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To cite this article: W. Lauder Lindsay M.D. F.R.S.E. F.L.S. (1879) XIV. Growth in Britain of the New Zealand Kowhai, Transactions of the Botanical Society of Edinburgh, 13:1-4, 125-131, DOI: [10.1080/03746607909468767](https://doi.org/10.1080/03746607909468767)

To link to this article: <http://dx.doi.org/10.1080/03746607909468767>



Published online: 01 Dec 2010.



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paratively early age of fifty-one. He published, in 1861, a work entitled "The Providence of God manifested in Natural Law."

Mr JOHN MILLER of Burgo Park, and a Fellow of the Society, who died during this year at a ripe age, was a native of Thurso, where he was actively engaged in business until his retirement some years ago, when he settled at the Bridge of Allan. This gave him the opportunity of cultivating the scientific tastes he possessed—especially in the direction of geology, in which he delighted, and in pursuit of which he obtained a good collection.

HENRY N. L. JAMES, M.D., a Non-resident Fellow, died suddenly on 19th December 1876, at Bolarum, near Secunderabad, India, from apoplexy, caused by sunstroke. Both at the Horse Guards and at Netley he stood very high, being in the first seven; and at the time of his death had seen eight years of Indian service. He contributed a large collection of Indian plants, especially orchids, to the Royal Botanic Garden.

XIV. *Growth in Britain of the New Zealand Kowhai.\** By  
W. LAUDER LINDSAY, M.D., F.R.S.E., F.L.S.

(Read 11th April 1878.)

In connection with the acclimatisation of foreign trees and shrubs in this country, and of British ones in our colonies, there are not a few problems that remain to be solved.

It is not enough to imitate mere conditions of latitude and climate, as these are represented by average temperature or other atmospheric details. Nor is it enough to imitate what are apparently other essential conditions of growth, such as altitude, distance from the sea, nature of the soil, and so forth. Notwithstanding all the care that has been bestowed, both at home and in our colonies, on the details of acclimatisation as applied to plants, we

\* The *Edwardsia grandiflora*, Salisb., of horticulturists; the *Sophora tetralpera*, Aiton, of Hooker's "Handbook of the New Zealand Flora" (1864); best known under the first-mentioned name.

know only too well, only too vexatiously, that some plants refuse to grow; that others refuse to flower or seed; that some which are hardy in one country are, under apparently the same climatic or other conditions, only half hardy in another, or *vice versa*; and that even in the same district of the same country, within an area of a few miles, the very same species behaves very differently under circumstances of difference that are apparently trivial, or that cannot be appreciated by the casual onlooker. Climate or weather-change frequently shows most capricious effects, such as that a plant may successfully withstand in one locality a severer winter than one that kills it in another, or that a plant may grow vigorously for some years and then die suddenly without any adequate or apparent cause,—any cause that can be satisfactorily determined. That there are and must be causes for such results is at least probable; and it is also probable that due inquiry will in course of time bring to light the nature and number of these causes. Meanwhile the causes in question constitute puzzles deserving the attention of all who are interested in the acclimatisation of exotic trees, a subject of increasing importance in some of our colonies or possessions, especially India, Southern Africa, Australia, and New Zealand.

Many illustrations might be adduced of the singular differences in the growth of the same species in different countries not differing much, if at all, in latitude or temperature. Thus, of the Dogwood (*Cornus florida*) Sir Charles Lyell tells us, in the account of his "Second Visit to the United States," vol. ii. p. 326, "No Virginian who was not a botanist could ever recognise it in England as the same plant as the Dogwood of his native land. Yet it is capable of enduring frosts as severe and protracted as are ever experienced in the South of England; and the cause of its flowers not attaining their full size in our climate is probably a want of sufficient intensity of light and heat."

I propose, however, confining myself to a single illustration, that of a single species, one of the most graceful trees of New Zealand, the equivalent or representative in that colony of our *Laburnum*, viz., the Kowhai, as it was

called by the Maoris, the *Goai*, as the Maori term has been corrupted by the settlers.

In 1863 some seeds of it that had been steeped in warm water were sown under glass by Mr Gowenlock, gardener to the Murray Royal Institution, Perth. Of the plants that came up two were selected for experimental purposes, the one being planted out and kept in the open all the year round, the other being kept in the greenhouse throughout the cold months of the year, and potted out all summer, if genial. The first lived for several years, became apparently hardy, but was an inelegant stunted tree with marked angularity of the branching. It never showed any signs of flower-bearing. At length one winter it shed or lost its leaves, and one of the under-gardeners, believing the tree to be dead, tore it up unadvisedly and destroyed it.

