

## Annotated summaries of letters to colleagues by the New Zealand botanist Leonard Cockayne–2

A. D. THOMSON

Botany Division, DSIR, Private Bag, Christchurch, New Zealand

**Abstract** Seventy holograph letters from Leonard Cockayne to colleagues in New Zealand and overseas have been summarised and annotated. The latter correspondents are J. D. Hooker (3 letters, 1904–1911), W. T. Thiselton-Dyer (3 letters, 1899–1904), W. B. Hemsley (6 letters, 1902–1914), D. Prain (29 letters, 1906–1921), A. W. Hill (19 letters, 1923–1928), W. L. Jepson (4 letters, 1900–1922 and 1 letter from Jepson to Cockayne, 1911), and E. C. Jeffrey (1 letter in 1929), and the former are H. G. Ell (1 letter in 1912), Mrs B. S. Halcombe (1 letter in 1925) and J. S. Yeates (3 letters, 1926–1927). Also included are 4 typescript letters from Hill to Cockayne, and a congratulatory letter and cable relating to Cockayne's award of the Darwin Medal. Three additional holograph letters are included: C. E. Foweraker to Prain, Prain to Hill, and H. H. Allan to the Royal Botanic Gardens, Kew. Of particular interest are the letters from Cockayne to three Directors of the Royal Botanic Gardens, Kew (Thiselton-Dyer, Prain, and Hill). Explanatory notes are given after each group of letters.

**Keywords** Leonard Cockayne; letters; biography; New Zealand botany; botanical history

### INTRODUCTION

This second part of letters from Leonard Cockayne to his colleagues presents data in the sequence adopted earlier (Thomson 1979): brief note about recipient with references to biographies, date and address on letter, annotated summary of contents, number of pages, and source and explanatory notes after each group of letters. The holograph letters or copies are retained at Botany Division, DSIR. Only Cockayne's letters, not the recipients', are recorded, except one typescript letter from Jepson to Cockayne, 4 typescript letters from A. W. Hill to Cockayne, and a congratulatory letter signed by 17 colleagues and a cable, both relating to Cockayne's award of the Darwin Medal. Three additional holograph letters are also included: C. E. Foweraker to D. Prain, Prain to Hill, and H. H. Allan to the Royal Botanic Gardens, Kew.

All plant names are given exactly as in the letters, except that Cockayne always used a capital initial letter with personal names for specific epithets and these have been changed to a lower-case letter. Genera and species are given in italic although they were often not underlined by Cockayne. All other words underlined in the letters are italicised.

The correspondence includes letters to colleagues overseas (J. D. Hooker, W. T. Thiselton-Dyer, W. B. Hemsley, D. Prain, A. W. Hill, W. L.

Jepson, and E. C. Jeffrey) and in New Zealand (H. G. Ell, Mrs B. S. Halcombe, and J. S. Yeates). The correspondence between Cockayne and the Royal Botanic Gardens, Kew is of particular interest and covers the period of the directorships of Thiselton-Dyer (1885–1905), Prain (1905–1922), and Hill (from 1922). The correspondence between Cockayne and von Goebel (Thomson 1979) covers a somewhat comparable period (1892–1931). However, whereas the Kew correspondence is concerned with more formal aspects of Cockayne's work, the correspondence with von Goebel reflects a long and close fellowship between two leading botanists. Both series of letters add to our knowledge of botany, the history of botany, and biographical information about Cockayne.

### CORRESPONDENCE TO COLLEAGUES AT THE ROYAL BOTANIC GARDENS, KEW

#### Cockayne to Hooker

##### RECIPIENT

Sir Joseph Dalton Hooker (1817–1911) was Assistant Director of the Royal Botanic Gardens, Kew, from 1855 to 1865 and Director from 1865 to 1885. Biographical information is recorded in Anonymous (1912), Hemsley (1911–12), and Cockayne (1912a).

##### ANNOTATED SUMMARY OF LETTERS

1. 10/10/1904 (Island Bay, Wellington). Cockayne sends paper on vegetation of Southern Islands

[Cockayne 1904], “. . . which will ever be associated with your honoured name. Whatever may be the many shortcomings of my little works, the photographs at any rate may perhaps be of some interest to you” (2 pp.).

2. 2/1/1905 (Island Bay, Wellington). Thanks Hooker for “. . . your honoured letter” and is delighted Hooker is pleased with above paper. “No letter that I have ever received has given me so much pleasure or so great encouragement. When on Auckland Island, you were never absent from my thoughts. I pictured your joy on seeing those magnificent composites and umbellifers, and the wealth of liverworts, mosses and filmy ferns in the forest”. They anchored close by where the *Erebus* and *Terror* anchored. Cockayne has also been to Dusky Sound [cf. Cockayne: Goebel Letter No. 17, Thomson 1979] and the remains of Cook’s hut is still to be seen — “There the ground and the trunks of beech or pine are covered as closely with *Trichomanes reniforme* as when they [Cook and Forsters] saw it first and the same shrubs still project over the calm waters of the sound — *Olearia oporina* and *Dracophyllum longifolium*, while the rata almost dips its leaves into the water”. But elsewhere in New Zealand, native vegetation has been “. . . replaced by European invaders and the whole landscape much more English than Antipodean”. Thanks Hooker for paper on flora of British India [Hooker (1904), the inscribed copy from Cockayne’s library is retained at Botany Division] and refers to Himalayan rhododendrons growing in Wellington and “In my former garden [Tarata Experimental Garden, New Brighton, Christchurch], on the Canterbury Plains near the sea, I grew a number of Himalayan alpine plants, several species of *Primula* being very luxuriant and growing side by side with cultivated *Celmisias* and *Ranunculus lyallii*” (4 pp.).

3. 26/6/1911 (127 Linwood Avenue, Christchurch) [This letter is not part of the collection of copies of Cockayne:Kew letters but is a holograph letter enclosed in the copy of “New Zealand Plants and Their Story” (Cockayne 1910) sent by Cockayne to Hooker and now retained at Botany Division. The book is inscribed by Cockayne on the title-page “Sir Joseph Hooker, O.M., F.R.S. with the Author’s Compliments”. Also written on the title-page is “Sold at Sothebys, after Hooker’s death, in May 1912”]. Cockayne acknowledges letter from Hooker and again thanks latter “. . . for all the great trouble that you have taken on my behalf”. Cockayne has been “. . . plodding day by day over the sand-dunes of both islands, and staying at night at so-called “hotels”, or settlers’ houses . . .” [Cockayne 1911]. “Of course I know by now that I was not amongst those recommended for election by the Council of the R.S., but I certainly never expected that I should be for there were certain to be men with better

claims, who had been candidates [for F.R.S.] far longer than myself. I quite appreciate also that my work (published) has not extended over many years, my first paper having appeared in 1898 i.e. 13 years ago [in fact the first research item published by Cockayne was in 1891, on humble-bees (Cockayne 1891)]. I might have commenced publishing at a much earlier date, but I was by no means sure that I was able to say anything worth saying, and above all I did not wish to be premature. But, I am trying to make up for lost time”. Sends “. . . little book [Cockayne 1910, cf. Thomson 1975b] which the Education Department has published for me. It was written mainly to stir up some interest here in the botany of the country. I had hoped ere this to have finished my larger work [Cockayne 1921d] and to have had the really great pleasure of sending you a copy, but my Government work on sand-dunes has delayed matters a great deal. My report is however now in the printer’s hand and I can get at the more agreeable task”. During dune investigations he saw “. . . only known example of Raoul’s *Pittosporum obcordatum* . . .” and secured seed — seedlings differ in leaf form from adult. He also found prothallus of *Loxsonia*, “. . . and it is of the ordinary type and bearing no resemblance to the prothalli of the *Hymenophyllaceae*” (4 pp.).

#### SOURCE

Dr E. J. Godley of Botany Division examined the Cockayne:Kew correspondence at the Royal Botanic Gardens, Kew in August 1973 (see Godley 1979, p. 211) and copies of holograph Letters No. 1 and 2 were provided by Dr P. S. Green and are retained at Botany Division. The source of the holograph Letter No. 3 is referred to above and is also retained at Botany Division.

#### EXPLANATORY NOTES

Cockayne clearly recognised the high status of a colleague such as Hooker and wrote to him with appropriate deference. Letter No. 2 includes a small item about Cockayne’s Tarata Experimental Garden which adds to our knowledge of the Garden (see Cockayne:Halcombe Letter No. 1; Cockayne:Goebel letters and Cockayne:Foweraker Letter No. 4, Thomson 1979; Thomson 1978, p. 398).

Letter No. 3 is of particular significance because it refers to Cockayne’s candidature for a Fellowship of the Royal Society and the support he received from Hooker. Although Cockayne was unsuccessful in 1911, he was elected in 1912 (Hill 1935, p. 448) and his sponsors are given in Thomson (1979, p. 403). Cockayne recorded in the Cockayne:Goebel Letter No. 28, “This [F.R.S.] was largely Hooker’s doing, and it was indeed a wonderful thing that a man of his great age [94] should have been watching the career of a worker in a land so distant . . .”. Letter No. 3 also includes the

comment about "New Zealand Plants and Their Story": "It was written mainly to stir up some interest here in the botany of the country".

### Cockayne to Thiselton-Dyer

#### RECIPIENT

Sir William Turner Thiselton-Dyer (1843–1928) was appointed professor at the Royal Agricultural College, Cirencester (1868), Royal College of Science, Dublin (1870), and to the Royal Horticultural Society (1872). In 1875 he was appointed Assistant Director of the Royal Botanic Gardens, Kew (and in 1877 married Harriet Anne, eldest daughter of J. D. Hooker). Thiselton-Dyer succeeded Hooker as Director at Kew in 1885 and retired in 1905. Biographical information is recorded in Anonymous (1929a, b), D. W. T. (1929), Prain (1930), and Blunt (1978).

#### ANNOTATED SUMMARY OF LETTERS

1. 15/8/1899 (Tarata, New Brighton, Canterbury) [letter is incorrectly addressed to Thiselton Dyer]. Cockayne sends small package of seeds of 92 species — each packet has number which corresponds with the one used in series of papers on seedling forms [e.g., Cockayne 1899]. "I am also working at the oecological plant geography of a typical portion of this island, much of which is yet botanically unexplored . . ." and hopes to send seeds of rare plants. He could also send living filmy ferns — those sent to Messrs Backhouse of York travelled well and suggests that seedlings packed in *Sphagnum* would travel safely (has sent in this way to Goebel [see Cockayne:Goebel Letter No. 5, Thomson 1979]). If required, Cockayne will send seedlings and points out ". . . that many are slow to germinate and that all, even true alpine plants, are best raised in peat". Asks how he can be of service and requests Kew seed catalogue and seeds of trees, shrubs, bulbs, and alpine plants. "I may say, I am not a Nursery Gardener, but merely a private individual who spends his whole time in the study of Botany" (3 pp.). (Written on the letter, but not in Cockayne's handwriting is note: "Can he send fresh seeds, packed in moist soil of *Celmisias*; *Ranunculus*, large fld. species; *Loxsonia* (spores); terrestrial orchids (tubers)").

2. 8/6/1900 (Tarata, New Brighton, Canterbury) [letter incorrectly addressed to Thiselton-Dyer]. Acknowledges receipt of 100 packets of seeds and has sent seeds of large-flowered *Ranunculi* and *Celmisias* — packed in wet earth as suggested and space in box filled with dormant rhizomes of *Ranunculus lyallii* packed in wet moss. Parcels are sent via Montevideo and will not reach London before 20/7/1900 but letter is due on 11/7/1900. Cockayne sends bag containing 130 kinds of seeds — mostly collected by himself on western portion of Southern Alps at 2500 ft and upwards.

Again suggests raising alpine seed in peat and asks how he can be of further use. Requests *Kew Bulletin* (3 pp.).

3. 23/11/1904 (Island Bay, Wellington). Sends ". . . a small collection of my plant-geographical photographs. By degrees, I hope to send you the whole of my collection, in the hope it may be of some use to Kew". Encloses explanation of the photographs (1 pp.). (Written on the letter but not in Cockayne's handwriting is note: "66 photographs and 6 folios of explanatory notes, received Dec. 27/04. Ackd. 5.i.05").

#### SOURCE

These letters are part of the Cockayne:Kew correspondence (see p. 406) and copies of the 3 holograph letters are retained at Botany Division.

#### EXPLANATORY NOTES

These letters appear to indicate Cockayne's first formal contact with the Royal Botanic Gardens, Kew, and they show his willingness to contribute seeds, seedlings and also photographs; presumably the 66 photographs sent to Kew on 23/11/1904 (Letter No. 3) are still retained there. Kew reciprocated by providing seeds and apparently the *Kew Bulletin* (Cockayne's copy of the *Bulletin* for 1909 is retained at Botany Division). But there is no mention of herbarium specimens (cf. p. 417).

### Cockayne to Hemsley

#### RECIPIENT

William Botting Hemsley (1843–1924) was appointed Keeper of the Herbarium and Library of the Royal Botanic Gardens, Kew, in 1899 and retired in 1908. Biographical information is recorded in Anonymous (1924a, b) and Jackson (1925).

#### ANNOTATED SUMMARY OF LETTERS

1. 26/8/1902 (Tarata, New Brighton, Nr Christchurch). Cockayne sending reprint of paper on vegetation of Chatham Island [Cockayne 1902] for review in *Botanisches Centralblatt* ". . . since you are the special editor in Great Britain and the Colonies for the Geog. of Plants [see Hemsley 1903b, Cockayne:Goebel Letter No. 16, Thomson 1979]. Had you not been connected with the editorial staff of the 'Centralblatt', I should all the same have given myself the pleasure of sending you a copy of this paper in the hope that you might find some matter of interest in it, and also since your phyto-geographical writings have been of very great assistance to me" (2 pp.).

2. 30/11/1903 (Box 338A P.O., Christchurch). Thanks Hemsley for kind words regarding paper on New Zealand Southern Islands [probably reprint of Cockayne (1903), see also Cockayne (1904)], and for paper on *Corynocarpus* [Hemsley 1903a], "I think *C. laevigata* is most certainly indigenous in the

Chatham Islands". Cockayne refers to the Horns on Chatham Islands — surrounded by *Senecio-Dracophyllum* forest, "... the largest tract of forest in the island. Notwithstanding this the Horns is covered with lowland forest with plenty of *Corynocarpus*, *Piper excelsum* etc.". Requests data on southern limit of tree-ferns in South America for paper he is concluding on Southern Islands [Cockayne 1904] — is *Hemitelia smithii* of Auckland Island the most southerly tree-fern? (3 pp.). (Written on the letter is note, possibly by Hemsley: "*Hemitelia smithii* Hook. Auckland Isds 50° 41'S. *Alsophila pruinata* Kaulf. Port Otway, Patagonia, about 47°" — see Cockayne 1904, footnote p. 246).

3. 10/10/1904 (Island Bay, Wellington). Sends paper on vegetation of Southern Islands [Cockayne 1904] for review in *Botanisches Centralblatt* [see Smith 1905] and is "... preparing for Kew a collection of my plant-geographical photographs of N.Z. plants in their stations and plant-formations ..." [see Cockayne:Thiselton-Dyer Letter No. 3]. Refers to Engler's [H. G. A. Engler (1844–1930)] request for contribution to "Vegetation der Erde" — Cockayne's new location at Wellington, "... is an excellent centre from which to prosecute the work. Whether I shall ever finish the book or not is another matter for my health has been very indifferent for some months past" (2 pp.).

4. 16/5/1912 (181 Linwood Avenue, Christchurch). Acknowledges congratulations [probably for F.R.S., see Thomson 1979, p. 403], "Of Course, it is extremely gratifying to have won the approbation of those in the Motherland so well qualified to judge as to the value of ones work ... But, at the same time, I feel how many there were more deserving of the honour than myself". Cockayne wishes he could have thanked J. D. Hooker [1817–1911] for his support and "... for the surpassing value of his basic work on the New Zealand and Subantarctic Floras ... Hooker was indeed our great and honoured Master". Cockayne has read Hemsley's "... admirable account of Hooker's work and life ..." in *Gardeners' Chronicle* [Hemsley 1911–12]. At meeting of Board of Governors of New Zealand Institute, Cheeseman [T. F. Cheeseman (1846–1923)] (President) referred to Hooker "... in a really fitting manner ..." and Cockayne will write a tribute [Cockayne 1912a]. Hooker was oldest Honorary Member of New Zealand Institute (4 pp.).

5. 5/2/1913 (181 Linwood Avenue, Christchurch). Cockayne expresses "intense gratification" that Hemsley was elected Honorary Member of the New Zealand Institute on 29 January and discusses Honorary Membership which is limited to 30. Expresses pleasure to hear from Hemsley "... one is apt to get a little lonely sometimes with so very few at hand interested in the same study. Even

Cheeseman and Petrie [D. Petrie (1846–1925)] are so wrapped up in deciding whether a certain plant be a species or no, that my perhaps wider pursuits are of little interest to them; and then too we live many hundreds of miles apart. The letters from my scientific colleagues in many lands are always most welcome and eagerly awaited". Hemsley interested in Cockayne's evolution paper [Cockayne 1912b] and approves view of isolation. Cockayne considers Stewart Island will have no endemic species, "... unless it be *Anisotome flabellifolia*". *Clemisia traversii* has been found in SW Otago and *Leptocarpus simplex* on shores of Lake Manapouri. "I was rather chary in sending the said Evolution paper to certain of my correspondents, since I feared some of the remarks re natural selection etc. might be distasteful, but to my immense surprise I have received nothing but encouragement and a wish expressed for more. In fact, of late years, a much more open mind has come upon the scientific world with regard to theories of evolution and one can now get a hearing which the partisan spirit at one period would have denied". First summer for 25 years that Cockayne has not been in mountains — "... trying to get my interminable book finished". Refers to Mawson [D. Mawson (1882–1958)] and ancient bridge to Antarctica, "This has come in the very nick of time for my book". Cockayne has seen plants from Macquarie Island collected by Mawson's expedition — some not recorded previously. F. G. Gibbs [1866–1953] has just re-discovered *Pittosporum dallii* (Dall kept locality secret) and Cockayne sending seed to Kew, Edinburgh, and Dorrien-Smith [T. A. Dorrien-Smith (1845–1918), Wall (1929) visited A. A. Dorrien-Smith at Tresco Abbey on the Scilly Isles and described the N.Z. species growing there] and specimens to Kew and Edinburgh. It should become an important hardy garden plant (8 pp.).

