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NEW ZEALAND EXHIBITION, 1865.

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ESSAY  
ON THE  
BOTANY  
OF THE  
NORTH ISLAND OF NEW ZEALAND,

BY  
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NAPIER.



PRINTED FOR THE COMMISSIONERS,  
BY FERGUSSON AND MITCHELL, DUNEDIN, OTAGO, N.Z.  
MDCCCLV.



ESSAY  
ON THE BOTANY, GEOGRAPHIC AND ŒCONOMIC, OF  
THE NORTH ISLAND OF THE NEW ZEALAND  
GROUP.

§ I. PRELIMINARY.

1. It is very nearly a century since the Botany of New Zealand first became known to science. On the north-west shore of Poverty Bay, in the evening of Sunday the 8th of October, 1769, (being early summer,) Sir Joseph Banks and Dr. Solander (then first landing with Captain Cook,) had the pleasure and privilege of beholding and gathering the first floral specimens of (what they then believed to be) the vegetation of the great *terra australis incognita*. That was truly a Botanical æra; when the queen of natural science (through the efforts of the immortal Linnaeus and his zealous disciples, aided by their royal patrons and promoters), vigorously flourished, and bore those pleasing and useful fruits which have come down with such good results to our own times. All those early Naturalists in the New Zealand field, to whom her *Flora* is so much indebted—Banks, Solander, Sparmann, and the two Forsters (father and son), were all disciples and correspondents of Linnaeus.—When the writer, in January, 1838, first visited those forests at “Howahowa” (Uaua) Tolaga Bay, (whence the earliest specimens of fine plants peculiar to New Zealand were first obtained by those Botanists,) a deep reverential undescribable feeling stole over him, on treading the same ground which Banks and Solander and Cook had trod, and on viewing the remarkable cliffs and trees, on which they had often gazed and visited and sketched. A feeling, heightened, doubtless, through conversing with the few old New Zealanders still dwelling there, who had seen and recollected those patriarchs of British enterprise in New Zealand. This present year of grace, 1864, has been lately signalized by Great Britain and the civilized world as that of the Tercentenary Commemoration of the immortal British Poet “of all nations and of all time”; and, surely, five years hence, the Colonists of New Zealand will suitably commemorate the Centenary landing of the adventurous and

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celebrated British Navigator Cook,—*the great Navigator of and for all Nations*,—on these shores with his illustrious band of devoted disciples of Natural Science! For, although many a Botanist has followed in their steps in New Zealand, yet none has equalled them,—whether the obstacles which impeded, or the fruits of their labours, or their devotedness to their calling, or the correctness of their views,—be duly considered.

2. But it is only during the nineteenth century that insular Botany has begun to receive that attention which it demands. It could not advantageously have been studied much earlier; and even now it may justly be said to be in its infancy. Island Floras with their geology and climate, have to be more fully explored and made known; and species have to be more clearly defined; and the bounds of varieties ascertained; and the innate powers of a plant to evolve and change under favorable natural conditions, have to be better understood, ere many important questions can be satisfactorily answered. Yet that day will come. Every natural fact collected and recorded by the true lover of science is a step towards it. The Sphinx, Nature, is daily being evoked by her faithful sons; and her answers, always extorted and always correct, (though not always interpreted correctly,) are being registered for future generations. To us it appears strange, that a species should be found here, (in New Zealand,) and its like only at the Antipodes; or, perhaps, at one of the two great Southern Capes of America, or Africa; or, which is far more probable, only at some small islet,—a mere speck in the oceanic waste of waters,—as Juan Fernandez, or Easter Island,—the Falkland Islands, or Tristan d'Acunha;—St. Paul's, or Amsterdam;—Kerguelen's Land, or Norfolk Island. Is it the very same identical species; or is it only similar? If it is similar, has it become changed through climate situation and soil? and, if so, how much more may it not change? If the same, were there more than one original germ of its kind? If only one, in which spot was it first? and how many ages rolled by ere it was first found in the other? and how many more before it became common therein? Or, were the present widely dissevered localities then one Continent? and, if so, how long a period did it require for the said one germ to reach its present outermost range—assuming such germ to have been originally placed in its centre? If not from one germ but many; were all, required for the various localities, created together? or, some earlier, some later? and, if so, which localities were the earlier, which the later supplied? Does every island, or island