The other plant, in a few years, grew to be a handsome tree, of too great height, however, to be suitable for growth in a small greenhouse only 15 feet high. Though leafing abundantly, it showed no signs of flowers till February 23, 1874, when it displayed a single, not axillary but terminal flower, about  $1\frac{1}{4}$  inch long, not pendulous, but standing straight out from the end of a branch. The calyx was urceolate and irregularly toothed. About the middle of the following February\* (1875) a dozen flowers at least appeared—none in racemes, but some in groups of two or three; others single, as in 1874. Since 1875 it has flowered annually in February, the flowers being numerous; but there has as yet been no seeding.†

Some years ago Mr Greig, then of the Perth Nurseries, informed me that many plants that will not grow out in Perth or its neighbourhood do so near Dundee or on the Fife coast (e.g., about Largo and Dysart). He found some foreign shrubs, notably those of Japan and China, more hardy than our own. He had grown the New Zealand *Edwardsia* in cold pits covered with mats, a pro-

\* February in Otago, New Zealand, is equivalent to our September, being the first month of the New Zealand autumn. *Vide* the author's "Contributions to New Zealand Botany," 1863, p. 12.

† Details concerning the growth of Mr Gowenlock's specimens were given in (1) the author's "Contributions to New Zealand Botany," p. 75; and (2) the "Scottish Naturalist," vol. ii. 1873, p. 33.

cedure he had adopted with all New Zealand plants. But in the case of the *Edwardsia* at least, the result was not encouraging, for I saw one twelve years old not higher than Mr Gowenlock's of eleven years, far from being a handsome tree; nor had it ever flowered. Mr Greig regarded all New Zealand plants as only half hardy, and the Perth climate as more rigorous than that of the neighbouring sea coast.

Mr Wm. Heale, presently of the Perth Nurseries, stated in a letter to Mr Gowenlock in November last (1877), that *Edwardsia grandiflora* grows at Bray, County Wicklow, about fifteen miles south of Dublin, on walls, trained like our fruit trees. "I have frequently," he says, "seen it growing against walls in the west and south of England. It requires protection in the winter even there, but not in Ireland. It flowers very freely—yellow; back of petals a bronzy hue. Through its not being hardy it is not cultivated, although the seeds are easily obtainable."

Now, in 1868 I pointed out that the province of Otago, which extends from 44° 40' to 46° 80' S. latitude, and is about the size of Scotland, "in its general aspect . . . may be said to combine the features of Scotland, Norway, and Switzerland. The greater part of the province—especially in the interior, and on the western sea-board—is hilly, mountainous, or alpine. Its Western Alps, which attain an elevation of upwards of 9000 feet, form part of that chain which runs throughout the South Island (of New Zealand), and which culminates in Canterbury in the Mount Cook of the settlers," about 13,000 feet high. "This Mont Blanc of New Zealand is ribbed with some magnificent *glaciers*, which, in respect of size, rival those of the Himalayas rather than those of the Swiss Alps. Some glaciers of considerable size occur also within the Otago boundary, in the north-west corner of the province, flanking the Alps, between the Wanaka and Wakatip Lakes and the west coast. The higher of the Otago Alps are covered also with *perennial snow*—the perpetual snow-line varying in elevation from 4000 to 8000 feet."\*

The capital of the province, Dunedin, is in latitude 45°

\* Extracts from the chapter on the Physical Geography and Geology of Otago in the author's "Contributions to New Zealand Botany," p. 29.

52' S. Its mean temperature for the year, according to the data published by me in 1868, ranges from 50° to 51°, the mean maximum 56° to 59°, the mean minimum 42° to 44°, the absolute maximum 86° to 89°, the absolute minimum 27° to 30°.\* "From the published meteorological statistics of Otago," however, "it would never be gathered that the winter, even on the plains and coasts, is frequently very severe, both as respects *frost and snow* ; that considerable snow-falls sometimes, though rarely, occur at so low elevations and so near the sea as Dunedin, where the snow is occasionally in sufficient quantity for snowballing, and the *ice* for skating; that storms of snow, *hail, or sleet*, sometimes occur even in summer in the Green Island district, at elevations so low as 1000 or 1400 feet; . . . that even in summer, in the same district, morning and evening fires are rendered desirable, if not necessary, by the lowness of the temperature; that night frosts sometimes occur very late in spring, and even in summer, down to the sea-level, destroying young vegetation, occasionally on the plains rendering the raising of gardening crops precarious; that on the gold-fields there is annually a considerable loss of life by frost-bite or snow-drifts; that losses of sheep sometimes occur by thousands from snow-drifts; that its *winds*, which are sudden and fitful, include all forms between the cold gales, locally known as 'busters,' and the hot dust-winds that sweep across from Australia; that Otago weather is eminently capricious, marked by extremes and sudden changes of temperature; and that the main difference between the climates of the eastern seaboard of Otago and of Scotland lies in the less distinction in the former between the seasons, and the superior mildness of the winter in relation to the summer, with, in general, a greatly inferior snowfall. Nor should we ever infer the existence of an equally unlooked-for group of phenomena, viz., the contiguity of what has generally been regarded as *subtropical* (jungle or forest) vegetation . . . to *glaciers* ; . . . or the facts that immigrant British weeds root and spread with amazing vigour and

\* Extracted from the chapter on the Climatology of Otago in the author's "Contributions to New Zealand Botany," p. 25; which chapter contains details also as to barometric pressure, moisture, wind, cloud, ozone, and so forth.

rapidity, displacing and replacing the strongest indigenous vegetation; and that all the *British cereals, fruits, and flowers* are grown with great ease and success."