6. 5/1/1914 (181 Linwood Avenue, Christchurch). Congratulates Hemsley on Doctorate "... and surely such has never been bestowed on one more worthy" and discusses British Association Meeting in Australia [see Cockayne:Bower Letter No. 6, Thomson 1979] but will not be attending. Hopes an excursion through New Zealand will be organised and assures Hemsley he would be warmly welcomed. Refers to plant environments which "... can now be seen with the greatest ease and absolutely in their primeval condition". Cockayne discusses his book [Cockayne 1912d] and the concluding chapter on history of flora which will be written in a day or two, and refers to Hemsley's essay on Insular Floras [Hemsley 1885], "At my elbow is the great volume of botany of the Challenger expedition with your splendid essay ...". He does not look forward to writing this chapter because little space is available, subject is highly speculative and

“. . . who am I to attempt a piece of work so difficult?”. Suggests that Hemsley “. . . may find the account of displacement and replacement of species and associations the most interesting part, if I dare mention the word “interesting” at all. I think my treatment of the subject altogether novel . . .”. Statistics as to growth-forms, leaf-structures, etc., may be useful for comparative purposes. Refers to Royal Commission on Forestry [Haszard *et al.* 1913] and “. . . great excursion throughout N.Z. as a member . . .” — gave a rapid view of whole country, but this delayed the finish of book by 6 months. Trip also assisted with itinerary for British Association visit. Cockayne intends leaving Christchurch for Wellington in February, “It is a far better centre for my purposes. Here New Zealand is gone, but in Wellington there is still, close to the city, fine forest virtually primeval, and there is so much to learn, for has my book done nothing else it has taught me my extreme ignorance” (8 pp.).

#### SOURCE

These letters are part of the Cockayne:Kew correspondence (see p. 406) and copies of the 6 holograph letters are retained at Botany Division.

#### EXPLANATORY NOTES

Cockayne was adept at soliciting support from colleagues overseas and as noted elsewhere in this (p. 415) and the earlier paper (Thomson 1979, pp. 400, 403) his distribution of plant material overseas provided one basis for this support. Photographs and lantern slides of New Zealand vegetation would also have been keenly sought and the Cockayne:Thiselton-Dyer Letter No. 3 indicates that Cockayne sent photographs to Kew; lantern slides were given to the University of California (Cockayne:Foweraker Letter No. 15, Thomson 1979).

Despite some early criticism of colleagues at Kew (Cockayne:Goebel Letter No. 16, Thomson 1979) and a frequently stated dislike for plant taxonomy (e.g., letter No. 5; Cockayne:Goebel Letter No. 13) and herbaria (e.g., Cockayne:Yeates Letter No. 3 and p. 428), Cockayne's letters to Hemsley are couched in somewhat flattering language, as was his custom when addressing peers and senior colleagues. Hemsley was an important contact at Kew for Cockayne and in particular they had a common interest in island floras. Hemsley helped to make some of Cockayne's papers widely known by having them reviewed in *Botanisches Centralblatt*, and also supported his election to a Fellowship of the Royal Society (Thomson 1979, p. 403). To colleagues such as Hemsley, Cockayne in his letters conveyed an impression of diffidence regarding his own work, but the opposite impression was conveyed verbally to at least some colleagues in New Zealand (J. S. Yeates, pers. comm. of 3/6/1979).

#### Cockayne to Prain

##### RECIPIENT

Sir David Prain (1857–1944) became Curator of the Herbarium and Librarian of the Royal Botanic Garden, Calcutta, in 1887, and in 1898 Superintendent and also Director of the Botanical Survey of India. From 1905 to 1922 he was Director of the Royal Botanic Gardens, Kew. Biographical information is recorded in Burkill (1944, 1945), Salisbury (1944), Merrill (1946), Brierley (1944), and Taylor (1957).

##### ANNOTATED SUMMARY OF LETTERS

1. 28/12/1906 (Ollivier's Road, Christchurch). Cockayne encloses two packets of *Epilobium* seed — *E. confertifolium* from Subantarctic Islands (“. . . has pink flowers and is rather a pretty plant for the Alpine Garden”) and probably a new species collected in Tararua Mountains (1 p.).

2. 11/11/1909 (127 Linwood Avenue, Christchurch). Sends reports on Stewart Island [Cockayne 1909a] and sand-dunes [Cockayne 1909b] and has “. . . made one or two corrections” [an annotated copy of the former is retained at the National Museum, Wellington, and I retain a copy of the latter inscribed by Cockayne “B. C. Aston Esq. with the Author's Regards” which has one annotation by Cockayne]. “These reports have to be written at a breakneck speed, owing to their having to be presented to Parliament at a certain date and it is quite impossible to give them all the care one would wish”. Refers to plant-geographical photographs sent to Kew [see Cockayne:Thiselton-Dyer Letter No. 3] and offers to send additional photographs to Kew. Thanks Prain for the “kindly notices” of survey reports in *Kew Bulletin* [Anonymous 1908a, b] (2 pp.).

3. 24/2/1910 (127 Linwood Avenue, Christchurch). Cockayne sending about 60 photographs of New Zealand vegetation. More would have been sent but Cockayne about to leave on trip to South Westland. Explanations included with photographs. Poor prints will be replaced if necessary (2 pp.).

4. 21/2/1912 (181 Linwood Avenue, Christchurch). Sends “museum specimen” of *Helichrysum coraloides* which he collected recently, and is confined to Marlborough Botanical District — “. . . on dry rocks at about a minimum altitude of 1200 m. It assumes either an open or cushion habit according to exposure. This specimen is the first of a series I propose to send to Kew, illustrating the growth-forms etc. of N.Z. plants. They will be eventually supplemented by photos” (2 pp.).

5.\* 18/12/1912 (181 Linwood Avenue, Christchurch). Thanks Prain for “. . . highly stimulating

\*This letter and also Letter No. 16 (p. 000), No. 20 (p. 000), No. 22 (p. 000) and No. 29 (p. 000) are reproduced in part in Godley (1979, pp. 211–2).

and gratifying letter of Sept. 24th . . . In truth, I had sent forth my Evolution paper [Cockayne 1912b] in fear and trembling, and, more than once, when in the MS. stage, had half decided not to publish it. And now you and others, so eminently capable of judging, think my subject worthy of a book and myself capable of writing such". Cockayne presently engaged on "The Vegetation of New Zealand" which should be finished in 3 months. He is limited to 300 pages ". . . so the biological part will be quite inadequate". If present work is a success it would create demand for the one Prain has in mind. First difficulty would be the cost of publication — Cockayne could not find funds for purpose — "Nor could our Government be tempted, for it would be hard to show any economic bearing in the subject". Presumes book ". . . would attempt to examine the variation of New Zealand plants in a searching manner . . . flora and vegetation of a quite distinct and isolated region would be examined in its entirety from the evolutionary standpoint". Cockayne enumerates chapter headings [see Godley 1979, p. 211]. "The subject is undoubtedly one of extreme importance and fascination, while the massing together, *impartially* of the host of facts and statistics that virgin New Zealand, from the Kermadecs to the Macquarie Islands, can supply, let alone any theories, should offer matter of interest to a considerable scientific public. Primitive New Zealand, too, is rapidly passing away, but it has been my inestimable privilege to examine nearly every type of its vegetation. The question is, am I able to write such a book rather than is it well that such should be written?". Cockayne refers to task as "splendid and congenial" and would do his best (6 pp.).

6. 24/6/1913 (181 Linwood Avenue, Christchurch). Apologises for delay in replying to Prain's letter but has been member of Royal Commission on Forestry [see Cockayne:Hemsley Letter No. 6, p. 409; Haszard *et al.* 1913]: "We travelled at breakneck speed, day after day, throughout the length and breadth of the land . . .". Refers to proposed book on evolution and will draw up synopsis and reply to Prain's questions. Thanks Prain for "great trouble" and confidence in Cockayne's ability to produce the work (3 pp.).

7. 6/1/1914 (20 Colombo Street, Wellington). Sends two tins, and others later, of chiefly *Hymenophyllum pulcherrimum* and *H. malingii*; the latter ". . . grows only on *Libocedrus bidwillii*, especially on dead trees" [cf. Cockayne:Goebel Letter No. 11, Thomson 1979]. Former is strictly an epiphyte. Hopes *H. malingii* reaches Prain in good condition; ". . . as you know, it is biologically a most remarkable fern . . .". Cockayne leaves for Marlborough Sounds soon and may send further

filmy ferns and has written to Carse [H. Carse (1857–1930)] for *Trichomanes rigidum* (4 pp.).

8. 2/4/1914 (Wellington). "Permit me to introduce to you my friend Mr B. C. Aston [1871–1951] F.I.C. who is visiting Europe with regard to Agricultural Chemistry and allied branches of science. But Mr Aston is also one of our keenest botanical explorers and I shall be much indebted if you can give him facilities to examine the Kew collection of New Zealand plants" (2 pp.).

9. 2/7/1914 (20 Colombo Street, Wellington). Cockayne sent four large tin boxes of filmy ferns [note on letter: "Recd. in good condition"]: *Trichomanes reniforme*, *Hymenophyllum sanguinolentum*, *H. scabrum*, *H. dilatatum*. Delay caused by wet winter conditions and work for Panama Exhibition in San Francisco [Cockayne 1914]. Hopes to arrange cool storage in New Zealand Shipping Co. "If necessary, I will interview the Post-Master General [R. Heaton Rhodes (Scholefield 1950)], who is a friend of mine. In any case, I am determined to make this business a success. I have done very little for Kew and it is high time I did something". Asks Prain to send letter of thanks to Esmond Atkinson [E. H. Atkinson (1888–1941)], assistant, Biological Laboratory, Department of Agriculture, for allowing ferns to be taken from his property, "He owns a beautiful piece of forest, quite virgin, just across the harbour in which the ground is covered for many square yards at a time with *T. reniforme* [see Cockayne:Goebel Letter No. 32 and 33, Thomson 1979]. Proposes to visit central North Island, on Main Trunk line ". . . where there are filmy ferns of many kinds in profusion . . . Perhaps while they [British Association members] are here I may combine my duties as "Director of Excursions" with filmy fern collecting!". Offers large mosses and liverworts for growing (7 pp.).

10. 14/10/1914 (20 Colombo Street, Wellington). Has sent biscuit tin [cf. Cockayne:Goebel Letter No. 4 and 5, Thomson 1979] containing *Hymenophyllum tunbridgense* and *Trichomanes reniforme* [note on letter: "Red. 23 Nov. in good condition"]. **Did not send samples in winter** ". . . for I wanted to learn if my method of packing was a success, or the contrary", then "terrible" war came. "It is very satisfactory to learn that the biscuit tin method is suitable". Has been engaged "superintending" the collection of ferns for fernery in San Francisco exhibition [see Letter No. 9 and Cockayne:Bower Letter No. 6, Thomson 1979; Cockayne 1914]. "Just before the war broke out [4/8/1914], Engelmann of Leipzig commenced printing my book "The Vegetation of New Zealand" and I have proofs of almost the first hundred pages. This I expect will be the last I shall ever see of the ill-fated volume! And, good or bad it represents my life's work. Nor have I a

copy of the MS. But what is my trifling grievance in the face of this conflagration? I am now at the evolution book, and it perhaps may never be published. But it is a great pleasure trying to write it and many new facts of interest are coming to light". Has sent some liverworts, etc., along with ferns from forest "... not 15 miles from the city in a beeline and for several thousands of acres is quite virgin and full of *Leptopteris superba* and various Hymenophyllaceae" (4 pp.).

11. 7/1/1915 (20 Colombo Street, Wellington). Refers to letter of yesterday [possibly note included with specimens]: only one tin of ferns posted. Parcels travel by longer route than letters. Cockayne will be sending two tins of ferns before he leaves for South Island [note on letter: "Recd 29.3.15 2 boxes. Contents in fair condition"]. Refers to filmy ferns in Marlborough Sounds district, but will have little chance to collect in quantity. Will send costs of present shipment (railway fare, hotel expenses, portage, etc.) — it should not exceed £4.10. Complains about inadequate data on departure of mail (4 pp.).

12. 3/2/1914 [should be 1915, not 1914, as indicated by Prain's note on letter "shd be 1915 D.P."'] (20 Colombo Street, Wellington). Acknowledges letter of 25 November from Prain and £1.4.6 from Board of Agriculture and Fisheries. Parcel post boats no longer sail at appointed time and filmy ferns may be extra 4 weeks in tins. Cockayne posted tin last week [note on letter: "Recd. 8.iii.15 (Rather poor condition)"] and two or three more this week [note on letter: "Recd. 25.iii.15 Recd. 26.3.15 in good condition"], but concerned about condition on arrival. Hopes to send more *H. malingii* from Volcanic Plateau — "... it will not tolerate knocking about" (4 pp.).

13. 25/3/1915 (20 Colombo Street, Wellington). Thanks Prain for letter, "It is the highest compliment I have ever received. How I agree with what you say re newspaper men and professional politicians". Has received from Warming [J. E. B. Warming (1841–1924)] some paged proofs of book [Cockayne 1921d], and proofs of illustrations. Earlier, proofs of a few illustrations and some text sent by Warming but latter had not arrived, "I, at once, wrote and expressed my deep regret that I could not *legally* return him the corrected proofs to send on to Engler, but that I felt sure the correcting could be accomplished well enough without my aid". Cockayne has corrected paged proofs and is sending on to Prain "... in the hope that you may find out if they can be *legally* sent to Warming to transmit to Germany. This can be done by you in England far better than by me here and, you know far more as to what is right and what is wrong than myself. It seems a great pity that the book should appear without the

corrections, though the Editors have accomplished wonders in that way, as you will see. If the proofs cannot be sent to Warming, then keep them for Kew if you think them worth keeping. I should think a scientific book, in English, from the Antipodes, being published in Germany during war is unique". Prain is "... first of my countrymen to see my "Vegetation of New Zealand". Refers to the book being "... written in an attempt at Anglo-Saxon, though there will be a good deal of German alloy such as "Landarea" etc.". Cockayne is concerned that present letter may look impertinent, but "Should it however be feasible to send the proofs to Warming his address is, — Prof. Dr Eug. Warming. Osterbrogade 102, Copenhagen, Denmark". Cockayne was to correct proofs and modify etc. statements; also W. G. Smith [1866–1928] of Edinburgh [East of Scotland College of Agriculture] has consented to read the proofs "... and had corrected a few pages in a masterly manner" and Diels [F. L. E. Diels (1874–1945)] "... was going to keep his eye on the publishing and his knowledge of N.Z. botany would have been and indeed is, of the greatest assistance. Anyhow, the book, I expect, will appear some day, and that is more than I expected. It was in 1904 that Engler invited me to contribute to the series". Cockayne working at evolution and ecology volume, "It is a highly interesting and instructive task. Fresh material and ideas come in almost daily". Adds postscript "... it seemed to me, in case the book never sees the light, Kew is the proper place for the fragment to be kept" (7 pp.).

14. 24/6/1915 (13 Colombo Street, Wellington). Prain has received all the tins of filmy ferns; one tin missed the mail and was extra month in Post Office — "It is amazing how long such ferns can tolerate being enclosed under the conditions of packing". Offers to send additional material. Sending corrected page proofs (pp. 81–112) of "Vegetation of New Zealand" and hopes they can be sent legally to Dr Engler or W. Engelmann the publisher of Leipzig via Warming of Copenhagen, or otherwise. "If not, and you think worth while, please place this and the portion of the book previously sent in the Kew Library". Even if corrections not made book will be understood, "I shall regret most not having been able to add a preface explaining the general idea of the book and expressing my obligations to many who have given great help" (4 pp.).

15. 24/1/1916 (13 Colombo Street, Wellington). Cockayne sending duplicate proof-sheets of those last sent — as a precaution, and some additional corrections made. Discusses possibility that Warming may not have received proofs already sent: "... he is now a fairly old man, and he might be incapacitated by illness ...". Suggests K. Schröter

[C. J. Schröter (1855–1939)], Professor of Botany, Polytechnicum, Zurich, could act in Cockayne's interest if necessary, but "Dr Warming may live for many years yet to carry on his splendid work". Cockayne feels ashamed to trouble Prain "... with such a petty concern [about book] at such a time as the present, when my one thought should be how to best help my country . . .", "... but it would be foolish for me not to do my best for its successful production" (4 pp.).

16. 1/3/1916 (13 Colombo Street, Wellington). Encloses duplicate of corrections to be made to book (referred to above) to be forwarded to Professor Eug. Warming. Cockayne is "... hard at work at "Evolution at Work in the New Zealand Vegetation" and should be completed in 2 months. Has interesting data on "plant-populating" of small island, 300 yds from mainland, and has been above sea for some 60 years when land-surface raised by earthquake [Taputeranga Island, Island Bay, Wellington — Miss Madeline Cockayne, pers. comm. of 14/4/1980]. Refers to plants before and after earthquake. Effect of sea-spray as reflected by the new vegetation is less than expected — a maritime flora forming a narrow belt just above high water, remainder of island has an inland flora. Is planning a thorough examination with Field Naturalists' Club (4 pp.).

17. 4/5/1916 (13 Colombo Street, Wellington). Encloses further list of corrections for forwarding to Warming, "Nearly all the corrections are of little moment, and this time, at any rate, some are not my fault". "The most promising botanist, Mr C. E. Foweraker [(1886–1964), see Cockayne:Foweraker letters, Thomson 1979], that the N.Z. University has as yet produced, and for whose zeal I think I may claim some share, has recently enlisted. His thesis for his M.A. degree on cushion-plants of river-bed [Foweraker 1917] has received the highest praise from Prof. Bayley Balfour the examiner. He has already been promoted to Lance Corporal". Cockayne has asked him to call on Prain. "He tells me the so-called "rough" life of the soldier is child's play compared with a botanical excursion to our mountains" (3 pp.).

