisation of Orchids* (1862), and made a detailed study of cross-pollination in the greenhood orchid, *Pterostylis*. This was published in the *Transactions of the New Zealand Institute* in 1873. He began to correspond with overseas biologists and sent an account of his observations on orchids to J. D. Hooker at Kew. Hooker passed this information on to Darwin, who, in a later edition of his book on orchids, gave an account of pollination in *Pterostylis*, concluding with the acknowledgement “All that I have here said is taken from the admirable description given by Mr Cheeseman”. Thomas received a copy of this edition, inscribed “With the Author’s compliments and respect”.

By now Cheeseman’s botanical work was becoming well known, and in 1874 he was appointed secretary of the Auckland Institute and curator of the museum. He had, in fact, served in an acting capacity as curator for some time before that. The museum was then in its infancy and temporarily located in the old post office in Princes Street. It was a small, two-roomed, weatherboard building. Cheeseman’s sister Emma learnt the skill of taxidermy and prepared bird specimens for him at home. Thomas’s three sisters were skilled artists, and the Auckland Museum possesses some of Emma’s botanical watercolours. Clara wrote magazine articles and a novel, *The Rolling Stone*. Thomas Cheeseman directed the Auckland Museum for fifty years. In 1889 he married Ellen Cawkwell. They had a son, Major Guy Cheeseman, and a daughter, who became Mrs Grant-Taylor.

Although Cheeseman was primarily a botanist, he was also interested in zoology and ethnology. Of 101 published papers and books, twenty-two deal with the latter two subjects. It has been stated that he could have achieved equal renown in zoology had he chosen to make that subject his life’s work. Nor were his botanical studies of an academic nature alone. In the words of Cockayne, his studies were “of high significance for agriculture,
horticulture and forestry”, but his greatest contributions were to floristic botany.

Much of New Zealand was unexplored botanically when he began his studies. In 1887 he accompanied an expedition to the Kermadec Islands and reported on their flora. He explored also the Three Kings and found several new plants. In 1899 Thomas and Ellen Cheeseman went on a Government trip to the Cook Islands. Again Thomas almost experienced a shipwreck, for their vessel was caught for a day on a reef fringing Rarotonga. His report on its flora was published in the prestigious Transactions of the Linnean Society of London. For fifty years, during his vacations, he botanised over much of the North Island and parts of the South Island. His observations and the new species he described paved the way for his Manual of the New Zealand Flora. Some of his publications were broad and philosophical, for example, his writings on the origin of the New Zealand subantarctic flora.

The Auckland Museum was developed to a high standard by Cheese-
man, despite having never more than three staff. The displays, some of
which still survive, were models of neatness, informative and painstakingly
compiled. Dr A. W. B. Powell, a member of the scientific staff of the
museum for many years, has written that Cheeseman was no dry-as-dust
scientist. He gave freely of his time, no matter what the enquiry, but he
could on occasion become abrupt, even to the point of rudeness, if confronted
with pomposity. Dr Powell added, “To adults he gave the impression of
studious abstraction, but in the presence of youth his manner would relax,
and an inborn — only lightly concealed sense of humour — would emerge.”
He was noted for his punctuality, and it was said that in the days when he
rode a horse to the museum and passed by a certain homestead, the occu-
pants would check their clock to ensure it was keeping good time! Unfortu-
nately he died not long before the Auckland War Memorial Museum,
which he had helped to plan, was built. The museum received Cheeseman’s
extensive herbarium, “a great botanical asset”. In 1946 the Cheeseman
Memorial Hall was opened in the museum, and his memory is today kept
alive by the museum with the Cheeseman Memorial Lectures and occasional
special displays on botanical themes.

Thomas Cheeseman received many distinguished awards, including a
fellowship of the Linnean Society of London, a fellowship of the Zoological
Society, corresponding membership of the Botanical Society of Edinburgh,
presidency of the New Zealand Institute in 1911, an original fellowship of
the New Zealand Institute and, shortly before he died, the Gold Medal of
the Linnean Society, one of the highest distinctions science can offer. He died
of a heart attack on 15 October 1923.