group, far from any mainland, contain genera and species peculiar to itself, (among many which are con-generic with others in the nearest, though far off, land,) and thereby constitute a Botanical centre, or region? Were all existing species created at once? or, are species still being created? or, has such creation ceased? and, if so, when? Are *all* the so-called generic or specific distinctions really such? Has a species a power of evolution and metamorphosis *per se*; which, the factors, time, suitable soils, and climate, being given, knows no bounds? Have there been in past eras any potent occult elemental causes at work, differing only in intensity combination and constancy from what now are, through which sub-varieties, varieties and species were the more readily evolved? May not a plant be outwardly distinct, yet chemically the same? May a plant be almost entirely outwardly the same with another, and yet chemically distinct? May not Nature educe, under the most favorable circumstances, from two genera slightly differing fertile plants forming new genera more divergent? and may not such (again crossed by Nature) produce plants still more widely differing? Why, among several species of any given endemic genus (*e. g.* *Coprosma*, *Dracophyllum*, *Veronica*,) should some species be of robust and vigorous growth and development, and common everywhere; other species of weakly growth and development, and comparatively scarce? are some of these forms older than others? and, if so, which are the seniors? Are not the more robust and vigorous ones, through their own progressive increase, likely to extirpate the weaker ones? - - - Such are some of the thoughts which must often arise in the intelligent Botanist's mind, especially when contemplating new or old forms in far off insular situations.

## § II. GEOGRAPHIC.

3. But, laying aside the ideal and theoretical, and coming to the practical and real:—how does the vegetation of this Northern Island of New Zealand appear when seen for the first time? What is its peculiar aspect? The answer will mainly depend on two things: (1.) the place whence the newly-arrived beholder last came; and (2.) the place in New Zealand where he lands;—not forgetting his expectations,—as the eye ever sees what the mind brings. If he last left the shores of Great Britain,—then the recollection of her verdant fields, may cause the brown fern-clad hills and dark-green forests of New Zealand to appear the more gloomy and sad; if his last landscapes were either South African or Australian, then their glaucous sea-green hue and arid appearance,

will be agreeably contrasted with New Zealand forest vegetation ;—but, if he should have come hither direct from the sunny skies and islands of the tropics, with their graceful perennial light ever-green dress, then the New Zealand hills and dells may appear very sombre, and will suffer from recollection and comparison. Again: if he should happen to anchor in one of the many rivers or harbours north of the Thames,—while the ubiquitous brown fern (*Pteris esculenta*) is everywhere,—he will be struck with the appearance of the White Mangrove (*Avicennia officinalis*) growing within the range of the tide, and the romantic Pohutukawa (*Metrosideros tomentosa*) pendant from the cliffs or perched on some rocky headland; and perhaps in some forest not far off the stately Kauri Pine (*Dammara australis*) uprearing its lofty head far above all its compeers; but these vegetable characteristics will not be found south of the East Cape.

4. The general appearance of New Zealand vegetation (North Island) is not on the whole of a pleasing character. Brown fern-clad plains, and low hills sometimes of tolerably regular outline but oftener of all rugged shapes and sizes; and dark-green almost gloomy looking forests,—here extending for many miles, and there in belts or patches,—yield not an agreeable prospect. But, in summer,—when the sombre fern is bedecked with the neat flowering mantle of its neighbour, the myriad blooming Manuka (*Leptospermum scoparium*), diffusing also its aromatic smell with every breeze; and the smaller and much more variegated woods, found nestling in deep glens and fringing the watercourses, exhibit their “ever-changing ever new” forms and summer colours in ever-varying lights and shades,—then the New Zealand vegetation appears greatly to advantage.