18. 19/7/1916 (Letter-head: New Zealand Institute, 13 Colombo Street, Wellington). Letter of introduction for Corporal Foweraker, to Sir David Prain. Foweraker "... is desirous of seeing such botanical institutions as he may find time to visit, and hopes to see Kew, first of all. There are certainly some types of New Zealand species at Kew which he may wish to examine" (1 pp.). (Letter No. 18 was enclosed in a letter of 6/8/1917 from Foweraker to Prain. The address is N.Z. Convalescent Hospital, Hornchurch, Essex: Foweraker "... receiving massage and electrical treatment to a finger which was

smashed at Messines on June 7th". Hopes to meet Prain before leaving England for the front. "Dr Cockayne refers to me as "Corporal". I am now merely "Private" because all reinforcement N.C.O.'s naturally revert to the ranks on joining up a unit in the Field, which I did last November" (2 pp.).

19. 16/8/1916 (13 Colombo Street, Wellington). Thanks Prain for portrait photograph, "... it is now with the portraits of other botanists which gaze on me from the walls of my small sanctum and urge me daily to attempt to follow in their footsteps". Sends congratulations on Prain's election as President of the Linnean Society. Has received letter of 24/6/1916 indicating that corrections for book were sent to Warming. Latter advised Cockayne about receipt, "It is wonderful what a legible and steady hand Warming still writes". Prain apparently has relations in New Zealand, "Perhaps I may have the pleasure of welcoming your New Zealand soldier when he returns". Foweraker left for Europe in last contingent and Cockayne has given him letter of introduction (see Letter No. 18). Refers to "... various floristic points on which no local botanists can agree, especially in the genera *Veronica*, *Poa*, *Festuca*, *Aciphylla* and *Celmisia*. Before he left, I had no opportunity of calling Foweraker's attention to the definite points one desired to investigate", but will write to him and send specimens. It is becoming clear to Cockayne that "... conception of species as aggregates is of no moment, and that such species must be divided into their distinct true-breeding entities, i.e. if these are easily recognisable". For "... general plant geography, the aggregate is indispensable". Refers to *Sophora tetraptera* and vars *microphylla*, *chathamica*, and *fernandeziana*. "Thus, I long greatly to know what is the type of many N.Z. aggregates, so that I can separate them into their recognizable units" (3 pp.).

20. 4/9/1917 (Ngaio, Wellington). Two of Cockayne's friends (W. R. B. Oliver [1883–1957] and [H. H. Allan (1882–1957)]) desirous to become Fellows of the Linnean Society and full details enclosed, "... I wonder, if, in order to save time, you might arrange that the candidates be signed for by Fellows at Home. Mr W. R. B. Oliver is one of the most promising of the younger New Zealand naturalists". Cockayne wants "... our soldier botanist, Mr C. E. Foweraker ..." to look at certain specimens in the Kew Herbarium. Evolution book "... which was getting on fast, came to a standstill months ago in consequence of Willis' recent papers on distribution [Willis 1916a, b; see also Cockayne:Foweraker Letter No. 7, Thomson 1979]. Not that I accept Willis' conclusions by any means, but because I want to examine as thoroughly as possible distribution in N.Z. from a numerical standpoint."



Hopes to obtain a species number “. . . which will mark its degree (not abundance of individuals) of distribution, and be also a fair gauge of its *power for distribution*”. Then can be compared different groups, but tediousness of getting data has hindered him. “In these times of war, too, one finds it hard to go at a piece of work as formerly. Otherwise the evolution book would have been completed long ago. Its posting “. . . short paper on the species question [Cockayne 1917a] and next mail another containing the first attempt to divide N.Z. into Botanical Districts with a small map of such” [Cockayne 1917b] (6 pp.).

21. 12/2/1918 (Ngaio, Wellington). Thanks Prain for trouble taken regarding election of Oliver and other to Linnean Society. Hopes Corporal Oliver will visit Kew — no opportunity to give him letter of introduction, “. . . as he was suddenly dispatched for the front . . .”. Cockayne sends Oliver’s paper on Lord Howe Island [Oliver (1917), reviewed in *Kew Bulletin* by J. H. (1918)]. Also thanks Prain for kindness to Foweraker who “. . . has been welcomed by so many eminent men of science. It will have benefitted him greatly, and he will return with renewed ardour to attack some of our many botanical problems”. Refers to project on behalf of New Zealand flax-millers to study “disease” of flax [*Phormium* yellow leaf, see Cockayne:Foweraker Letter No. 3, Thomson 1979] which has “. . . suddenly made its appearance . . .”. Cockayne has been asked to report on this serious disease [Cockayne 1919g, 1920f]. He will send some samples of the yellow leaf disease for the Kew Museum, and has already spent a fortnight “. . . mostly in the *Phormium* “swamps” — exceedingly *dry* areas! The problem appears to be ecological rather than pathological . . .” and has set up experiments in *Phormium* areas; “. . . it is perhaps the first time that a body of private individuals, in N.Z., have called in a scientific man to investigate one of their economic problems. So I can tell you I am on my mettle”. Also gives him opportunity to study habitats where *Phormium* grows (3 pp.).

22. 12/1/1920 (Ngaio, Wellington). Acknowledges “welcome letter” of 24 October. Comments that “. . . it is very true that N.Z. is intensely British”. Again refers to evolution book but economic work on sheep pastures [Cockayne 1919a, b, c, d; 1920a, b, c, d, e; 1921a, b; 1922a, b, c] “. . . allows little else to be done, so I fear the book may never be written after all”. Also new statistics required “. . . for the old ones used for the ill-fated “Vegetation of New Zealand” will no longer suffice”. Last year Cockayne prepared new edition “. . . an altogether new book indeed — of “New Zealand Plants and Their Story” ” [Cockayne 1919e; this was Manual No. 1 of the New Zealand Board of Science and Art and I retain a copy of both hard cover and paper-

back editions]. Because Dominion Museum who are selling book “. . . have made a muddle of affairs . . .” only paper-back copies presently available but this will suffice in meantime for review purposes. Also sending preliminary and final reports on yellow-leaf disease in *Phormium tenax* — Prain may like to have some account of this “new” disease in *Kew Bulletin* [reports not included, see Letter No. 25]. An abstract of the reports appeared in *New Zealand Journal of Agriculture* “. . . but it was not at all well done” [Cockayne 1919g, 1920f]. “It is splendid to have a final opportunity for unlimited work in the most interesting part of New Zealand from the botanical standpoint, but it is pretty strenuous for one 65 years of age!” (2 pp.).

23. 21/7/1920 (Ngaio, Wellington). Cockayne received “important letter” from Prain but has not had time to reply because of being on Royal Commission [on Southern Pastoral Lands (Sadd *et al.* 1920)] “. . . travelling as fast as possible”. Final proofs of “The Vegetation of New Zealand” have reached Cockayne, “From here the mails to Germany are irregular and letters are still censored”. Thus Cockayne sending letters and corrections of proofs direct to Diels, but actual corrected proofs will be sent to Prain for reposting (registered) to former — “Diels writes me to register all postal matter as their postal affairs are not as good as formerly. The Censor here has been most obliging, but I wish to make the coming into Diels’ hands of the proofs as nearly certain as possible . . .”. Diels’ address is Botanischer Garten und Museum, Berlin-Dahlem, Königen Luise Str. 6–8, Germany. “I am trying to bring this last part of the book up to date and am offering the Publisher to forgo the payment for the book, the money to be spent on the excess of corrections”. Again apologises for trouble caused by “. . . this hapless book of mine . . .” but would be a pity if mistakes occurred, “I am not ambitious to produce a literary curiosity . . .” (3 pp.).

24. 29/7/1920 (Ngaio, Wellington). Sending proofs of final part of “The Vegetation of New Zealand” for forwarding to Diels. Copy of corrections being sent direct to Diels as indicated above. Hopes to have Preface ready soon but leaves for Central Otago and Preface cannot be written for fortnight (1 p.).

25. 16/9/1920 (Ngaio, Wellington). Cockayne now has opportunity to reply to Prain’s letter of 13 March regarding *Phormium*: Waters [R. Waters, appointed bacteriologist at Biological Laboratory, Department of Agriculture in 1923 (Chamberlain 1969) and then lecturer in bacteriology and mycology at Massey Agricultural College (Brooking 1977)] has made cultures of a fungus [*A Ramularia* species was isolated by Waters (Waters & Atkinson 1922)] “. . . which may or may not be the organism causing the disease; but up to the present, has — so far as I

know — not gone *seriously* further into the matter” because Biological Division of Department of Agriculture has been removed from Weraroa (in the flax area) to Wellington and although a house has been purchased it had to be completely altered so “. . . botanical operations are more or less at a standstill. Then there is routine work without end . . .” — and there are the outbreaks of disease and farmers affected demand instant attention. “. . . a “new” disease, such as yellow leaf, requires a specialist to be set aside for that alone and, not only have we few in N.Z. able to undertake such work, but those few are mostly otherwise engaged in order to earn their bread”. But the *Phormium* disease “. . . getting better of its own accord, as my marked plants said it would . . .” and now there is no pressure from flax-millers to have matter investigated: “. . . the problem has become one rather of pure than of applied science according to the view of the public”. Discusses question of growing *Phormium* commercially in Great Britain or Ireland [see Anonymous 1919]. Cockayne considers matter “. . . purely of whether it is more profitable to use land for that purpose than to use it for other classes of farming”. Also production of fibre per acre is important. In *Phormium* area of North Island high-class land used but “I have often thought much poorer land could be used, e.g. sand-hollows, poorly-grassed slopes etc. I think you did right to keep back my report from publication until more was known about the disease” [see Letter No. 22]. Sends bound copy of “New Zealand Plants and Their Story” [Cockayne 1919e] and two packets of duplicate copy of corrections for “The Vegetation of New Zealand” — latter for forwarding to Diels if no acknowledgment of former proofs. Cockayne leaves for Central Otago at beginning of October — he has now 14 experimental plots at various altitudes and aspects [see Douglas 1970] and they keep Cockayne and his assistant busy. “I have a most excellent assistant, a young man only 22 years old [W. D. Reid (b. 1897), see Letter No. 26, Cockayne:Hill Letter No. 17 and Thomson 1979, p. 408] but full to the brim of energy, willingness to work to the utmost and good common-sense” (4 pp.).

26. 5/1/1921 (Ngaio, Wellington). Prain should receive with this letter two packets containing final corrections to paged-proofs of “The Vegetation of New Zealand” and hopes to send by next mail the final portions: preface, errata, index, and appendix. Asks that two packets be re-addressed to Diels. “Let me also thank you with all my heart for the splendid way you have helped me in this work”. Cockayne gives example of difficulties. Thanks Prain for letter of 11 November. Editor of *New Zealand Journal of Science and Technology* [J. A. Thomson (1881–1928)] “. . . all on a sudden informed me he was getting my *Phormium* Report ready for

the Journal [Cockayne 1920f], so that it will not see the light in the *Kew Bulletin* after all”. Cockayne would have preferred it published in latter. Disease is “. . . very bad in places, though in other places there has been great recovery”. He sees “. . . but little of *Phormium tenax* in the back country sheep pastures where the problems are of a very different nature”. Is assembling a fine series of photographs, illustrating such problems and means taken to solve them and hopes to send best photographs. “One of the problems is regrassing Central Otago, and, in this regard, the facts coming to hand, partly from my experiments, and partly from the unpremeditated experiments of the run-holders, are making me rather sanguine. But the photos to be sent will illustrate what my youthful assistant [W. D. Reid] — a splendid fellow just 22 years’ old — and I are doing regarding regrassing and other cognate matters” (3 pp.).

27. 17/1/1921 (Ngaio, Wellington). Concluding material for “The Vegetation of New Zealand” sent and requests that it be forwarded to Diels: index, preface, appendix, corrections, contents, list of illustrations and corrections of plates, duplicates of corrections sent on 5 January. Proposes to send duplicates of above by next mail. Although material no longer censored, sending via Kew has been so successful. Next sending should be final one. Book should be in Prain’s hands by about June. “. . . if ever a book can be unique, this venture of mine should “fill the bill”. I have about decided to give up my tussock-grassland work . . . at the end of this year. I am finding being away from home month after month rather trying, and climbing mountains is getting very hard work. So, it may be possible for me to recommence the Evolution book. I have a good deal of new matter for it, especially as concerns distribution, and as I expect to get into some unbotanized country this season, there is bound to come to hand something or other of interest for the proposed book. The most important “find” of this character is what appears to be a fixed juvenile form of the spinous *Discaria toumatou*” — mentioned in appendix to “The Vegetation of New Zealand” [Cockayne 1921d, p. 332]. Cockayne’s assistant is now printing grassland photographs for Kew (3 pp.).

28. 1/2/1921 (Ngaio, Wellington). Sending final duplicates of “The Vegetation of New Zealand” to be posted to Diels and hopes these duplicates are the last, “Surely it should not be necessary to send me proofs of Index etc.”. Again thanks Prain for assistance. Science Congress [Second New Zealand Science Congress, 25 to 29 January 1921 (see Anonymous 1921)] just concluded and “. . . was distinguished by the number of young men who took a prominent part — as satisfactory as unexpected”. Reid was kept busy with lantern-slides for Congress

and has not printed photographs for Kew. Again refers to "... finishing the tussock-grassland investigation this year and going on with the Evolution book. It is really a good thing it was not written earlier, for much new matter is coming to hand, especially as I get into country previously unvisited by any botanist" (2 pp.).

29. 29/6/1921 (Ngaio, Wellington). Has received Prain's letter of 19 March and has "... heard from Diels that he received everything and that the book is now receiving the finishing touches". Diels is correcting final proofs "So I shall not have to trespass on your kindness any more ...". Again thanks Prain for "vital assistance". Refers again to evolution book: "... is much in my thoughts" and should be recommenced at beginning of March 1922 — tussock-grassland work finishes on 31 January. Introductory chapter on vegetation and flora of New Zealand ("Workshop and material"), then Part 1 on Variation and Part 2 on Distribution, and then concluding chapter. "Recently I have had a piece of good luck both in material for the book and in a discovery, if it may be so called, of considerable economic bearing. This is that certain of our species of *Nothofagus* hybridise in a remarkable degree" [see Thomson 1979, p. 407] — Collections from six localities show an "astonishing number" of intermediates between *N. fusca* and *N. cliffortioides*, both adults and juvenile, and apparently always occur when two parents are present but *never* when one is absent. Many of "new" forms are "beautiful" trees for gardens. Cockayne also expects *N. solanderi* and *N. fusca* to hybridise. *N. blairii* is "most certainly" one of hybrid forms, also *N. apiculata*. Hopes to have material from all over country. The bearing on forestry is the timber-value of hybrids; "*N. fusca* yields excellent durable timber but that of *N. cliffortioides* is poor and of bad lasting quality. In one place within a distance of a few chains hardly two trees were alike". Has sent seed of high-mountain plants and next mail hopes "... to send the long-promised tussock-grassland photos." Letter includes postscript regarding visit of Mr Wilson [E. H. Wilson (1876–1930), see Cockayne:Hill Letter No. 14] from Arnold Arboretum who had letter of introduction from Prain. They spent several days at Hanmer (2 pp.).

#### SOURCE

These letters are part of the Cockayne:Kew correspondence (see p. 406) and copies of the 29 holograph letters as well as the Foweraker:Prain letter are retained at Botany Division.

#### EXPLANATORY NOTES

The Cockayne:Prain letters continue the sequence commenced in 1899 (Cockayne:Thiselton-Dyer Letter No. 1) of Cockayne's correspondence with the Royal Botanic Gardens, Kew. He developed a

rapport with Prain during the long period of their correspondence from 1906 to 1921. The correspondence was on a more formal basis than that with Goebel (Thomson 1979), for example, and was primarily concerned with botany and especially administrative matters relating to Cockayne's publications. However, the rapport apparently extended to their assessment of "newspaper men" and "professional politicians" (Letter No. 13).

The correspondence is particularly noteworthy because it includes information relating to the publication of the 1st edition of "The Vegetation of New Zealand" (Cockayne 1921d) and the proposed book on evolution Cockayne had contemplated writing and for which he received Prain's encouragement. Cockayne himself in the Preface recounts the difficulties involved in the publication of the former book; Hill (1935, p. 449) also briefly referred to them and Moore (1967, p. 6) provided additional data, apparently quoting from the Cockayne:Gibbs letters (copies retained at Botany Division). However, the Cockayne:Prain letters provide the most complete record of the saga. The letters indicate that J. E. B. Warming, who was Professor of Botany and Director of the Botanic Garden at the University of Copenhagen from 1886 to 1911, acted as an intermediary between Cockayne and the publishers via Prain (incidentally, Cockayne's copy of Warming (1902), dated May 1903, is retained at Botany Division). The letters emphasise Cockayne's persistence and care in doing his utmost to see that corrections to the book reached Diels and in this he was greatly assisted by Prain. It is an example of the maintenance of links in science, albeit slender, between warring countries — in a manner which recalls the efforts of Sir Joseph Banks in an earlier era (see Cameron 1952, Chapter VII). The proposed book on evolution is discussed by Godley (1979, p. 211) and in the explanatory notes to the Cockayne:Jeffrey letter (p. 424). Despite frequent mention of it in the letters to Prain, the book was never completed.

The letters indicate the trouble Cockayne took to send living plants to Kew, and the assistance he received from Kew, not only regarding "The Vegetation of New Zealand", but also in having New Zealand work reviewed in *Kew Bulletin*.

Cockayne's contributions to research were primarily in the descriptive fields of botany. His contributions to experimental botany were limited (e.g., Cockayne 1898, 1905b), possibly because of his own inclination, and a lack of training and facilities. With regard to applied botany, his major work on montane tussock grassland (Cockayne 1919a, b, c, d; 1920a, b, c, d, e; 1921a, b; 1922a, b, c) was a significant study in what was then a relatively new field of applied ecology (see O'Connor 1979). His efforts at problem solving were also limited and the Cockayne:Prain letters do provide data on one

example, namely his studies on the disease of *Phormium tenax* (cf. Thomson 1975a) which he called yellow leaf (Letter No. 21, 22, and 25).

### Cockayne to Hill

#### RECIPIENT

Sir Arthur William Hill (1875–1941) was appointed Assistant Director at the Royal Botanic Gardens, Kew, in 1907 and Director in 1922 when he succeeded Sir David Prain. Hill visited New Zealand in January and February 1928 (Hill 1928). Biographical information is recorded in Brooks (1942), Turrill (1942), Burkill (1943), and Allan (1942).