Now, it was from this province of Otago, and from the neighbourhood of Dunedin, that the Kowhai seeds were forwarded which were sown by Mr Gowenlock at Perth in 1863. It was in this province that I saw the tree in question growing abundantly and quite hardily in the New Zealand spring and summer of 1861-62. And it is from this province, no doubt, that most of the seed was sent which is the origin of the various Kowhai trees or shrubs now to be found under glass, or in the open, in so many parts of the three kingdoms.

It has to be added as singular that while *British* plants are perfectly at home in a country so alpine and a climate so rigorous as that of Otago, the apparently hardy trees and shrubs of that province do not, as a rule at least, thrive in Britain; and in no case, probably, can they be described as hardy in this country.

Writing in February 1874, Sir Joseph Hooker reported that "*Sophora tetraptera* has flowered with us repeatedly (at Kew). In fact we have had three forms of it, though it has never fruited. I do not remember that there was any difference between our cultivated and the indigenous New Zealand flower."

Dr Moore, of the Glasnevin Botanical Garden, Dublin, in March 1874, thus wrote:—"In reference to *Edwardsia grandiflora*, I have to state that I remember a fine plant of it flowering profusely at the College Botanic Garden, Dublin. It was placed against a wall facing the south, and spread from right to left of the bole some 10 yards on each side. So far as I recollect, the flowers were in largish racemes. It flowered annually, but more profusely some years than others. I cannot recollect distinctly seeing it in flower elsewhere, though I think I have."

And Mr M'Nab, in February of the same year (1874), informed me that "*Edwardsia grandiflora* flowers frequently in the greenhouse here (the Royal Botanic Garden of Edinburgh) during the summer months. About thirty years ago it used to flower freely on the open wall. The racemes bore generally five or six flowers. I never

examined the flowers minutely, but I rather think they were abnormal, as the stamens were very irregular in length." I am not quite sure whether Mr M'Nab's allusion to "thirty years ago" implies his belief that the climate of Scotland has in the interval altered for the worse, or that the imported New Zealand Kowhai has become deteriorated in strength.

XV. *Enumeration of Polyporus.* By M. C. COOKE,  
M.A., LL.D.

(Read 2d July 1878.)

The number of species in the genus *Polyporus* having become so large, I found it necessary to construct for my own use an alphabetical catalogue, but upon the suggestion that it would also be useful to others, I made the addition of geographical distribution, and references to technical descriptions. With these accessions I submit the list to the Society, for the use of its members, reserving any observations which I may deem it desirable to make, on comparative distribution, for a future occasion, when the list may be consulted in verification. It is only necessary to observe that such synonyms as have been included are indicated by the use of a different type. No critical opinion has been ventured as to the value of the species included.

POLYPORUS, Fr.

- abietinus*, DC., Fl., Fr. = *amorphus*, Fr.  
*ABIETINUS*, Fr., *Hym. Eur.*, 569 (Inodermei), Arctic America, U. States, Europe.  
*ABNORMIS*, Lev., *Ann. Sci. Nat.*, 1844, 186 (Ino.), Java.  
*ABRUPTUS*, Berk., *Linn. Journ.* xvi. 42 (Anodermei), Aru.  
*ACANTHOIDES* (Bull), Fr., *Hym. Eur.*, 540 (Merisma), Europe.  
*accrinus*, Opiz seznám, 137, sp. dubia.  
*ACICULA*, B. & C., *Linn. Journ.* x. 304 (Mesopus), Cuba.  
*ACTINOBOLUS*, Mont., *Syll.*, 166 (Ino.), Guiana.  
*ACCLEANS*, Berk., *Hook. Journ.*, 1856, 199 (Ino.), Brazil.  
*ACULEATUS*, Lev., *Ann. Sci. Nat.*, 1846, 137 (Ino.), Java.  
*aculeatus*, Mont., *Ann. Sci. Nat.*, 1840, 205 = *Hexagona aculeata*.  
*ACUPUNCTATUS*, B. & Br., *Linn. Journ.* xiv. 52 (Resup.), Ceylon.  
*ADAMANTINUS*, Berk., *Hook. Journ.*, 1852, 141 (Placo.), India.  
*ADAMI*, B. = *dilatatus*, B. (Pleur.), Australia, Ceylon.  
*ADIPOSUS*, B. & Br., Fr., *Hym. Eur.*, 550 (Ano.), Europe.  
*ADUSTUS*, Fr., *Hym. Eur.*, 549 (Ano.), Cuba, India, N. Zealand, U. States, Tahiti, Japan, Brit. N. America, Mexico, Sandwich Isles, Europe.