His greatest contribution to New Zealand botany was his Manual of
the New Zealand Flora, a work that, as Cockayne put it, “can be used with
all confidence in the certain knowledge that it contains the well-considered
conclusions of a master mind”.

[125]
Matilda Smith
(1854-1926)

Matilda Smith, the first botanical artist to comprehensively illustrate the New Zealand flora, was linked to J. D. Hooker, who wrote the first detailed flora of New Zealand (1864, 1867), a book that served as an inspiration to Thomas Cheeseman. A second cousin of Hooker’s, she was invited to the Royal Botanic Gardens, Kew, of which he was director, to be trained as a botanical artist. Sir Joseph was himself a botanical draughtsman of considerable ability and undertook to teach her and supervise her work. The invitation was made when the greatly talented botanical artist and lithographer Walter Hood Fitch (1817-92) withdrew his services in 1877 as illustrator of *Curtis’s Botanical Magazine*, which Hooker edited. W. H. Fitch had prepared most of the plates for this periodical since 1834, and after his resignation Hooker’s daughter, Harriet Ann, later Lady Thiselton-Dyer (1854-1946), “held the fort” until Matilda arrived.

Miss Smith was born in Bombay on 30 July 1854, and came to England in her infancy. Her first drawing for the *Botanical Magazine* was in October 1878, and from 1887 to 1920 she was practically sole artist, contributing some 2,300 plates, only 600 fewer than Fitch, by the time her last one appeared in the February 1923 issue. Matilda Smith frankly acknowledged her admiration for her predecessor’s work and her inability to emulate it. Nevertheless, she became a talented botanical artist, preparing many of the lithographs from her drawings. She contributed also more than 1,500 plates to Hooker’s *Icones Plantarum*, which illustrated and described plants selected from Kew Herbarium.

Matilda Smith was noted for her skill in “re-animated dried, flattened specimens, often of an imperfect character”. In addition to the floras mentioned at the beginning of this chapter, she illustrated a number of other books, including Watt’s *The Wild and Cultivated Cotton Plants of the World* (1907). Her penmanship was very neat and she had remarkable skill in making copies of plates to complete imperfect volumes in the Kew Library.

Although associated with Kew for nearly fifty years, Matilda Smith was not appointed official artist until 1898, and even then was employed for only two days a week. This arrangement enabled her to continue working on *Curtis’s Botanical Magazine* and *Icones Plantarum* and to undertake commissions for any unofficial publications. She retired in 1921.

Matilda Smith gave freely of her time to assist visitors to Kew and took an active part in local public matters. She was the first woman to be appointed president of the Kew Guild, an organisation of senior employees of Kew. In 1921 she became the second woman to be elected an associate of the Linnean Society of London. She was awarded the Silver Veitch Memorial Medal of the Royal Horticultural Society “for her botanical draughtsmanship, especially in connection with the Botanical Magazine”. Two plants have been named after her, *Smithiantha*, a member of the family Gesneriaceae, which includes the African violet (*Saintpaulia*), and *Smithiella*, a Himalayan member of the nettle family (*Urticaceae*).
J. N. Fitch, who prepared the lithographs for the *Illustrations*, has been described as second only to his uncle, W. H. Fitch, in industry. He lithographed nearly 2,500 drawings for *Curtis's Botanical Magazine*, in a style difficult to distinguish from that of his uncle, from whom he had received most of his instruction in drawing. He was a talented artist whose work included the illustrations (in colour) for the eleven-volume *The Orchid Album* by R. Wattet and B. S. Williams (1882-97), and illustrations in Horwood's *A New British Flora* (1919). He was elected a fellow of the Linnean Society in 1877. His artistic career was terminated in 1920 by an illness that resulted in the loss of the use of his fingers. In appreciation of his work, he received a Civil List pension a few years before he died. Wilfrid Blunt, in probably the most authoritative book on botanical art, *The Art of Botanical Illustration*, is critical of Matilda Smith's skills. He commented that she remained to the end a rather fumbling draughtsman, more remembered for her great pains and untiring efforts than for her skill. He added, "she owed much to John Fitch, who made some attractive lithographs from her rather hesitant sketches". The illustrations in Cheeseman's book are clearly skilfully done, but the extent to which their excellence is due to "retouching" by John Fitch when he made the lithographs is an interesting question. Fortunately, it can be answered, for the original pencil drawings Matilda Smith prepared for the *Illustrations* are at the Auckland Institute and Museum. These drawings, signed by Miss Smith, differ little from the lithographs apart from being mirror images, as is characteristic of lithography. They demonstrate unequivocally that Fitch added few extra touches apart from some finer shading.