#### ANNOTATED SUMMARY OF LETTERS

1. 9/1/1923 (Ngaio, Wellington). Cockayne pleased to learn that Hill had been appointed Director of Kew and that there will be "... no further change, and that you, whom I had known for a number of years, were to guide the destinies of the great gardens". Thanks Hill for letters and paper on *Caltha* [Hill 1918] and by "remarkable coincidence" Cockayne had just earlier seen *C. obtusa* wild and in bloom for the first time — it is extremely difficult to establish in a garden and grows on "... moist shady banks near streams in the subalpine belt. *C. novae-zelandiae* is common enough". Interested in effects of goats on Riviera, "We, too, in certain parts of N.Z., have wild goats in plenty and they do much damage; so, too, the red deer — sometimes in mobs of 300 at a time!" [cf. Cockayne:Goebel Letter No. 10, Thomson 1979; Thomson 1978, p. 402]. Sends last part of regrassing article [Cockayne 1922c], "... you will see things look decidedly promising". Now asks for Hill's help because plants necessary for improving results [of regrassing experiments] are not in N.Z. so he is writing to correspondents in many parts of the world for seed, and will sow himself and test for palatability for sheep. He requires perennial herbs or grasses with rapidly growing, far-extending subterranean stems: *Achillea millefolium* — "excellent, highly palatable", *Agropyron repens*, *Rumex acetosella* — "excellent, highly palatable", *Cnicus arvensis*; grasses — closely cropped by sheep and rabbits, but never killed (*Festuca rubra* var. *fallax* = Cheving's fescue); annuals or biennials which will not be eaten out before sowing themselves — *Reseda luteola* ("reproduces excellently"), *Erodium cicutarium* ("splendid, highly palatable"), *Verbascum blattaria*. "Possibly you may have some species at Kew which would fill the bill. . . . In short, I am eager to try anything not likely to add to our list of bad weeds, or especially to be of danger through being poisonous". Refers to Sampson's [1919] list of plants with high or medium palatability for sheep. Cockayne would be most grateful for seed which might be of use — must tolerate drought. Pleased to learn that Hill had "The

Vegetation of New Zealand" [Cockayne 1921d], "It is the first I have heard of the book being in England. The first edition was only 400 copies [This number also given in Cockayne:Gibbs letter of 7/7/1922, see Moore 1967, p. 7] of which nearly all evidently were sold on the continent. I understand Engelmann is having a reprint made. Certainly there ought to have been an ordinary map, but there was no opportunity for suggesting such to be put in the book" (4 pp.).

2. 19/2/1923 (Ngaio, Wellington) (note on letter: "Pkt of *Holmskioldia sanguinea* seed sent 12.4.23). Cockayne has "... accepted — but very reluctantly — an invitation from the State Forest Service to join the Dept. and spend several months yearly in making an ecological survey of the whole *Nothofagus* forest area" [Cockayne 1926, 1928a] — forest-rangers at his disposal and every facility for moving rapidly; thus he is in "... excellent circumstances to procure botanical material for Kew. Now I want to know how I can be of the best use", e.g., more filmy ferns. Suggests various specimens that may be required. Intends making large collection of seed in March and April; and there are photographs, "... but such I have promised to Kew for so long a time that I dare not repeat the promise". Encloses list of *Semina desiderata*. "Messrs. Whitcombe and Tombs, who publish a good many books, have invited me to write a little book of about 140 pages on the cultivation of New Zealand plants [Cockayne 1923] and I hope to commence it in May or June. Such a book is badly wanted here, also think there are a good many in Great Britain to whom it would be useful. . . . The amount of ignorance shown by writers in the *Gardeners' Chronicle*, for instance, in such matters is great, but not surprising. I propose to devote a special chapter to *Veronica*" [Chapter VI] (2 pp.).

3. 5/6/1923 (Ngaio, Wellington). Cockayne has received seed from Hill for tussock grassland work and "... valuable hints concerning certain plants and how to procure them". Each species will be sown in a pot and plants then established "... on an acre or two not far from here and a few sheep turned on to them. Others will be sent, at once, to friends of mine in the arid area to test on their farms, or in their gardens". Kew requires photographs, living filmy ferns, "ecological material" and wood samples. Latter "... will be more difficult, but with the State Forest Service behind me, and one of the rangers — Perham [F. J. Perham (?–1967) see Kennedy (1967)] by name — full of enthusiasm (an ex-sawmill hand likewise) this part, too should be accomplished. Perham was with me for some time in the field and he was entirely satisfactory". "As for Herbarium Material I have a good deal, collected during the tussock-grassland research, and I am steadily collecting forest species. So I think, if my health holds out — at present it is excellent — I may be

able to discharge a little of my great debt to Kew" (2 pp.).

4. 2/7/1923 (Ngaio, Wellington). Sending 84 packets of seeds. State Forest Service requested to procure timbers "... but I expect I shall have to arrange the matter finally". Has received second lot of seeds from Hill. "The Cultivation of New Zealand Plants" [Cockayne 1923] is finished except for "final revise" and a copy will be sent to Hill. Cheeseman [T. F. Cheeseman (1846–1923, died 15 October)] has proofs of his new Flora [Cheeseman 1925] up to end of the Monocotyledons: "Here we are awaiting it most eagerly ... It was a great pleasure to me when the news came that he had got the Linnean Medal ... His first paper appeared in the early seventies" [probably Cheeseman (1872)]. Refers to H. H. Travers's [1844–1928] paper on Chatham Island [Travers 1869], "The funny part is that the Chatham paper was his first and also his last! [but note Travers (1911)]. Anyway he was the first to make the flora of the group available for study; and not a great many species have been added since his first visit. He is now over 80, but one still calls him "Young Travers" to distinguish him from his father, the late W. T. L. Travers [1819–1903]" (3 pp.).

5. 21/8/1923 (Ngaio, Wellington). Sends small parcel of herbarium specimens (70 species etc.) "... including some species published by me". Includes 21 specimens of the "recently-discovered" *Nothofagus* hybrids [see Thomson 1979, p. 407]. Paper is being prepared for the Linnean Society [cf. Cockayne: Foweraker Letter No. 7, Thomson 1979; paper actually published in *Genetica* (Cockayne & Atkinson 1926) and hopes to send examples of the different named groups. Has many more specimens, "... but those sent give a fair idea of the extreme polymorphy of these hybrid southern-beeches. I have two in which near the base of the tree ordinary juvenile *Nothofagus fusca* was given off, although the remainder of the foliage was of a marked hybrid character. Usually the shoots from the trunk correspond to the sapling form at that height, i.e. each tree bears its own life-history" (3 pp.).

6. 7/9/1923 (Ngaio, Wellington). Cockayne reports that samples of wood [see Letter No. 4] are coming into State Forest Service, "... but unfortunately they made a mistake regarding the dimensions, cutting them only 4 in. deep. But fresh orders, accompanied by a drawing to scale, have been sent out ...". Department anxious to send good material. Leaves for beech forests early next month and will then prepare the ecological specimens and filmy ferns. Encloses packet of fresh seed of *Cordyline indivisa* (3 pp.). (Included in Cockayne:Hill correspondence is letter of 10/10/1925 from H. H. Allan (Feilding Agricultural High School, Feilding) to the Director, Royal Botanic Gardens, Kew. On the

suggestion of Cockayne, Allan forwards *Hymenophyllum* and hybrid *Coprosma*s (collected by Cockayne in Deans Bush, Christchurch) for Kew Herbarium. Allan notes that he has successfully made the cross *Coprosma propinqua* × *robusta* "... any field botanist would have placed [F<sub>1</sub>] as *Coprosma cunninghamii* ..." [see Allan (1926)]. Encloses paper on study of *C. cunninghamii* [Allan 1924] (2 pp.).

7. 26/4/1926 (Ngaio, Wellington). Allan and Cockayne "delighted" to receive the advance copy of paper on *Hoheria* [probably Sprague & Summerhayes (1926)]. "What a thick-head I must have been not to spot that my *Gaya ribifolia* [Cockayne 1901] was the type, but the truth is I had followed Hooker with his *Plagianthus lyallii* and none of us ever dreamed that the plant with long drip-points to the leaves of the most rainy part of South Island was not the real Simon Pure, white, except myself no one separated the tree of the dry east — the true *lyallii* — from the compound species". Notes that in Sprague & Summerhayes (1926) nothing said about the distinct juvenile forms of the two species, nor "... their rather remarkable distribution — *Hoheria lyallii* to the dry and *H. glabrata* to the wet area of South Island". Refers to Travers's Hurunui specimens — *H. glabrata* × *lyallii*, "... and I have seen trees in cultivation which suggest hybridity — but of course I am, at present, hybrid-mad!". Refers to "nature prints" of juvenile and transition leaves to two *Hoheria* species "... which may be of interest to Messrs Sprague [T. A. Sprague (1877–1958)] and Summerhayes [V. S. Summerhayes (1897–1974)] ..." which are enclosed. Cockayne and Allan intend to tackle the group *Hoheria populnea* "... and have already done a little in that regard. *H. angustifolia* and *H. sextylosa* hybridise freely". Encloses two or three packets of seed (Note on letter: "3 pkts seeds recd. 26.5.1926"). "Var. *serrulata* of *Hebe salicifolia* comes true or we would have given no name. The *Aciphylla* is a remarkable plant. *A. squarrosa* is a surprising mixture" (2 pp.).

8. 10/5/1926 (Ngaio, Wellington). Cockayne "... with considerable reluctance ..." requests data from Kew, "... I am anxious to have the nomenclature in the 2nd edition of *The Vegetation of New Zealand* [Cockayne 1928b] as accurate as possible". Refers to Oliver's [1926] criticism of Hutchinson's [1921] conclusions regarding *Wintera* and *Drimys*. Cockayne follows Hutchinson in use of *Wintera* for New Zealand species. Oliver has made a case to the contrary and Cockayne would "... like a definite pronouncement from Kew on the matter". Refers to "type" of *Celmisia sinclairii* [see Cockayne: Martin Letter No. 17, Thomson (1979) and Martin (1936)] and *C. discolor* — "Cheeseman [1925, p. 939], acting on my recommendation ... explains that he

did not know what *C. sinclairii* really is and he reproduces the original description [Hooker 1867, p. 132]”, but fails to point out that there is *no* type and Hooker included two different plants, “. . . one with tomentose and other with glabrous, thin leaves, either of which can be made the type”. F. G. Gibbs states there is no *Celmisia* of the kind on Dun Mountain. Refers to *Celmisia* species in Cheeseman (1925) from *C. walkeri* (p. 937) to *C. incana* (p. 940), but excluding *C. lindsayi* and adding *C. bonplandii*, “. . . give rise to an astonishing number of hybrids . . .” and *C. sinclairii* may be hybrid. *C. discolor* is an “equal difficulty” and refers to “wide range” and “here, again, the type, if of only *one* form, may have come from one plant and be a hybrid, unless there are specimens to match it from other localities”. Suggests *C. intermedia* may be type of *C. discolor* and encloses specimen. Former is “. . . of fairly wide range and it forms a swarm of hybrids with *C. incana* when the two come together . . .”. Would be “delighted” to send Kew specimens of *Celmisia* forms mentioned. To resolve the problem “. . . would be a matter of some years for an active man; my day is done for work of that kind. Would that I had not been drugged long ago by the term “variable species” when I could have done my share!”. Encloses fresh seed of *Tetrapathaea tetrandra* (4 pp.).

9. 22/6/1926 (Ngaio, Wellington). Encloses report on “. . . treatment of a Reserve within the City of Wellington, situated less than three miles from the centre of the town [Wilton's Bush (Otari Open-Air Native Plant Museum, Anonymous 1926; see MacKenzie & Cockayne 1927, Cockayne 1932)] . . . The reserve is only about a mile away from where I live . . .”. Cockayne refers to the forest and its modification, “Of course it will be impossible to reproduce certain of the plant-associations of New Zealand, e.g. those of the Subantarctic Islands (they could be well done in Dunedin) but a considerable number can be imitated . . . It is the systematic part which will give the most trouble, since certain species will refuse to grow at all alongside their relatives, e.g. lowland and subalpine podocarps. Anyhow, to attempt to overcome difficulties adds special zest to horticulture”. Hopes to send photographs of the reserve (2 pp.) [Part of Letter No. 9 is reproduced in Anonymous (1926)].

10. 19/7/1926 (Ngaio, Wellington). Cockayne will send all his material of *Asperula perpusilla* “. . . which may perhaps be a *Galium* . . .”. “. . . I must trouble you once more . . . what have you [Hill 1927] done with the New Zealand species? [of *Lilaeopsis*]”. Cockayne so far is “. . . following Fernald and calling it *Lilaeopsis attenuata* (Hook. et Arn.) Fernald, but I really am quite in the dark. The plant here alters greatly according to its environ-

ment; also there may be more than one true-breeding race”. Refers to *Asperula perpusilla*, “. . . grows in a variety of habitats . . .” (1 p.).

11. 12/10/1926 (Ngaio, Wellington). Has sent 36 species, hybrids, etc., of *Celmisia* for Kew Herbarium, “One or two are the only specimens I possess, but they are far better with you than with me”. Goes to Arthur's Pass in January with Du Rietz [G. E. Du Rietz (1895–1967), see Cockayne:Goebel Letter No. 31, Thomson 1979] where “. . . hybrids of many kinds abound and, when there before, I had not developed either the hybrid eye or the hybrid mania, so expect great finds, especially in *Olearia* and *Celmisia*” and “. . . Kew will get the lion's share”. Has not been able to find *Asperula*. Conveys thanks through Hill to person who replied “so fully” to his questions re *Celmisia*, “The information was invaluable”. Has asked Allan to send “. . . such *Celmisias* as he has. There is much in my herbarium Kew ought to have and when “*The Vegetation of New Zealand*” is finished I shall have time to go through all my bundles” (2 pp.).

12. 12/10/1926 (Ngaio, Wellington). Aston [B. C. Aston (1871–1951)] and Cockayne “. . . had the pleasure . . .” of taking Lady Cecil [Lady Alicia Margaret Rockley (1865–1941) arrived in New Zealand in September 1926, see Rockley (1935)] and Miss [Margaret] Cecil to podocarp-broadleaf forest (subtropical rain-forest) on water reserve of [Wellington] City Council. Also present was Mr MacKenzie [J. G. MacKenzie (1880–1953)], Director of Parks and Reserves. “Never have I seen any one more interested in such forest vegetation than was Lady Cecil who saw with delight the 50 foot high tree-ferns, the great asteliads high in the forest roof, the lianes, the filmy ferns and so forth”. Lady Cecil was given “The Cultivation of New Zealand Plants” [Cockayne 1923]. Next day MacKenzie and Cockayne took Cecils to Wilton's Bush Reserve, “. . . she was most enthusiastic over the scheme . . .”. Lady Cecil then travelled to South Island along east coast to Christchurch “. . . and would see, but not in bloom, *Pachystegia (Olearia) insignis* and *Hebe hulkeana* growing in company, for every cliff bears these beautiful plants”. Cockayne has asked Chilton [C. Chilton (1860–1929)] to take her to Riccarton Bush. Has heard from Chilton that she visited Sir Heaton Rhodes' [1861–1956] garden [“Otahuna”, Tai Tapu] “. . . and saw his splendid seedling daffodils”. Lady Cecil interviewed by press “. . . and made some much-wanted remarks re rich allowing heather etc. to be planted in our National Parks” [Dominion, 23 September 1926]. Cockayne indebted to Hill for providing opportunity to assist Lady Cecil. A postscript is added by Cockayne — he has received postcard from Ithaca [International Congress of Plant Sciences (4th International Botanical Congress), Ithaca, 16–23 August 1926

(Duggar 1929)] “. . . with the names of so many great botanists appended thereto and not the smallest of my pleasure was to see your name amongst them” (2 pp.).

13. 20/11/1926 (Ngaio, Wellington). Encloses 12 photographs of plots made by Cockayne for Department of Agriculture's exhibit at the Dunedin Exhibition [New Zealand and South Seas Exhibition] to illustrate 1. evolution of depleted grasslands of Central Otago and Cockayne's experiments, 2. evolution of ordinary montane tussock-grassland and effect of sheep-grazing and browsing. Considers this is first time New Zealand farming (grassland and crops) has been shown “. . . by means of little plots of living plants” (1 p.).

14. 25/4/1927 (Ngaio, Wellington). Cockayne thanks Hill for photograph (portrait), “Kew is now represented on my study walls by Hooker, Prain and yourself, and I might add E. H. Wilson [see Cockayne:Prain Letter No. 29], who hails from Kew and though fixed in U.S.A. still remains British!”. Had intended sending *Celmisia* and *Olearia* hybrids “. . . but could not find time . . .”. Refers to latest hybrid swarm (*Dracophyllum longifolium* × *subantarcticum*) discovered on Campbell Island by Du Rietz and Oliver, “. . . but Oliver has brought back far too few specimens”. Cockayne saw no trace of swarm in 1903, “. . . Unless *D. scoparium* be one of its individuals — this Oliver did not see . . . I have careful field notes taken in the *Dracophyllum* shrubland, and examining bush after bush I found virtual uniformity, all belonging to a distinct species, the unpublished *D. subantarcticum* of *The Vegetation of New Zealand* [Cockayne 1921d]”. He found only one plant of *D. scoparium*. Suggests Hooker confused *D. subantarcticum* with *D. longifolium*. Kirk noted three species for Campbell Island and called *D. subantarcticum*, *D. urvilleanum* and Cheeseman clumped former with *D. scoparium*. Oliver is convinced of specific rank of *D. subantarcticum* “. . . and he and I shall publish the name and send Kew a specimen [*D. scoparium*, cf. Oliver (1929, p. 693)]. But the point comes up, how did I miss the hybrids, for they are very well-marked? Can it be that they have originated recently since the shrubland was opened up by sheep-farming and *D. subantarcticum* and *D. longifolium* have come together? Oliver thinks not, but he would never dream of such an occurrence and not examine the vegetation from the standpoint of man's influence. He tells me of land-slips and they might very well be caused by sheep” — a nice problem to be investigated in future, “. . . if that “some one” ever gets a chance . . .” — island visited only once a year by Government steamer (3 pp.). (A copy of Hill's letter of 22/6/1927 to Cockayne (2 pp. typescript) is included in the Cockayne:Kew correspondence. Hill acknowledges Cockayne's letter of 25 April and

expresses interest in *Celmisia* and *Olearia* hybrids, “I feel, however, that I want to see some of your plants growing in their native habitat to appreciate the various points you raise in your letter. It does seem from what you say that some of the hybrids must have originated recently owing to the opening up of the shrubland”. Hill may visit New Zealand early next year — he has had request from Commonwealth Council for Scientific and Industrial Research to visit Australia and may visit Australia towards end of 1927 [Hill visited New Zealand in January and February 1928 (Hill 1928, Anonymous 1928a, b)]. Suggests spending a fortnight in New Zealand, “All too short a time, I fear . . . there is nothing I should enjoy more than seeing the New Zealand botanists and something of the vegetation of the country”. Asks Cockayne for suggestions regarding visit).