5. Not many of our larger timber trees are either handsome or graceful in foliage and branching when full grown, although several are both while young,—(e. g. the drooping-branched Rimu, (*Dacrydium cupressinum*,) the graceful fern-plumaged Kawaka, (*Thuja Doniana*,\* ) the handsome celery-leaved Tanekaha, (*Phyllocladus trichomanoides*,) the elegant poplar-like Rewarewa, (*Knightia excelsa*,) the soft full-foliaged Titoki, (*Alectryon excelsum*,) the ornate Tawhai, (*Fagus Menziesii*,) and, in high alluvial soils, the spreading Tawhai-rau-nui, (*Fagus fusca*). Yet, what may be absent of beauty and grace is more than supplied in size and utility. The huge bulk of some of the vegetable giants of the New Zealand forests, and the clean symmetrical trunks of others

\* *Libocedrus Doniana*, Hook: f.—ED.

towering aloft in silent grandeur, can never fail to strike the beholder with astonishment and awe: a feeling sense of his own littleness and span-like existence—of admiration at “the (living) high embowered roof, with antique pillars massy proof,—eastng a dim religious light,”—(ending perchance in lofty thoughts tending towards immortality,) is sure in such umbrageous retreats to steal over him.

6. Of our shrubs and smaller timber trees, several are of strikingly beautiful growth, or blossom, or foliage; and are often seen to advantage when standing in some clear glade, or on the outskirts of a forest:—(e. g.) the Houhere, *Hoheria populnea* (a) and its varieties; the Horopito, *Drimys axillaris*; the Manuka-rau-riki, *Leptospermum ericoides*; the Kohuhu, *Pittosporum tenuifolium*; the Kowhai, especially the small-leaved mountain variety, *Sophora tetraptera* var.: *grandiflora*; the Koromiko-taranga, *Veronica*, several species; the Mairehau, *Phebaliū nudum*; the Toro, *Persoonia Toro*; the Pukapuka, *Brachyglottis repanda*; the Northern Maire, *Santalum Cunninghamii*; the Tawari, *Ixerba brexioides*; the Tipau, *Myrsine Urvillei* and *M. salicina*; the Tangeao, *Tetranthera calicaris*; the Ramarama, *Myrtus bullata*; the Ti, *Cordyline australis*; the Kahikomako, *Pennantia corymbosa*; the Pate, *Schefflera digitata*; the Horoeoka, *Panax crassifolia*: and, on the sea-coast, the Karaka, *Corynocarpus lævigata*; the Karo, *Pittosporum crassifolium*; and the truly ever-green Ngaio, *Myoporum latum*, (fit symbol of vigorous health on its barren and desolate beaches!)—while the tree ferns are universally praised for elegance of form, and, wherever seen, add an indescribable charm to the landscape, and draw willing homage from the delighted admirer.

7. The large virgin forests are generally composed of trees different in genera and sizes. The Kauri pine is always associated with other trees; yet, its loftiness, its colossal bulk, and peculiar growth, (including a huge mound of 8—12 feet alt. around its base, composed of its own fallen deciduous scales of outer bark,) ever gives the forest in which it grows a highly characteristic appearance, so that such is truly a Kauri forest. A few only of our timber trees can be said to form large forests of a single species; such as, (on the low grounds,) Kahikatea, or White Pine, (*Podocarpus dacrydioides*); this alone of all the timber trees is chiefly found growing thickly together. The Totara, (*P. totara*) may also sometimes be found forming clumps or groves. The Tawhai, or Black Birch, (*Fagus Solandri*,) is frequently, in the south parts of the Island,