The *Illustrations* of the New Zealand Flora remained for many decades the most comprehensive and accurate collection of illustrations of the native flora. Today, a good copy of this work fetches several hundred dollars. Each plate is usually accompanied by a single page of text by Thomas Cheeseman. A valuable feature is that it indicates who was the first to collect the plant and the date and location of this discovery. This is followed by a summary of its range of distribution and a brief description of the plant. Associated plants and any economic uses are also frequently noted. The legend for each plate indicates where the particular plant illustrated was collected. Most drawings are natural size and include enlarged figures of flowers and fruits, frequently showing dissections. It is usual for a single plant species to be illustrated in each plate, but some smaller plants (for example, some orchids) are shown two per plate. At the end of the second volume is a list of illustrations of native seed plants and ferns that had appeared prior to the publication of *Illustrations*.
CODA

The illustrations reproduced in this book span nearly 150 years. The most remarkable botanical artist to illustrate New Zealand plants during that time was surely Sydney Parkinson. He was obliged to work under more difficult conditions than other artists mentioned, with the possible exception of George Forster. Despite the difficulties of frequently working in an ill-lit cabin on a small pitching and tossing sailing ship, he produced in a very short time over 200 watercolours of New Zealand plants. Although most of these illustrations were incomplete, he filled in sufficient detail to enable the skilled illustrators Joseph Banks hired after the voyage to complete them. These finished watercolours have all the detailed accuracy and, with a few exceptions, colour fidelity of the very best large-format colour photographs. This achievement was not Parkinson’s alone, for Banks and Solander kept a critical eye on his work throughout the voyage. Sydney Parkinson did, as noted, use “artistic licence” at times in his landscape paintings, but Banks was a stickler for strict accuracy in the portrayal of plants and animals. Sydney Parkinson’s illustration was, though, more than Banks’s “colour camera”, as the artistic and pleasing way in which the paintings are composed demonstrates.

An interesting thread runs through the 150-year time span in the form of William and Joseph Hooker. Banks did much to inspire William Hooker to specialise in botany and no doubt regaled him with incidents that took place during the voyage of the Endeavour. Banks also helped to secure William Hooker’s first professional botanical appointment and laid the foundation for Hooker to become director of Kew Gardens twenty years after Banks’s death. This institution has, more than any other, increased our knowledge of the world’s flora. William Hooker must have admired Parkinson’s illustrations during some of the visits he had made to Banks in London.