15. 15/8/1927 (Ngaio, Wellington). “It was both exciting and most pleasant news to learn that you propose to visit this country next January. But a fortnight is far too short a time. Possibly in a well-directed month you could see a good deal of N.Z. vegetation and also the economic botany (forestry, agriculture, horticulture)”. Assistance will be provided by Government Departments and local botanists. Cockayne will give assistance, “Above all, I want you to see some of our hybrid swarms”. He may accompany Hill from Christchurch to Franz Josef Glacier and suggests walk from Arthur's Pass railway station to Otira station. Allan will be in South, “. . . using up some of the £100 grant from the Royal Society [see Cockayne:Goebel Letter No. 32, Thomson 1979; Chamberlain 1965, p. 86], but I shall try to get him to meet you, for he — above all others — can show you wild hybrids” (2 pp.).

16. 13/9/27 (Ngaio, Wellington). Cockayne received dates for Hill's visit. Hill will receive invitation to stay in New Zealand “. . . at least one month . . . A fortnight is far too short”. Itinerary will be arranged when Hill arrives “. . . every assistance possible will be yours”. “Forestry people” will want Hill to see Rotorua and Hanmer. Arthur's Pass is “. . . easiest and best place for a rapid view of high-mountain vegetation . . .” [Two photographs of Hill at Arthur's Pass in 1928 are in the Oliver papers retained at Botany Division: one was taken at the Hostel at Arthur's Pass and shows Oliver, Hill, and E. Phillips Turner (1865–1937); the other was taken at the summit of Arthur's Pass and shows Oliver, R. M. Laing (1865–1941), Turner, Hill, Leonard and Alfred Cockayne]. With regard to botanists, Allan and Cunningham [G. H. Cunningham (1892–1962)] “. . . will be away in the south of the South Island on the hybrid swarm investigation . . .” [Cunningham, who was later associated with Allan at the Plant Research Station at Palmerston North, provided the car transport (Chamberlain 1965, p. 86)], Holloway

[J. E. Holloway (1881–1945)] at Lake Wakatipu, so only Oliver and Cockayne will be in Wellington. “Anyhow, we are a very small botanical band at best. I want you to meet Allan above all others. If you stay the month, then you are almost certain to go to Dunedin and he could meet you there, or anywhere in the south”. Allan and Cunningham are going for 3 months, “. . . if Allan can get away from his school [Feilding Agricultural High School] for that length of time” [cf. Thomson 1979, p. 413]. Cockayne trying to arrange for DSIR to pay for substitute. “By means of the car many plants can be studied in three months working day by day, wet or fine”. A postscript is added by Cockayne — “Lotsy [J. P. Lotsy (1867–1931)] was to show a number of our hybrids at the Brit. Assoc. meeting. If he did I hope you saw them. But they are a poor substitute for what can be seen in the field. Unfortunately [Wellington?] is a poor locality for hybrids” (2 pp.).

17. 3/6/1928 (Ngaio, Wellington). Acknowledges letter from Hill giving experiences in Java, etc., “. . . and the land of “spicy breezes where only *Man* is vile”. Never had the fact struck me before of a teeming population in the tropics, for it had always seemed as if there — at any rate — virgin vegetation would be common. But doubtless man the world over — N.Z. excepted until recently — has done much to modify the plant-covering of the earth, and then grazing and browsing mammals have always been a notable factor in habitats. Well, you saw on Aleck’s Knob [Alex Knob, Franz Josef Glacier], and in certain other places, vegetation which had come into being and gained its form without interference by vertebrates (except birds), and you saw also how the latter can rapidly alter the face of nature when they get the chance”. Cockayne regrets his letter to Hill sent to Ceylon (18 March) was too late, “. . . though had I followed the order of “she who must be obeyed” — Mrs C. — the letter would have been written much earlier”. Allan sent paper on diverse progeny from *Myrtus* individual to Linnean Society “. . . and they turned it down until such time as he had more to tell ’em. Nor do I blame them, since, instead of the plain unvarnished tale which the seedlings told, many of his remarks (there should have been none) would be taxonomically offensive to one class of mind. Anyhow, these despised seedlings now show every transition from *Myrtus bullata* to *M. obcordata* and you (in due course) shall have specimens for Kew” [data later included in Allan (1929)]. Cockayne reports on “highly-pleasing” botanical news: “*Plant Research Institute*” [Plant Research Station] established at Palmerston North [the politics in its establishment are discussed in Atkinson 1976, p. 33], “. . . but not in the least belonging to the Massey Agricultural College . . .”, which is an “. . . enlarged and transformed old Biological Laboratory of the Dept. of

Agriculture”. Alfred [A. H. Cockayne] is Director and also remains Director of the Fields’ Division of Department. Staff is G. H. Cunningham and Neale [J. O. C. Neill (1882–1978)] — mycologists, H. H. Allan — systematic botanist, E. B. Levy [b. 1892] — pasture ecologist, present seed testing section under Foy [N. R. Foy (?–1961)] and “. . . my former first-rate assistant in tussock-grassland investigation, W. D. (“Bill”) Reid — now well versed in the technique of Bacteriology . . .”. Also a chemist and plant breeder [J. W. Hadfield (1887–1977)] yet to be appointed. There is ground for open-air experiments, and for hybrid trees and shrubs. “To me, all the above is truly splendid, and it is especially gratifying that Allan is divorced from teaching, even botanical teaching, and that much of his time will be spent in the field”. Cockayne also looks forward to the “. . . making of a proper herbarium in which the history of every specimen can be seen at a glance”. He will soon commence “. . . combing out my disreputable herbarium and sending, by degrees, all that is worth sending to Kew” because “The Vegetation of New Zealand” [Cockayne 1928b] and “The Trees of New Zealand” [Cockayne & Turner 1928] have been completed. Will be sending Hill material, “. . . package after package and box after box will be dealt with”. An alpine garden is being established at Otari Open-Air Native Plant Museum — all alpine plants from Cockayne’s garden will be transferred there and he discusses layout of Otari. Refers to Hill’s report [Hill 1928] which “. . . has been considered by a special committee of the Departments concerned plus myself but what was done is confidential . . . All (a large majority of the public) except the disgruntled (The “winter gardeners”) consider it to be a masterly Report [James Young (1862–1934), curator of the Christchurch Botanic Gardens, was aggrieved about Hill’s criticism of the Cuninghams Winter Gardens which he considered unjustified (Anonymous 1928c)]. And there is always a section of the public here who consider that N.Z. is perfect and no one should do anything but praise!”. Hopes Hill will publish account of journey in *Gardeners’ Chronicle*. “Kew and New Zealand though friends always are now doubly so” (4 pp.).

18. 13/8/1928 (Ngaio, Wellington). Requests information about *Dracophyllum* on Campbell Island and traces history of its taxonomic status citing papers by Hooker (1844), Kirk (1891, p. 223), Cockayne (1904, pp. 270–1, 322), Cheeseman (1906, pp. 424–5), Cockayne (1921d, p. 269), Cheeseman (1925, pp. 706–7), Cockayne (1928b, p. 339) and refers to specimen Oliver recently received from Kew. Enquires in form of five questions to Kew about the taxonomic status of *Dracophyllum* (8 pp.). (Included in Cockayne:Hill correspondence is a 3 pp. typescript entitled “Report on *Dracophyllum*



*scoparium* Hook.f. in reply to Dr L. Cockayne's letter of August 13th, 1928" which is signed V. S. S. [V. S. Summerhayes] and there is the written comment "Mr Sprague [T. A. Sprague] agrees with these conclusions". There is a covering letter dated 21/9/1928 (1 p., typescript) from A. W. Hill indicating that the reply to Cockayne's letter of 13/8/1928 was drawn up by Summerhayes. Enclosed are photographs of Hooker's specimen and drawings).

19. 13/8/1928 (Ngaio, Wellington). Cockayne refers to Hill's anxiety regarding the fate of latter's "... collection of  $\times$  *Gaultheria* etc.", but they must have arrived [see Hill (1930), Burt & Hill (1935)]. Discusses Tasmanian alpine plants and agrees with Hill that they should be in cultivation; but would they survive winter in Great Britain? However, they could be grown by "pot-culture", even the various "vegetable sheep". Refers to question of "N.Z. collectors" but none are available [to collect plant material in Tasmania?]; the masseur from Te Aroha, C. E. Christensen [see Cockayne:Foweraker Letter No. 4, Thomson 1979] would be most likely but is unavailable — also H. H. Allan, and F. G. Gibbs is no gardener "... nor has he the eye for hybrids. The University lecturers could find the time in the long vacation, but all are mainly plant anatomists". Suggests "... best for Tasmania would be local collector ..." and he would need garden to prepare plants for export. Also refers to collecting seed and dry specimens. "There must be dozens of hybrid groups. I know that many so-called species of *Eucalyptus* are mixtures of jordanons and hybrids between them and maybe between other species. Maiden [J. H. Maiden (1859–1925)] was far from getting to the bottom of the *Eucalyptus* question. Osborn [T. G. B. Osborn (1887–1973)] at Sydney talks about doing field taxonomy on N.Z. lines" (3 pp.).

Enclosed with the Cockayne:Kew correspondence are five items relating to the award of the Darwin Medal to Cockayne in 1928 (Anonymous 1929c):

(1.) Copy of holograph letter of 22/7/1928 (1 p.) from D. Prain (The Well Farm, Warmingham, Surrey) to A. W. Hill. Prain expresses thanks to Hill "... and to the others who have helped in making a case for Cockayne. I only hope that our effort on his behalf may be successful". Refers to statement (see 2 below) as "excellent" and only needs brief sentence "... which I shall have no difficulty in framing, making it perfectly clear to those who are not biologists that Cockayne's work while "of acknowledged distinction" (see Year Book for conditions of award) is also work "in the field in which Mr Darwin himself laboured" "

(2.) Copy of typescript (2 pp.) entitled "Dr L. Cockayne, F.R.S., Hon. Botanist, New Zealand State Forest Service etc.". This is apparently the

statement referred to above. It is a laudatory comment on Cockayne's work and most of the points are referred to in the statement made by the President of the Royal Society (E. Rutherford, 1871–1937), although written differently (see Anonymous 1929c).

(3.) Copy of typescript letter of 20/11/1928 (1 p.) from A. W. Hill to Cockayne. Expresses "... warmest congratulations on this [Darwin Medal] well deserved honour".

(4.) Copy of typescript letter of St Andrew's Day 1928 (1 p.), to Cockayne sending congratulations on award of Darwin Medal. The letter was signed by E. Rutherford, S. F. Harmer [1862–1950], A. B. Rendle [1865–1938], G. C. Druce [1850–1932], F. O. Bower [1855–1948], O. Stapf [1857–1933], F. F. Blackman [1866–1947], R. H. Biffen [1874–1949], D. H. Scott [1854–1934], D. Prain [1857–1944], H. Wager [H. W. T. Wager (1862–1929)], J. B. Farmer [1865–1944], A. C. Seward [1863–1941], F. W. Oliver [1864–1951], A. G. Tansley [1871–1955], E. Meyrick [1854–1938], and A. W. Hill [1875–1941].

(5.) Copy of typescript covering-letter of 13/12/1928 (1 p.) for above from A. W. Hill to Cockayne. Gives brief description of above signatories who are Fellows of the Royal Society.

(6.) Copy of typescript cable of 14/12/1928 (1 p.) from President of Linnean Society [S. F. Harmer], sending congratulations and Christmas greetings from Society.

#### SOURCE

These letters are part of the Cockayne:Kew correspondence (see p. 406) and copies of the 19 holograph letters as well as the additional Hill:Cockayne letters, the Allan:Kew letter, and 6 items relating to the Darwin Medal are retained at Botany Division.

#### EXPLANATORY NOTES

The Cockayne:Hill letters complete the sequence of correspondence Cockayne had with the Royal Botanic Gardens, Kew. The sequence commenced on 15/8/1899 with Cockayne's letter to Thiselton-Dyer and closes with his letter on 13/8/1928 to Hill. The Cockayne:Hill letters cover an important period in Cockayne's life, from 1923 to 1928, and they contain a wealth of data relating to botany, history of botany, and biographical information about Cockayne.

The visit to New Zealand in 1928 by Hill was a significant episode in New Zealand botanical history and came about by the government, at the suggestion of the DSIR, taking advantage of Hill's invitation to visit Australia. Cockayne played a major role in organising this visit and with E. Phillips Turner, Secretary of Forestry, accompanied Hill through New Zealand (Phillips Turner 1928). The visit helped to cement a close relationship with Kew (Letter No.

17), and there was the possibility that "... the Government will listen to Kew, but not to L. C.!" (see Cockayne:Goebel Letter No. 32, Thomson 1979). Hill kept a diary of his visit to Australia and New Zealand: the original is held by the Royal Botanic Gardens, Kew (see Burkill 1943) and a copy of the section relating to New Zealand is retained at Botany Division, DSIR. According to the diary Hill arrived at Bluff on 22 January 1928 and his itinerary was as follows: Invercargill (22 January), Dunedin (23 January), Oamaru (24 January), Christchurch (24 January), Wellington (25–26 January), Nelson (27 January), Blenheim (27 January), Hanmer via Kaikoura and Waiau (28–29 January), Christchurch (29 January), Hokitika via Arthur's Pass (30 January), Franz Josef Glacier (31 January–1 February), Hokitika (1 February), Christchurch via Arthur's Pass (2–3 February), Wellington (4 February), Auckland (by train, 5–6 February), Rotorua (7 February), Wairakei (8 February), Wanganui via Taupo and Ruapehu (9 February), New Plymouth and Mt Egmont (10 February), Palmerston North (11 February), and Wellington via Otaki and Ngaio (12–14 February).

The Darwin Medal was Cockayne's major award and the letter of 22/7/1928 from Prain to Hill and other items included in the Cockayne:Hill letters provide data on the award and the citation. Another aspect of New Zealand botanical history referred to in the letters is the establishment of the Plant Research Station at Palmerston North (Letter No. 17), a progenitor of the biology Divisions of DSIR (see Thomson 1976a, Atkinson 1976). Letter No. 1 adds some additional data to the publication of "The Vegetation of New Zealand" (Cockayne 1921d).

The letters refer to the development of Cockayne's work in the 1920's on hybrids (cf. p. 424 and Thomson 1979, p. 407) as he developed the "hybrid eye" and "hybrid mania" (Letter No. 7, 11). Cockayne's ambivalent attitude to herbaria is also evident: he often propounds a dislike for herbaria (see p. 428) but does appear to recognise their significance (Letter No. 17) and the letters show that he did call on assistance from Kew (e.g., Letter No. 8).

In 1932, Cockayne (Cockayne:Sledge Letter No. 1, Thomson 1979) referred to the paper by Cockayne & Sledge (1932) as "... the first which has received one word of criticism from either editors or referees...". However, Letter No. 5, Cockayne:Jepson Letter No. 5, Cockayne:Foweraker Letter No. 7 (Thomson 1979), and a Cockayne:Holloway letter of 16/8/1923 (retained by Mr J. S. Holloway) suggest that the paper on *Nothofagus* hybrids, which was eventually published in *Genetica* (Cockayne & Atkinson 1926), may have been rejected by the Linnean Society. Letter No. 17 shows that Allan's paper on *Myrtus* was rejected by the Society, although the data was later included in

Allan's (1929) paper in *Genetica*; it is likely that the basic tenets of the original paper would have had Cockayne's approval. There is also evidence that Cockayne had intended publishing in *Annals of Botany* with H. H. Allan on the "Age and Area" theory of Willis (1922) (Cockayne:Foweraker Letter No. 7, Thomson 1979, above Cockayne:Holloway letter and Cockayne & Allan 1927, footnote on p. 275) — this was not published, but it is not certain that the paper was in fact submitted.

Brief reference has been made elsewhere to Cockayne's views on conservation and how they equate well with present-day views (Thomson 1979, p. 400). In Letter No. 17, in referring to the land of "spicy breezes where only *Man* is vile", he laments the changes that have occurred in virgin vegetation.

## CORRESPONDENCE TO OTHER OVERSEAS COLLEAGUES

### Cockayne to Jepson

#### RECIPIENT

Willis Linn Jepson (1867–1946) was born in California and graduated from the University of California, where he became Professor of Botany in 1918. Biographical information is recorded in Constance (1947), Mason (1947), and Humphrey (1961).

#### ANNOTATED SUMMARY OF LETTERS

1. 6/7/1900 (Tarata, New Brighton Nr Christchurch). Cockayne sends his recent papers because Miss A. Eastwood of the Academy of Sciences, San Francisco, informed him that Jepson was "... interested in ecological botany and that perhaps you might like a correspondent in New Zealand". Offers his services (1 p.).

2. 11/4/1910 (127 Linwood Avenue, Christchurch). Cockayne received Jepson's "... admirable little book" ["The Trees of California" (Jepson 1909) — the copy from Cockayne's library is retained at Botany Division]. Cockayne interested in photographs which show "... the trees as they grow naturally... Also the account of your national parks is of special interest to me, since I have attempted for many years to influence public sentiment in that direction, and have done some little towards the creation of plant and animal sanctuaries". Refers to the private arboretum of Mr T. W. Adams [(1841–1919), see Cockayne (1919f) at Greendale, Canterbury "... which would be respectable in any country..."] and Californian species grown in New Zealand — "... *Pinus radiata* and *Cupressus macrocarpa* are the physiognomic plants and even *P. muricata*, *P. coulteri*, *Sequoia gigantea*, *Pseudotsuga douglasii*, *P. ponderosa* and others are quite common". Also refers to economic importance of *Lupinus arboreus* on dunes. Sends reports (4 pp.).

3. 26/8/1911 Jepson to Cockayne. He received Cockayne's book on New Zealand plants ["New Zealand Plants and Their Story" (Cockayne 1910)] — "I am especially pleased with the manner of the ecological treatment and also with your description of juvenile forms of New Zealand plants. It seems to me that the New Zealanders are to be congratulated upon the possession of such a convenient, readable, and illuminating handbook of the New Zealand plants" (1 p., typescript).

4. 3/7/1919 (Ngaio, Wellington). Leonard's son Alfred H. Cockayne [1880–1966] and his wife [née Ella Hutton] sail for San Francisco at beginning of August [left New Zealand on 11/8/1919 and returned on 14/2/1920. During 4½ months in U.S.A. Cockayne visited ". . . many of the agricultural institutions in the west, middle west, and eastern States, devoting myself mainly to a study of agromonomical conditions from the standpoints of education, research, and extension" (Cockayne, A. H. 1920)]. "My son is head of the biological division of the N.Z. Dept. of Agriculture and is being sent on an important mission, in connection with his work, to the United States by the New Zealand Government". First time Alfred and his wife have travelled out of New Zealand ". . . so you may be sure will be most grateful for any information you can give. He will also call on you, in order to see the botanical laboratories of your University, for one of his objects is to see such institutions in America and his Dept. is going to build new laboratories for his division". Cockayne comments, "I had hoped some day to perhaps see your country for myself and my many scientific correspondents, but as time goes on and I get old, that is hardly likely" (3 pp.).

5. 11/4/1922 (Ngaio, Wellington). Sends two papers, ". . . one a quite preliminary account [probably Cockayne 1921c] of a remarkable series of *Nothofagus* hybrids (I have now more than 250 distinct adult forms) . . .". Refers to "The Vegetation of New Zealand" [Cockayne 1921d] ". . . which has at last appeared, and no one more astonished than myself that it has done so". Requests information about hybrid trees and shrubs growing wild in California. "I am hoping to publish a full account of this *Nothofagus* business in one of the English botanical journals and to want to refer to the phenomenon in general. Literature references would also be greatly valued" [Article was in fact published in *Genetica* (Cockayne & Atkinson 1926, see p. 422); Cockayne did not refer to the phenomenon in general and in the literature on hybridisation, except for his own publications, cites only Lotsy (1925)] (1 p.).

#### SOURCE

Copies of the 4 holograph letters as well as the additional Jepson:Cockayne letter were sent in response to a request to Dr L. R. Heckard, Jepson

Herbarium, Department of Botany, University of California, Berkeley, and were received at Botany Division on 1/7/1976.

#### EXPLANATORY NOTES

The Cockayne:Jepson letters provide an interesting example of Cockayne's international correspondence. In this case the exchange of literature was a significant outcome as well as providing a contact for Alfred Cockayne during his visit to U.S.A. (Letter No. 4). Incidentally, Alfred took some of his father's lantern slides to U.S.A. ". . . and gave what were not broken to the University of California" (see *Cockayne:Foweraker Letter No. 15*, Thomson 1979).

Mention is also made in Letter No. 4 of Cockayne's thoughts about overseas travel. There is no evidence that Cockayne left New Zealand after arriving in 1881 (see Thomson 1979, p. 402), although he is listed as a member (with M. W. Aitken and G. H. Cunningham) of the 1924 Imperial Botanical Conference (Brooks 1925, p. 387) and his paper "New Zealand economic plant ecology" is given in the Proceedings (Cockayne 1925) he did not attend the conference.

#### Cockayne to Jeffrey

##### RECIPIENT

Edward Charles Jeffrey (1866–1952) was born in Canada and graduated from the University of Toronto, and Harvard University in 1898, and became Professor of Plant Morphology at Harvard. Biographical information is recorded in Wetmore & Barghoorn (1953), Torrey (1953), and Carlquist (1969).

##### ANNOTATED SUMMARY OF LETTER

1. 24/2/1929 (Ngaio, Wellington) [This letter is significant in the context of Cockayne's view of hybridisation and evolution and is reproduced in full] "My dear Jeffrey, thank you most sincerely for your extremely welcome congratulations regarding my having — to my most intense surprise — been awarded the Darwin Medal. Why it has come to me of all men is beyond my imagination, but having received so many congratulations from those who ought to know — and you amongst the very foremost — I am almost beginning to think that I may have accomplished something. At any rate, if I live for a few more years, there is a chance I may do something worth while in regard to our wild hybrids. As for your estimation of the present-day chromosome genetics, let me quote Professor H. B. Kirk's [1859–1948] couplet, sent me as his congratulations, concerning what he takes to be my position:

"Cockayne, of years not few  
and honours more,  
In Fame's wide temple strides  
the spacious floor;

Hybrids and vegetation raise  
their head,  
While chromosomes a mixed  
reception dread".

And he has just about scored a bull's-eye!

And now as to your evolution book. Quite apart from my humble share in it, which I feel is inadequate, it is splendid news to learn that the book is taking shape. Certainly the subject bristles with difficulties and progress must, of necessity, be slow. But the time is ripe, as never before, for the putting forth of your ideas based on so many years of experience and careful research, and the looking at the matter from a new angle.

As for my part, if I have given a total for the wild hybrid groups in New Zealand, it will be far too small. They now number 320 (frequently swarms as you know, for did you not assist in discovering one of great size in Pelorus Valley [Cockayne and Jeffrey visited area on 28/11/1925, see Hamlin (1967) and Cockayne:Wastney Letter No. 8, Thomson (1979)], resulting from the crossing of 2 species of *Fuchsia*, the one a tree, the other a liane) and these belong to 47 families and 100 genera (there are 109 families and 383 genera in the N.Z. vascular flora). Making liberal allowance for more or less doubtful groups, at least 260 are beyond suspicion. So please, if necessary, alter my Ms. in accordance with the above.

I am sure when you again visit this land, you will receive a most hearty welcome from those you met before. I should especially like you to have a talk with Prof. W. P. Evans [(1864–1959), Professor of Chemistry, 1906–22, Canterbury University College] who is now, as you will know, tackling our coals by a method different from yours. Again, I must thank you with all my heart for your letter and, with kindest regards. Believe me, Ever yours most faithfully, L. Cockayne" (4 pp.).

#### SOURCE

On 17/11/1972 I found at the Auckland Institute and Museum Library Cockayne's manuscript material relating to a book he intended publishing on evolution. Appended to a 48 pp. manuscript entitled "Evolution in the Light of a small isolated Flora" by Cockayne was Professor E. C. Jeffrey's address at Harvard University. With this clue my initial enquiry in search of Cockayne:Jeffrey letters was made to Professor J. G. Torrey who passed the request on to Professor R. H. Wetmore. By coincidence the latter had the task of putting Jeffrey's files in order after his death in 1952 (R. H. Wetmore, pers. comm. of 9/4/1974) and recalled especially one letter from Cockayne which he sent to the University Archives. Professor Wetmore searched the files and provided a copy of the holograph letter which was received at Botany Division on 16/4/1974.

#### EXPLANATORY NOTES

This letter is of significance because it refers to the common interest of Cockayne and Jeffrey in matters relating to evolution (cf. also Cockayne:Yeates Letter No. 1 and 2). Godley (1979a) in his paper "Leonard Cockayne and evolution" refers to the book on evolution that Cockayne intended publishing. This proposed book is of interest in New Zealand botanical history and the opportunity is taken here to add some data which is in addition to that recorded by Godley.

Godley (1979a) concluded from the Cockayne:Kew correspondence (see Cockayne:Prain letters) that it "... appears that Sir David Prain, after reading Cockayne's evolution paper of 1912 [Cockayne 1912b], had suggested that the subject was worthy of a book ...". As well as the five Cockayne:Prain letters mentioned by Godley, the Cockayne:Goebel Letter No. 29 dated 12/2/1914 (Thomson 1979) is relevant: "It is very probable too the Cambridge University Press is going to publish a second work, to deal with Evolution viewed in the light of New Zealand Ecology. The idea was not mine but originated I understand with Prain, Scott, Seward and other British botanists. There would be several chapters on Juvenile forms. I have drawn up a table of contents which has been approved by the Syndics of the Press. My only doubt is as to my ability to produce a good book". Despite the evidence presented above it appears Cockayne had in fact contemplated publishing a book on evolution long before 1912 because in Cockayne's manuscript notes at the Auckland Institute and Museum Library (MS 74) there is a 2-page manuscript entitled "Notes for Evolution Book. 18/5/1904". Godley (1979a) suggested that Cockayne, because of other botanical commitments, did not have time to complete the book. Be that as it may, Cockayne in later years was pleased the book had not been published. Thus, in a letter dated 26/11/1928 to W. R. B. Oliver (holograph letter retained at National Museum, Wellington) Cockayne wrote: "For two things I am especially glad, viz (1) that though commencing to study N.Z. plants in 1887 I held my hand from all publishing for more than 10 years and (2) that the book on Evolution commenced in 1913 was never finished".

With regard to hybridisation and evolution, Cockayne and Jeffrey appear to have had similar views (see Cockayne:Yeates Letter No. 2). Professor R. H. Wetmore (pers. comm. of 9/4/1974) recalled talking with Jeffrey at length on the latter's discussions and field trip with Cockayne on the possible role of hybridism in plant evolution. Professor Wetmore commented "I can state that Professor Jeffrey was a firm believer in the thesis that hybridism played a significant part in evolution in plants, and especially in the angiosperms, and was profoundly impressed by Professor Cockayne's data". The Cockayne:Yeates Letter No. 2 clearly

indicates Cockayne's support to Jeffrey for what in retrospect were radical views. Jeffrey (1925) himself referred to T. H. Morgan's (1866–1945) work thus: "It is in fact not impossible that before many years have elapsed the doctrine of mutation will appear to the eyes of men as a fantastic *Fata Morgana*, appropriately staged on the exaggerated skyline of the lower Hudson". Earlier (Jeffrey 1914), he had referred to the mutation theory of De Vries (1848–1935): "... appears accordingly to lag useless on the biological stage and may apparently be now relegated to the limbo of discarded hypotheses". It is also appropriate to quote here from Torrey (1953): "Prof. Jeffrey was a creative genius and a man of strong enthusiasms and convictions. Almost of necessity he became a controversial figure in American botany".

The comment has been made elsewhere that Cockayne intended launching an attack on the contemporary views on evolution and to emphasise the role of hybridisation, but decided to join forces with Jeffrey (Thomson 1976b). The Cockayne:Jeffrey letter does indicate that Cockayne had provided manuscript material on hybridisation in the New Zealand flora. As noted by Thomson (1976b), Jeffrey's book on evolution was never published but the manuscript is retained in the Harvard University Archives.

Thomson (1979, p. 409) commented in explanatory notes to the Cockayne:Frankel letters that Cockayne seems to have regarded cytogenetics with suspicion. The letter to Jeffrey which quotes H. B. Kirk's couplet with the added "And he has just about scored a bull's-eye!" supports this view.

#### CORRESPONDENCE TO COLLEAGUES IN NEW ZEALAND

##### Cockayne to Ell

###### RECIPIENT

Henry George Ell (1862–1934) was born in Christchurch, New Zealand. He was a member of Parliament for Christchurch City (1899–1905) and Christchurch South (1905–1919). In Christchurch he is particularly associated with the development of roads, walkways, and rest houses on the Port Hills, and with the preservation of Kennedy's Bush. Biographical information is recorded in Oakley (1960), Wall (1965, p. 100), and Ogilvie (1978).

###### ANNOTATED SUMMARY OF LETTER

1. 12/4/1912 (181 Linwood Avenue, Christchurch). Cockayne thanks Ell for congratulations on election to Fellowship of the Royal Society [see Cockayne:Hemsley Letter No. 4; Cockayne:Hooker Letter No. 3; Cockayne:Goebel Letter No. 28, Thomson 1979]: "Leaving myself out of the matter altogether, as you say, the coming of the title F.R.S. to the Dominion is a national honour, for, as you know,

only 15 are selected yearly from the millions of the Empire, and of these, at most, only *one* can be a botanist. Indeed no Australasian botanist, except Baron von Mueller, has been an F.R.S. But, so far as my success goes, how much do I not owe to yourself who secured for me the writing of those Government Botanical Reports [Cockayne 1907a, 1908a, 1908b, 1909a, 1909b, 1911], which, before all, have brought my work into prominence throughout the scientific world. Assuredly, but for your foresight this honour would not have come to New Zealand at the present time. My friend, Mr Laurenson [G. Laurenson, Member of Parliament for Lyttelton, 1899–1913], also did me great service, when he secured for me various trips in the Hinemoa [see Cockayne 1904, p. 231; 1905a; 1906b; 1907b; 1908c]. Surely I, of all men, should be grateful to such enlightened public men!" (3 pp.).

###### SOURCE

The holograph letter is included in the Ell papers which are lodged in the Canterbury Public Library, Christchurch, and a copy was received at Botany Division on 16/2/1979.

###### EXPLANATORY NOTES

Ell was one of many like-minded, but non-botanist citizens who promoted Cockayne's work. Cockayne and Ell were both interested in matters relating to conservation, were far-sighted and had an individualistic philosophy coupled with missionary zeal. Oakley (1960, p. 13) refers to "... the idealistic fires of enthusiasm which were the driving force of Ell's life" and Wall (1965, p. 100) refers to his "very unorthodox" methods. No doubt Cockayne and Ell disagreed on occasion and an example, at a meeting of the Christchurch Beautifying Association, related to the daffodil beds in Christchurch (see Chilton 1925). As well as this organisation (see Thomson 1978), both were associated with the Port Hills Summit Road project (Baughan *et al.* 1914, Oakley 1960, Ogilvie 1978) and the preservation of Kennedy's Bush (Cockayne 1915; Oakley 1960; Ogilvie 1976a, b, 1978): Ell wrote in the *Lyttelton Times* of 16 July 1928, "I knew Kennedy's Bush when the valley was covered with beautiful native forest and when the songs of the native birds filled the air. The memory of it all made me love the place. I never forgot it, and one of my first acts as a member of Parliament in 1900 had to do with the stopping of closing orders of roads on Banks Peninsula and the Port Hills, and with the purchase of what remained of Kennedy's Bush for a native bird sanctuary". Some aspects of their collaborative work are cited by Oakley (1960). Ell was also associated with the passage through Parliament of the Scenery Preservation Bill in 1908 (Oakley 1960, Ogilvie 1978).

Cockayne did not "hide his light under a bushel" and this letter is an example of his oblique self-praise. The letter is also of particular interest

because it refers to the support Cockayne obtained for his vegetation surveys (see Cockayne:Goebel Letter No. 25, Thomson 1979). In the survey of Kapiti Island (Cockayne 1907a) which was his first publication of the series, Cockayne acknowledges Ell and also R. McNab (1864–1917) who was Minister of Lands at the time (Scholefield 1950). Ell no doubt provided support for Cockayne in Parliament and made representations to the Minister. An example is given in Godley (1979b, p. 140) who described the 1907 expedition to the Auckland and Campbell Islands and noted that the expedition was provided with a government subsidy, partly through the effort of Ell. Further, Cockayne in his papers relating to studies made when transport was provided by the Government steamer *Hinemoa* (Cockayne 1904, 1905a, 1906b, 1907b, 1908c), acknowledges G. Launson and W. Hall-Jones (1851–1936) who was Minister of Marine from 1896 to 1906 (Scholefield 1950). Again, it is likely that Launson made representations to the Minister on Cockayne's behalf.

#### Cockayne to Halcombe

##### RECIPIENT

Mrs Blanche Stuart Halcombe (1881–1961) from New Plymouth, New Zealand, was a grand-daughter of William Swainson (1789–1855). Biographical information about Swainson is recorded, for example, in Dell (1974) and Galloway (1978).

##### ANNOTATED SUMMARY OF LETTER

1. 19/8/1925 (Ngaio, Wellington). Cockayne apologises for delay in replying to Mrs Halcombe's letter of 22 July (is hard at work rewriting "The Vegetation of New Zealand"), "... for is it not of great interest to me to hear from a grand-daughter of William Swainson, the first F.R.S. in this country". Refers to *Swainsona novae-zelandiae* — not discovered by Swainson but by von Haast [1822–1887], "Like all 'shingle-slip' plants it is nearly impossible to cultivate". Cockayne presumes genus named in honour of Mrs Halcombe's grandfather [in fact was named after Mr Isaac Swainson an amateur horticulturist of Twickenham (Hooker 1860, p. 361)]. Refers to *Gentiana verna* — "New Plymouth is quite unsuitable for real alpine gardening. Doubtless, too, the summer would be bad for *Myosotidium*. My alpine garden [Tarata Experimental Garden] was about one mile inland from New Brighton, Canterbury, situated at the base of sandhills and watered by a small stream. Here I grew many foreign and indigenous alpine plants. *Gentiana verna* (as for most of my plants) I raised from seed; it grew fairly well and flowered, but one day, in a foolishly-generous mood, I dug up a piece for a lady who lived at Opawa [Christchurch] and my plant forthwith died, but hers multiplied so greatly she used it for an edging to her flower beds! So, too, I

slew *Saxifraga oppositifolia* which was blooming by weeding out of it some *Hydrocotyle*". Thanks for offering seed of *Linaria alpina* which he has grown many times. "Here [Ngaio] I have really no time for gardening and much that I grow is for study and experiments — really a wicked way to treat flowers! Also, I am away from home far too frequently, and for too long periods, to attend to the garden" (2 pp.).

##### SOURCE

The holograph letter is lodged in the Alexander Turnbull Library, Wellington, and a copy was received at Botany Division on 18/12/1979.

##### EXPLANATORY NOTES

This letter is of interest because it adds to our knowledge of Cockayne's Tarata Experimental Garden (see Cockayne:Hooker Letter No. 2; Cockayne:Goebel letters and Cockayne:Foweraker Letter No. 4, Thomson 1979; Thomson 1978, p. 398). The opportunity is taken here to note that in addition to the extant photographs of Tarata which were recorded in Thomson (1978, p. 400), Cockayne (1911) in his "Report on the Dune-Areas of New Zealand" includes photograph No. 48 which has the caption "Various species of Australian Acacia. Experiment Garden of author in March, 1903". This photograph was taken in the year Cockayne left Tarata.