Hooker not only was a fine artist himself, as PLATE 14 shows, but had the ability to instruct others with artistic talent so that they became outstanding botanical artists, as in the case of his protégé Walter Fitch. Fitch became William Hooker’s artistic alter ego when the latter gave up illustrating on account of the pressure of other duties. Joseph Hooker, through inheritance and tutoring, acquired much of his father’s artistic skill and developed a rapport with Walter Fitch too. Accordingly, Fitch was able to produce excellent detailed illustrations from Joseph’s rough sketches and the specimens he had collected for such works as Floraantarctica and Flora Novae-Zelandiae. Walter Fitch’s skill as an artist and lithographer was passed on to his nephew John Fitch, who not only prepared many fine
lithographs of New Zealand plants for *Curtis's Botanical Magazine*, but did the lithography for Cheeseman's *Illustrations*. A further link with the Hookers was that it was Joseph's cousin, Matilda Smith, who did the drawings for *Illustrations of the New Zealand Flora*. Joseph Hooker was as adept at training her as a botanical artist as his father had been with Walter Fitch, although it seems that Matilda Smith arrived at Kew with considerably less artistic skill than Walter Fitch had when William Hooker first met him. There were, even, tenuous links between the Hookers and some of the French illustrators I have mentioned. For example, William Hooker, on his first visit to the Continent in 1814, met Bory de Saint-Vincent, with whom he maintained a life-long correspondence. Bory de Saint-Vincent, as noted in chapter III, contributed some illustrations and text to the *Voyage ... La Coquille*.

The influence of the Hookers and their artists was not lost on some of the botanical artists resident in New Zealand at the time, as the botanical illustrations by Walter and John Fitch passed in John Buchanan's scrapbooks demonstrate.

Of the New Zealand resident artists considered in this book, Martha King seems closest to the Sydney Parkinson mould, by virtue of the accuracy, faithfulness of colour and pleasing composition of her paintings. Emily Harris seems to possess the most distinctive style; some of her paintings, especially those of the two sets issued by the Turnbull Library, leave no doubt as to their author. They may lack the finest detail and fidelity of the best scientific botanical illustrations, but as works of art they offer much.

By the time Cheeseman's *Illustrations of the New Zealand Flora* was in preparation, there were, as illustrations in this book indicate, botanical artists of considerable talent resident in New Zealand. These artists could, under the guidance of a botanist with a keen eye, have prepared suitable illustrations for Cheeseman. In fact, Cheeseman need not have looked further than his sister Emma, as her paintings of New Zealand orchids, now in the Auckland Institute and Museum, show. Be that as it may, Cheeseman considered there was no "competent botanical artist resident in New Zealand", and it must be admitted that Matilda Smith and John Fitch made an excellent job of the *Illustrations*, a work that, at the time (1914) and for many years to come, was the most comprehensive set of detailed illustrations of New Zealand plants.

I have not attempted in this book to cover all competent botanical artists who illustrated New Zealand plants up to 1914. Rather, I have considered artists who, in general, had illustrations published in their lifetime, with the exception of Sydney Parkinson.

I have not confined myself to reproducing only those examples of an artist's work that had already been published. Choice of artists has, of course, been a personal one. I have chosen to reproduce, in most instances, several examples of one artist's work in preference to other artists whose work I was less enthusiastic about.
CODA

It is only in recent years that the paintings of some talented nineteenth-century New Zealand botanical artists ― for example, Martha King ― have been "rediscovered". Another example is Fanny Bertha Good (1860-1950), who lived in Taranaki throughout her long life and received little recognition. Her paintings, 260 of which are now in the Taranaki Museum in New Plymouth, seem closest in style to those of Emily Harris.
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Dr F. Bruce Sampson is Reader in Botany at Victoria University of Wellington. He was born in New Plymouth and was educated at New Plymouth Boys High School, Christchurch Secondary Teachers College and Victoria University, where he obtained an M.Sc. and Ph.D. In 1969–70 he spent ten months as a Post-Doctoral Fellow in the Botany Department, University of California, Berkeley, and he was a Visiting Professor in Botany at Louisiana State University, Baton Rouge, for nine months in 1976–7.

He is co-author with Dr John H. Troughton of *Plants — A Scanning Electron Microscope Survey*. Dr Sampson's main research interest is in primitive living flowering plants, especially members of the families Monimiaceae, Trimeniaceae and Winteraceae. He has published extensively on the floral morphology, cytology, embryology and pollen ultrastructure of these groups.

Bruce Sampson's interests outside botany include photography, art (although he says he is no artist), do-it-yourselfing and music. Bruce and Vivienne Sampson have two young sons and live on the Western Hutt hills.