#### Cockayne to Yeates

##### RECIPIENT

John Stuart Yeates (b. 1900 at Waitara, New Zealand) graduated M.Sc. and Ph.D in botany from Victoria University College and Ph.D. from Cambridge University. Yeates joined Massey College in 1928 as lecturer in agricultural botany and retired in 1965. Biographical information is recorded in Veale (1978).

##### ANNOTATED SUMMARY OF LETTERS

1. 28/3/1926 (Ngaio, Wellington). Cockayne acknowledges letters from Yeates in Cambridge, especially that of 10 January. Suggests July 1927 too early for Yeates to return to New Zealand. Refers to climate in England: "You must not judge the climate of England from your brief experience though of course it cannot compare with ours here". Yeates has seen Forsters' herbarium of New Zealand plants and Cockayne enquires about location, and requests data on *Hebe salicifolia* type — will send specimens of plants from Marlborough Sounds and Dusky Sound. "The chief matter in our botanical world here has been the visit of Professor E. C. Jeffrey [see Cockayne:Jeffrey Letter No. 1] of Harvard. He was in quest of hybrids and of coal . . . I took him to Marlborough–Nelson and showed him a few "swarms". As for hybrids he is chiefly concerned in their cytology". Refers briefly to recent meetings with H. B. Kirk and J. E. Holloway — "He is

raising quantities of prothalli of *Hymenophyllum*". Cockayne writing papers on hybrids for *Genetica* [Cockayne & Atkinson (1926)], etc., ". . . and so "The Vegetation of New Zealand" [Cockayne (1928b)] has been taking a rest . . ." but hopes to have it completed by Christmas. Sends on to Yeates letter from the Royal Society. Concludes, "When you find a bit of spare time for letter writing remember I like greatly to hear from you. Any matters concerning your daily life under your novel surroundings will interest me greatly" (3 pp.).

2. 26/4/1926 (Ngaio, Wellington). Acknowledges Yeates's letter of 28 February which ". . . tells me you are enjoying your life and keeping your eyes open". Yeates has met Bower ". . . he and I have been desultory correspondents for many years [see Cockayne:Bower letters, Thomson 1979] and, once on a time, I sent him much pteridophyte material for a paper he later published in *Annals of Botany*". Refers to sporophylls of *Paesia*. "Evidently Bower now occupies the *facile princeps* position left vacant by the death of Sir Isaac Bayley Balfour [1853–1922] but he has not the wide range of view of the latter, so greatly stimulated by his splendid garden." Cockayne saw a good deal of Jeffrey and refers to latter's "splendid technique" of using microtome for cutting sections of coal. Also refers to Jeffrey's cytological work in *Genetica* [probably Jeffrey & Hicks (1925)] which ". . . succeeded where Morgan [T. H. Morgan] and his school have failed and I think demolishes the Morgan doctrine of mutations derived from *Drosophila*". Cockayne states that "As for my position re effect of hybridism in evolution, I become day by day a deeper convert to its efficacy and my position is now that regarding the evolution of allied species I am certain it alone is to be considered, but as to what it does in more distantly-related groups my mind is still open. Anyhow, it is so far the only *real* cause of fixed polymorphy in plants that we know of, all other causes being merely guesswork". Is now working hard at "The Vegetation of New Zealand" and hopes to send it to publisher in October or November. "I trust you will have a decent summer and so get a better idea of the land of my birth, but no more loved — if as much so — by me as the land of my adoption" (2 pp.).

3. 29/3/1927 (Ngaio, Wellington). Allan and Cockayne ". . . are making considerable progress in regard to fixing by field studies those different groups (our jordanons, epharmones and hybrids — in our sense as published by us). It is clearly appearing that so far as herbarium "types" go, they tell nothing, for no one from a dried specimen can do more than make a guess at its taxonomic status, unless he has a great amount of carefully-collected material, each specimen, or set of such, taken from a

single plant, supported by copious field-notes as to the individual status of such plants. Such material was never collected by any person sending material to Kew during the preparation of Hooker's New Zealand floras — and, for that matter, herbarium material in general is nearly always quite inadequate — so that but little can be learnt from the Kew Herbarium (or any Herbarium), except that those plants can be seen which Hooker dealt with". The emphasises that many of the "new species" in Handbook, and those described by Cheeseman, and Petrie, ". . . were based on more than one specimen, which did not match one another, and the description referred *not* to any one plant, but was an imaginary conception based on the entire lot. Obviously, an abstraction not existing in nature can have no "type" ". Thus, Cockayne will not trouble Yeates regarding comparison of specimens at Kew, ". . . but I will send to Kew, as hitherto, for such information as seems likely to be available". Field-work by Allan and Cockayne has provided no clue to identity of *Hebe traversii* ". . . so great is the diversity everywhere; and so for species after species of *Hebe* and many other genera. The secret is only to be found out by close field studies, supported by genetic experiments, and probably your cytology will be the final Board of Appeal". No space for discussing ". . . those deep questions your zeal propounds, but will have a *go* when we meet once more in this favoured land. Nor will it be favoured the less by the return of one of its sons fired with holy enthusiasm to devote his days to the study of the many problems that land perhaps above all others offers for the expenditure of such splendid zeal" (2 pp.).

#### SOURCE

The 3 holograph letters were sent in response to a request to Dr J. S. Yeates of Palmerston North and were received at Botany Division on 6/8/1979.

#### EXPLANATORY NOTES

The three letters are of particular interest because Cockayne expresses to Yeates, one of the first botanists in New Zealand to train in the field of cytology, some of his views on cytology, evolution, and the significance of herbarium specimens. There is some evidence that Cockayne regarded cytogenetics with suspicion (see p. 425). However, he was also aware of the contributions cytology could make to taxonomy and to theories on evolution. Yeates (1925) in his study of the nucleolus of *Tmesipteris* acknowledges Cockayne ". . . for help he has freely given . . .". In some personal reminiscences, Dr Yeates (pers. comm. of 3/6/1979) recalled Cockayne visiting him at Victoria University College while he was making drawings of *Tmesipteris* chromosomes, and the paper on the nucleolus was communicated to the *Proceedings of the Royal*

*Society* by Cockayne. With regard to the identification of *Hebe* species, etc., Cockayne gives support to cytological work by suggesting "... probably your cytology will be the final Board of Appeal" (Letter No. 3). The first substantial development of cytogenetics in New Zealand was by O. H. Frankel (b. 1900) and later J. B. Hair (1909–1979) (see Cockayne:Frankel Letters, Thomson 1979).

Cockayne refers to the visit of E. C. Jeffrey to Pelorus Valley (28/11/1925, see Hamlin 1967) in quest of hybrids, his chief interest being in their cytology (Letter No. 1). This visit would have been of great significance to Cockayne and would have further stimulated his rapidly developing interest in hybrids, an interest which continued until his death in 1934. Cockayne clearly indicates in Letter No. 2 his view on recent work in cytogenetics and considers Jeffrey's work (Jeffrey & Hicks 1925) "... demolishes the Morgan doctrine of mutations derived from *Drosophila*", and with regard to evolution, hybridism "... is so far the only real cause of fixed polymorphy in plants ...".

Letter No. 3 gives Cockayne's critical view on dried specimens retained in herbaria, including those at Kew, but does equivocate (cf. Cockayne:Hill Letter No. 17) — he intends to maintain links with Kew as hitherto, and elsewhere (Letter No. 1) he requires the services of herbaria (cf. also Cockayne:Hill Letter No. 8). Cockayne often discussed informally with colleagues (e.g., Cockayne:Wastney letters, Thomson 1979) and formally in publications (e.g., Cockayne & Allan 1926; Cockayne & Atkinson 1926, p. 3) the question of herbarium specimens. The series of newspaper articles which formed the basis of Cockayne's "New Zealand Plants and Their Story" (Thomson 1975b) included data which was not in the book; perhaps better counsels prevailed. In one such item in Part I ("The history of the plants") Cockayne (1906a) gave his general view on herbaria: "Previously the one object of a field botanist, no matter how well the flora of a region was known, was usually to collect specimens, dry them and store them away in a herbarium, whose dried and most unnatural contents were available for study. But such profitless work is being superseded. Plants are now being studied as living organisms". Again, in 1927 Cockayne & Allan concluded their paper on ecological studies and taxonomic conceptions with a plea: "And would that new workers, free from the thralldom of the dangerous herbarium artificial method, would come forth".

#### ACKNOWLEDGMENTS

Copies of the Cockayne letters were generously provided by the following: Dr P. S. Green, Royal Botanic Gardens, Kew, provided copies of the Cockayne:Kew letters and are included here by courtesy of the Director; Professor J. A. Ewan and Mrs A. N. Ewan during a visit to Botany

Division in 1974 suggested the Jepson Herbarium, Department of Botany, University of California, Berkeley, as a source of Cockayne:Jepson letters, and in response to my request Dr L. R. Heckard provided copies; Professor J. G. Torrey, Maria Moors Cabot Foundation for Botanical Research, Harvard University, kindly conveyed my request for copies of Cockayne:Jeffrey letters to Professor R. H. Wetmore who provided a copy of the only extant letter, and also data about Cockayne and Jeffrey and the latter's unpublished manuscript on evolution; Mr C. S. Ell, Christchurch, gave data on the Ell papers and the Librarian, Canterbury Public Library, Christchurch, provided access to them; The Alexander Turnbull Library, Wellington, provided a copy of the Cockayne:Halcombe letter, and the assistance of Sir Charles Fleming F.R.S. is also acknowledged; Dr J. S. Yeates, Palmerston North, kindly provided letters he received from Cockayne as well as personal reminiscences. Miss S. M. D. FitzGerald, Chief Librarian and Archivist, Royal Botanic Gardens, Kew, provided a copy of A. W. Hill's diary of his visit to New Zealand. I am also grateful to Mr G. B. Ogilvie of Christchurch for references to newspaper reports about Cockayne and Kennedy's Bush, Mr I. G. Thwaites and his staff at the Auckland Institute and Museum Library for access to the Cockayne manuscript collection (MS 74), Mr H. de S. C. MacLean, Chief Librarian, General Assembly Library, for a newspaper report on Lady Cecil's visit to New Zealand, and Dr P. J. Brownsey for access to the Cockayne Collection at the National Museum, Wellington. I am indebted to my colleagues at Botany Division, DSIR, especially Dr E. J. Godley, for their interest and assistance. Finally, I thank Mrs M. E. Blackmore and her staff at the DSIR Library, Lincoln, for obtaining through inter-library loan, literature not available at Lincoln, and Miss A. White for typing the manuscript.

#### REFERENCES

- ALLAN, H. H. 1924: On the hybridity of *Coprosma cunninghamii* Hook.f. *N.Z. Journal of Science and Technology* 6: 310–8.
- 1926: The F<sub>1</sub> progeny resulting from crossing *Coprosma propinqua* with *C. robusta*. *Genetica* 8: 155–60.
- 1929: Illustrations of wild hybrids in the New Zealand flora. VI. *Ibid.* 11: 491–508.
- 1942: Obituary: Arthur William Hill, 1875–1942. *Transactions and Proceedings of the Royal Society of New Zealand* 72: xxxvi–xxxviii.
- ANONYMOUS 1908a: Kapiti Island. *Kew Bulletin* 1908: 266–8.
- 1908b: New Zealand. *Ibid.* 1908: 464–5.
- 1912: Sir Joseph Dalton Hooker, 1817–1911. *Ibid.* 1912: 1–34.
- 1919: New Zealand flax. *Ibid.* 1919: 169–74.
- 1921: Proceedings of the New Zealand Institute Science Congress. *Transactions and Proceedings of the New Zealand Institute* 53: 506–19.
- 1924a: William Botting Hemsley. *Kew Bulletin* 1924: 389–92.
- 1924b: Obituary: Dr W. B. Hemsley, F.R.S. *Nature* 114: 616–7.
- 1926: A nature reserve in Wellington, New Zealand. *Kew Bulletin* 1926: 428–9.
- 1928a: Botanic gardens/Dr Hill's Report/Ideal to be aimed at/Outspoken criticism. *Evening Post* (Wellington), 2 April 1928.



- 1928b: Crowded month/New Zealand flora/Dr Hill's recent visit/A good impression. *Ibid.*, 2 July 1928.
- 1928c: Winter garden/Botanists criticism/ Mr James Young in reply. *Lyttelton Times*, 14 July 1928.
- 1929a: Obituary: Sir W. T. Thiselton-Dyer, K.C.M.G. *Nature* 123: 212-4.
- 1929b: Sir William Turner Thiselton-Dyer, 1843-1928. *Kew Bulletin* 1929: 65-75.
- 1929c: The award of the Darwin Medal. *N.Z. Journal of Science and Technology* 10: 259-62.
- ATKINSON, J. D. 1976: DSIR's first fifty years. *N.Z. Department of Scientific and Industrial Research Information Series* 115: 1-220.
- BAUGHAN, B. E.; COCKAYNE, L.; SPEIGHT, R. 1914: "The Summit Road". Smith and Anthony, Christchurch. 40 pp.
- BLUNT, WILFRID 1978: "In for a Penny". Hamish Hamilton, London. Pp. 190-6.
- BRIERLEY, W. B. 1944: Lt.-Col. Sir David Prain, C.M.G., C.I.E., V.M.H., M.A., M.B., LL.D., F.R.S. *Annals of Applied Biology* 31: 169.
- BROOKING, T. W. H. 1977: "Massey: Its Early Years". Massey Alumni Association, Palmerston North. 171 pp.
- BROOKS, F. T. (Ed.) 1925: "Report of Proceedings Imperial Botanical Conference". Cambridge University Press, Cambridge. 390 pp.
- 1942: Arthur William Hill 1875-1941. *Obituary Notices of Fellows of the Royal Society* 4(11): 87-100.
- BURKILL, I. H. 1943: Obituary: Sir Arthur William Hill (1875-1941). *Proceedings of the Linnean Society of London 154th Session*: 280-5.
- 1944: David Prain 1857-1944. *Obituary Notices of Fellows of the Royal Society* 4 (13): 747-70.
- 1945: Obituary: Sir David Prain (1857-1944). *Proceedings of the Linnean Society of London 156th Session*: 223-9.
- BURTT, BRIAN L.; HILL, SIR ARTHUR W. 1935: The genera *Gaultheria* and *Pernettya* in New Zealand, Tasmania, and Australia. *Journal of the Linnean Society of London (Botany)* 49: 611-44.
- CAMERON, HECTOR CHARLES 1952: "Sir Joseph Banks K.B., P.R.S.". Batchworth Press, London. 341 pp.
- CARLQUIST, SHERWIN 1969: Morphology and anatomy. In Ewan, Joseph (Ed.) "A Short History of Botany in the United States". Hafner, New York. Pp. 49-57.
- CHAMBERLAIN, E. E. (E.E.C.) 1965: Obituary Notice: Gordon Herriot Cunningham, C.B.E., D.Sc., Ph.D., F.R.S., F.R.S.N.Z., F.A.N.Z.A.A.S. (1892-1962). *Proceedings of the Royal Society of New Zealand* 93: 83-90.
- 1969: Plant pathology in New Zealand. *Review of Applied Mycology* 48: 1-10.
- CHEESEMAN, THOMAS F. 1872: On the botany of the Titirangi district of the Province of Auckland. *Transactions and Proceedings of the New Zealand Institute* 4: 270-84.
- 1906: "Manual of the New Zealand Flora". Government Printer, Wellington. 1199 pp.
- 1925: "Manual of the New Zealand Flora". 2nd Edition. New Zealand Board of Science and Art. Government Printer, Wellington. 1163 pp.
- CHILTON, CHAS. 1925: History of the Christchurch Beautifying Association VII. The Riccarton Bush and the Provincial Government Buildings. *City Beautiful* 1(8): 5-9.
- COCKAYNE, A. H. 1920: Biology Section. *Department of Agriculture Annual Report for 1919-20*: 43-4.
- COCKAYNE, L. 1891: Humble-bees. *N.Z. Journal of Science* 1 (new series) (2): 74-5.
- 1898: On the freezing of New Zealand alpine plants: notes of an experiment conducted in the freezing-chamber, Lyttelton. *Transactions and Proceedings of the New Zealand Institute* 30: 435-42.
- 1899: An inquiry into the seedling forms of New Zealand phanerogams and their development. Parts I and II. *Ibid.* 31: 354-98.
- 1901: An inquiry into the seedling forms of New Zealand phanerogams and their development. Part IV. *Ibid.* 33: 265-98.
- 1902: A short account of the plant-covering of Chatham Island. *Ibid.* 34: 243-325.
- 1903: Southern Isles/Their plant and animal life/A trip in the Hinemoa. *Lyttelton Times*, 25 July 1903.
- 1904: A botanical excursion during midwinter to the Southern Islands of New Zealand. *Transactions and Proceedings of the New Zealand Institute* 36: 225-333.
- 1905a: Notes on the vegetation of the Open Bay Islands. *Ibid.* 37: 368-77.
- 1905b: On the significance of spines in *Discaria toumatou*, Raoul (Rhamnaceae). *New Phytologist* 4: 79-85.
- 1906a: New Zealand plants and their story/I. The history of the plants. *Lyttelton Times*, 28 April 1906.
- 1906b: Notes on a brief botanical visit to the Poor Knights Islands. *Transactions and Proceedings of the New Zealand Institute* 38: 351-60.
- 1907a: "Report on a Botanical Survey of Kapiti Island". Department of Lands. Government Printer, Wellington. 23 pp.
- 1907b: Some observations on the coastal vegetation of the South Island of New Zealand — Part I: General remarks on the coastal plant covering. *Transactions and Proceedings of the New Zealand Institute* 39: 312-59.
- 1908a: "Report on a Botanical Survey of the Tongariro National Park". Department of Lands. Government Printer, Wellington. 42 pp.
- 1908b: "Report on a Botanical Survey of the Waipoua Kauri Forest". Department of Lands. Government Printer, Wellington. 44 pp.
- 1908c: The Southern Islands Expedition. *Kew Bulletin* 1908: 237-9.
- 1909a: "Report on a Botanical Survey of Stewart Island". Department of Lands. Government Printer, Wellington. 68 pp.
- 1909b: "Report on the Sand Dunes of New Zealand". Department of Lands. Government Printer, Wellington. 30 pp.
- 1910: "New Zealand Plants and Their Story". Government Printer, Wellington. 190 pp.
- 1911: "Report on the Dune-Areas of New Zealand". Government Printer, Wellington. 76 pp.
- 1912a: Obituary: Sir Joseph Dalton Hooker, O.M., F.R.S. (1817-1911). *Transactions and Proceedings of the New Zealand Institute* 44: iii-iv.

- 1912b: Observations concerning evolution, derived from ecological studies in New Zealand. *Ibid.* 44: 1–50.
- 1914: "New Zealand Plants Suitable for North American Gardens". Panama Pacific International Exposition, San Francisco, U.S.A. February–December, 1915. Government Printer, Wellington. 35 pp.
- 1915: "Notes on the Plant Covering of Kennedy's Bush and Other Scenic Reserves of the Port Hills (Canterbury)". Department of Lands and Survey. Government Printer, Wellington. 6 pp.
- 1917a: A consideration of the terms "species" and "variety" as used in botany, with special reference to the flora of New Zealand. *Transactions and Proceedings of the New Zealand Institute* 49: 66–79.
- 1917b: Notes on New Zealand floristic botany, including descriptions of new species, etc. (No. 2). *Ibid.* 49: 56–65.
- 1919a: An economic investigation of the montane tussock-grassland of New Zealand. No. I — Introduction. *N.Z. Journal of Agriculture* 18: 1–9.
- 1919b: An economic investigation of the montane tussock-grassland of New Zealand. II. Relative palatability for sheep of the various pasture-plants. *Ibid.* 18: 321–31.
- 1919c: An economic investigation of the montane tussock-grassland of New Zealand. III. Notes on depletion of the grassland. *Ibid.* 19: 129–38.
- 1919d: An economic investigation of the montane tussock-grassland of New Zealand. IV. Increase of the Californian thistle (*Cnicus arvensis*) on the Dunstan Range, Central Otago. *Ibid.* 19: 343–6.
- 1919e: "New Zealand Plants and Their Story". 2nd edition. New Zealand Board of Science and Art. Manual No. 1. Government Printer, Wellington. 248 pp.
- 1919f: Thomas William Adams, 1841–1919. *Transactions and Proceedings of the New Zealand Institute* 51: xi–xii.
- 1919g: Yellow-leaf disease in *Phormium tenax*. A recent investigation. *N.Z. Journal of Agriculture* 19: 89–93.
- 1920a: An economic investigation of the montane tussock-grassland of New Zealand. V. Regeneration of grassland after depletion. *Ibid.* 20: 82–94.
- 1920b: An economic investigation of montane tussock-grassland of New Zealand. VI. Further details regarding the relative palatability for sheep of various pasture-plants. *Ibid.* 20: 209–17.
- 1920c: An economic investigation of the montane tussock-grassland of New Zealand. VII. On the effect of understocking and stocking to its full capacity a certain area. *Ibid.* 20: 337–45.
- 1920d: An economic investigation of the montane tussock-grassland of New Zealand. VIII. An experiment in Central Otago concerning the relative palatability for sheep of various pasture-plants. *Ibid.* 21: 176–88.
- 1920e: An economic investigation of the montane tussock-grassland of New Zealand. IX. Further details regarding the Earnsclough (Central Otago) palatability experiment. *Ibid.* 21: 324–34.
- 1920f: Yellow-leaf disease in *Phormium tenax*. *N.Z. Journal of Science and Technology* 3: 190–6.
- 1921a: An economic investigation of the montane tussock-grassland of New Zealand. X. The effect of spelling a heavily grazed pasture in Central Otago. *N.Z. Journal of Agriculture* 22: 148–57.
- 1921b: An economic investigation of the montane tussock-grassland of New Zealand. XI. The grassland of the Humboldt Mountains established since the burning of their forest covering. *Ibid.* 23: 137–47.
- 1921c: The southern-beech (*Nothofagus*) forests of New Zealand. *Ibid.* 23: 353–60.
- 1921d: "The Vegetation of New Zealand". 1st edition. Engelmann, Leipzig. 364 pp.
- 1922a: An economic investigation of the montane tussock-grassland of New Zealand. XII. The regrassing experiments in Central Otago. Part I. An account of the depleted area in relation to the experiments. *N.Z. Journal of Agriculture* 24: 321–34.
- 1922b: An economic investigation of the montane tussock-grassland of New Zealand. XII. The regrassing experiments in Central Otago. Part II. Objects, principles, and methods. *Ibid.* 25: 1–11.
- 1922c: An economic investigation of the montane tussock-grassland of New Zealand. XII. The regrassing experiments in Central Otago. Part III. Results up to May, 1922. *Ibid.* 25: 129–44.
- [1923]: "The Cultivation of New Zealand Plants". Whitcombe and Tombs, Christchurch. 139 pp.
- 1925: New Zealand economic plant ecology. In Brooks, F. T. (Ed.) "Report of Proceedings Imperial Botanical Conference". Cambridge University Press, Cambridge. Pp. 259–69.
- 1926: Monograph on the New Zealand beech forests. Part I. The ecology of the forests and taxonomy of the beeches. *N.Z. State Forest Service Bulletin No. 4*: 1–71.
- 1928a: Monograph on the New Zealand beech forests. Part II. The forests from the practical and economic standpoints. *Ibid. No. 4*: 1–59.
- 1928b: "The Vegetation of New Zealand". 2nd edition. Engelmann, Leipzig. 456 pp.
- 1932: "A Scheme for the Development and Arrangement of the Otari Open-Air Native Plant Museum, and other Matters Connected Therewith". City Council, Wellington. 28 pp.
- COCKAYNE, L.; ALLAN, H. H. 1926: The present taxonomic status of the New Zealand species of *Hebe*. *Transactions and Proceedings of the New Zealand Institute* 57: 11–47.
- 1927: The bearing of ecological studies in New Zealand on botanical taxonomic conceptions and procedure. *Journal of Ecology* 15: 234–77.
- COCKAYNE, L.; ATKINSON, ESMOND 1926: On the New Zealand wild hybrids of *Nothofagus*. *Genetica* 8: 1–43.
- COCKAYNE, L.; SLEDGE, W. A. 1932: A study of the changes following the removal of subalpine forest in the vicinity of Arthur's Pass, Southern Alps, New Zealand. *Journal of the Linnean Society (Botany)* 49: 115–31.
- COCKAYNE, L.; TURNER, E. PHILLIP 1928: "The Trees of New Zealand". Government Printer, Wellington. 171 pp.
- CONSTANCE, LINCOLN 1947: Willis Linn Jepson 1867–1946. *Science* 105: 614.

- DELL, R. K. (R. K. D.) 1974: Science gallery: William Swainson (1789–1855). *New Zealand's Nature Heritage* 2(20): 565.
- DOUGLAS, J. A. 1970: The Cockayne plots of Central Otago. *Proceedings of the New Zealand Ecological Society* 17: 18–24.
- DUGGAR, B. M. (Ed.) 1929: "Proceedings of the International Congress of Plant Sciences". Ithaca, New York, August 16–23, 1926. Volumes I and II. George Banta, Menasha. 1799 pp.
- D. W. T. 1929: Obituary: Sir W. T. Thiselton-Dyer, K.C.M.G. *Nature* 123: 214–5.
- ELL, H. G. 1928: Letter to Editor. *Lyttelton Times*, 16 July 1928.
- FOWERAKER, C. E. 1917: Notes from the Canterbury College Mountain Biological Station, Cass. No. 5. The mat-plants, cushion-plants, and allied forms of the Cass River bed (Eastern Botanical District, New Zealand). *Transactions and Proceedings of the New Zealand Institute* 49: 1–45.
- GALLOWAY, D. J. 1978: The botanical researches of William Swainson F.R.S., in Australasia, 1841–1855. *Journal of the Society for the Bibliography of Natural History* 8: 369–79.
- GODLEY, E. J. 1979a: Leonard Cockayne and evolution. *N.Z. Journal of Botany* 17: 197–215.
- 1979b: The 1907 expedition to the Auckland and Campbell Islands, and an unpublished report by B. C. Aston. *Tuatara* 23: 133–58.
- HAMLIN, B. G. 1967: Itinerary of Leonard Cockayne's botanical expeditions. *Records of the Dominion Museum* 5: 265–76.
- HASZARD, H. D. M.; ADAMS, T. W.; CLARKE, S. I.; COCKAYNE, L.; LETHBRIDGE, F. Y.; MURDOCH, C. P. 1913: "Royal Commission on Forestry". Government Printer, Wellington. 87 pp.
- HEMSLEY, WILLIAM BOTTING 1885: Report on present state of knowledge of various insular floras, being an introduction to the botany of the Challenger Expedition. In Thomson, Sir C. Wyville; Murray, John "Report on the Scientific Results of the Voyage of H.M.S. Challenger During the Years 1873–76". Her Majesty's Stationery Office, London. Pp. 1–75.
- 1903a: On the genus *Corynocarpus*, Forst., with descriptions of two new species. *Annals of Botany* 17: 743–60.
- 1903b: Review: Cockayne, L. A short account of the plant-covering of Chatham Island. *Botanische Centralblatt* 92: 338–40.
- 1911–12: The life of Sir Joseph Hooker. *Gardeners' Chronicle* 50: 427–9, 448–50, 468–9; 51: 11–2, 26–7, 43.
- HILL, ARTHUR W. 1918: The genus *Caltha* in the Southern Hemisphere. *Annals of Botany* 32: 421–35.
- 1927: The genus *Lilaeopsis*: a study in geographical distribution. *Journal of the Linnean Society of London (Botany)* 47: 525–51.
- 1928: Report on matters of botanical interest in New Zealand. *N.Z. Journal of Science and Technology* 10: 53–9.
- 1930: Hybridisation in the New Zealand flora, with special reference to *Gaultheria*. *Proceedings of the Linnean Society of London 141st Session*: 34–6.
- 1935: Leonard Cockayne 1855–1934. *Obituary Notices of the Royal Society of London No. 4*: 443–57.
- HOOKE, JOSEPH DALTON 1844: "The Botany The Antarctic Voyage". I. Flora Antarctica. Part I. Botany of Lord Auckland's Group and Campbell's Island. Reeve, London. Pp. 46–8.
- 1860: "The Botany The Antarctic Voyage". Part III. Flora Tasmaniae. Vol. II Monocotyledones and Acotyledones. Reeve, London. 422 pp.
- 1867: "Handbook of the New Zealand Flora". Reeve, London. 798 pp.
- 1904: "A Sketch of the Flora of British India". Eyre and Spottiswoode, London. 55 pp.
- HUMPHREY, HARRY BAKER 1961: "Makers of North American Botany". Ronald Press, New York. Pp. 127–9.
- HUTCHINSON, J. 1921: The family Winteraceae. *Kew Bulletin* 1921: 185–91.
- JACKSON, B. D. (B. D. J.) 1925: Obituary notice: William Botting Hemsley. *Proceedings of the Linnean Society of London 137th Session*: 76–8.
- JEFFREY, EDWARD C. 1914: The mutation myth. *Science* 39: 488–91.
- 1925: *Drosophila* and the mutation hypothesis. *Ibid.* 62: 3–5.
- JEFFREY, E. C.; HICKS, G. C. 1925: Evidence as to the cause of so-called mutations in *Drosophila*. *Genetica* 7: 273–86.
- JEPSON, WILLIS LINN 1909: "The Trees of California". Cunningham, Curtis and Welch, San Francisco. 228 pp.
- J. H. 1918: Lord Howe Island. *Kew Bulletin* 1918: 216.
- KENNEDY, D. (D. K.) 1967: Obituary: Frederick J. Perham. *N.Z. Journal of Forestry* 12: 204–5.
- KIRK, T. 1891: On the botany of the Antarctic Islands. In Hector, Sir James (Ed.) "Report of the Third Meeting of the Australasian Association for the Advancement of Science". Christchurch, New Zealand, January 1891. Government Printer, Wellington. Pp. 213–31.
- LOTSY, J. P. 1925: "Evolution Considered in the Light of Hybridisation". Canterbury College, Christchurch. 67 pp.
- MACKENZIE, J. G.; COCKAYNE, L. 1927: The Otari Open-Air Native-Plant Museum. *N.Z. Journal of Agriculture* [34]: 309–21.
- MARTIN, WM. 1936: Critical notes on *Celmisia sinclairii* Hook.f. *Transactions and Proceedings of the Royal Society of New Zealand* 66: 71–7.
- MASON, HERBERT L. 1947: Willis Linn Jepson. *Madroño* 9: 61–4.
- MERRILL, E. D. 1946: Sir David Prain (1857–1944). *Chronica Botanica* 10: 374–6.
- MOORE, LUCY B. 1967: The Cockayne Memorial Lecture, 1965: Leonard Cockayne, botanist. *Transactions of the Royal Society of New Zealand (General)* 2: 1–18.
- OAKLEY, LENORE 1960: "Harry Ell and His Summit Road". Caxton Press, Christchurch. 112 pp.
- O'CONNOR, K. F. 1979: Mountain revegetation: technologies and objectives. *Nineteenth Annual Report Tussock Grasslands and Mountain Lands Institute* 1979: 11–38.
- OGILVIE, GORDON 1976a: Kennedy's Bush and the pioneer timber men of Canterbury. *The Press* (Christchurch), 2 October 1976.

- 1976b: Kennedy's Bush road — a historic route to the hills. *Ibid.*, 9 October 1976.
- 1978: "The Port Hills of Christchurch". A. H. and A. W. Reed, Wellington. Pp. 211–25.
- OLIVER, W. R. B. 1917: The vegetation and flora of Lord Howe Island. *Transactions and Proceedings of the New Zealand Institute* 49: 94–161.
- 1926: New Zealand angiosperms. *Ibid.* 56: 1–5.
- 1929: A revision of the genus *Dracophyllum*. *Ibid.* 59: 678–714.
- PHILLIPS TURNER, E. 1928: "Annual Report New Zealand State Forest Service". Government Printer, Wellington. P. 16.
- PRAIN, D. 1930: Obituary Notice: Sir William Turner Thiselton-Dyer. *Proceedings of Linnean Society of London 141st Session*: 147–9.
- ROCKLEY, THE LADY 1935: "Wild Flowers of the Great Dominions of the British Empire". Macmillan, London. Pp. vii–viii.
- SADD, ROBT. T.; BUCKHURST, W. B.; COCKAYNE, LEONARD; JARDINE, DICKSON; MCINNES, ARCHD.; MURRAY, A. J.; SCOTT, R.; TODD, CHARLES 1920: "Southern Pastoral Lands". Report of the Commission appointed to inquire into and report upon. Government Printer, Wellington. 24 pp.
- SALISBURY, E. J. 1944: Obituary: Sir David Prain, C.M.G., C.I.E., F.R.S. *Nature* 153: 426–7.
- SAMPSON, ARTHUR W. 1919: Plant succession in relation to range management. *United States Department of Agriculture Bulletin No. 791*: 1–76.
- SCHOLEFIELD, GUY H. (Ed.) 1950: "New Zealand Parliamentary Record 1840–1949". Government Printer, Wellington. 244 pp.
- SMITH, [W. G.?] 1905: Review: Cockayne, L. A botanical excursion during mid-winter to the Southern Islands of New Zealand. *Botanisches Centralblatt* 98: 99–102.
- SPRAGUE, T. A.; SUMMERHAYES, V. S. 1926: The taxonomic position of *Hoheria lyallii*. *Kew Bulletin* 1926: 214–20.
- TAYLOR, GEORGE 1957: Sir David Prain, 1857–1944. *Nature* 180: 162–3.
- THOMSON, A. D. 1975a: Aspects of the early history of Government-sponsored plant breeding in New Zealand. *Crop Research News No. 17*: 12–4.
- 1975b: The original publication of Leonard Cockayne's "New Zealand Plants and Their Story". *N.Z. Journal of Botany* 13: 807–9.
- 1976a: Evolution of plant research in DSIR: impetus for the establishment of Plant Diseases Division at Mt Albert. *Crop Research News No. 18*: 15–6.
- 1976b: Hybridisation and evolution. *N.Z. Genetical Society Newsletter No. 1*: 9–10.
- 1978: Leonard Cockayne: horticulturist. *N.Z. Journal of Botany* 16: 397–404.
- 1979: Annotated summaries of letters to colleagues by the New Zealand botanist Leonard Cockayne — I. *Ibid.* 17: 389–416.
- TORREY, RAY E. 1953: Prof. E. C. Jeffrey. *Nature* 172: 653.
- TRAVERS, H. H. 1869: On the Chatham Islands. *Transactions and Proceedings of the New Zealand Institute* 1: 173–80.
- [1911]: "Cultivation of Native Plants". Otago Daily Times, Dunedin. 11 pp.
- TURRILL, W. B. 1942: Sir Arthur W. Hill K.C.M.G., Sc.D., F.R.S. *Chronica Botanica* 7: 141–2.
- VEALE, J. A. 1978: John Stuart Yeates M.Sc., Ph.D.(N.Z.), Ph.D.(Camb.). *Royal New Zealand Institute of Horticulture Annual Journal No. 6*: 78–9.
- WALL, ARNOLD [1929]: "The Cultivation of New Zealand Plants in Britain". Christchurch Press, Christchurch. 11 pp.
- 1965: "Long and Happy". A. H. and A. W. Reed, Wellington. 128 pp.
- WARMING, EUGENIUS 1902: "Lehrbuch der Ökologischen Pflanzengeographie". Borntraeger, Berlin. 442 pp.
- WATERS, R.; ATKINSON, E. H. 1922: Yellow-leaf disease in *Phormium tenax*. *N.Z. Journal of Agriculture* 24: 27–32.
- WETMORE, RALPH H.; BARGHOORN, ELSON S. 1953: Edward Charles Jeffrey, 1866–1952. *Phytomorphology* 3: 127–32.
- WILLIS, J. C. 1916a: The evolution of species in Ceylon, with reference to the dying out of species. *Annals of Botany* 30: 1–23.
- 1916b: The distribution of species in New Zealand. *Ibid.* 30: 437–57.
- 1922: "Age and Area". Cambridge University Press, Cambridge. 259 pp.
- YEATES, J. S. 1925: The nucleolus of *Tmesipteris tannensis*, Bernh. *Proceedings of the Royal Society B* 98: 227–44.