the prevailing tree on the sides of clayey hills, where it forms continuous woods. The Tawa (*Nesodaphne Tawa*), on both dry hills and low alluvial grounds, is commonly found forming large forests. On high grounds in the interior, especially on the old sandstone (*Palæozoic*), the Tawhai-rau-nui (*Fagus fusca*) often grows together in large forests; and the peculiar glory of these woods is, their openness and freeness from underwood, so that a traveller may run through them,—to the great danger, however, of losing the track. And, at a much higher elevation,—4000 to 6000 feet,—on the top of the mountain ranges, grows an allied species, *F. Cliffortioides*; and with it many small tough thick-growing gnarled shrubs as underwood, which can only be passed by walking *on* (not among); and which, with the prostrate and concealed rotten trees and branches, sadly tries the traveller's strength and patience, causing him to wish he was again in the low alluvial woods by the water-courses, among the supple-jacks, polygonums, and brambles!—

8. In order, however, that the Botanical Geography of this large island may be the better known, especially to those at a distance, it will be necessary to go a little into detail, and to show the same, as far as practicable, from its insular position, climate, and situation; as well as from a brief comparison of its Botany with that of the nearest lands. In doing this, the phænogamous genera and species, including also Ferns, endemic to our island, will be particularly noticed; and those plants which are very local in their *habitat* will be pointed out. For, although the general climate of the whole island is temperate and genial, (extending as it does from 34° to 42° south, and with only two elevations above the line of perpetual snow,) several of its vegetable productions are remarkably local. And, that this may be the more naturally and readily perceived, it is purposed to show the same in two ways:—(1.) by areas corresponding more or less to its degrees of latitude; and (2.) by zones increasing in altitude surrounding the island. (b.)

9. Of phænogamie GENERA which (as far as is at present known) are peculiar to the North Island of New Zealand, the following may be mentioned, *viz.*,—*Entelea*, *Ackama*, *Ixerba*, *Alseuosmia* (several species), *Colensoa*, *Rhabdothamnus*, *Nesodaphne* (2 sp.), *Dactylanthus*, and *Adenochilus*; and of Ferns, *Loxsonia*. And of endemic SPECIES of genera hitherto unknown to the other New Zealand Islands, the following phænogams, *viz.*,—\**Phebalium nudum*; *Pomaderris* (3.), *elliptica*, *Elderleyi*, and *phylicifolia*; *Clianthus puniceus*; *Eugenia Maire*; *Meryta Sinclairii*;

\**Sapota costata*; *Olea* (3), *Cunninghamii*, *lanccolata*, and *montana*; *Geniostoma ligustrifolium*; *Calceolaria* (2), *Sinclairii*, and *repens*; *Glossostigma elatinoïdes*; *Vitex littoralis*; \**Pisonia Brunoniana*; *Tetranthera calicaris*; *Knightia exccelsa*; *Persoonia Toro*; *Santalum Cunninghamii*; *Elatostemma rugosum*; *Dammara australis*; *Sarcophilus adversus*; *Alepyrum pallidum*; *Ehrharta Colensoi*; *Microlaena* (2), *avenacea*, and *polynoda*; *Catabrosa antarctica*: and of Ferns:—*Doodia* (2), *media*, and *caudata*; *Arthropteris tenella*; *Nephrolepis tuberosa*; *Lygodium articulatum*; and *Phylloglossum Drummondii*.\*

10. Besides which there are very many species peculiar to the North Island, but of genera common to all New Zealand; of which species the more notable are the following, viz., of phænogams:—*Ranunculus* (2), *insignis*, and *nivicola*; *Melicytus* (2), *macrophyllus*, and *lanccolatus*; *Pittosporum* (6), *cornifolium*, *crassifolium*, *umbellatum*, *Colensoi*, *pimeleoides* and *reflexum*; *Hoheria* (2), *populnea*, (*vera*) and *Sinclairii*; *Aristolelia Colensoi*; *Carmichaelia pilosa*; *Quintinia elliptica*; *Metrosideros* (5), *albiflora*, *diffusa*, *Colensoi*, *robusta*, and *tomentosa*; *Myrtus* (2), *bullata*, and *Ralphii*; *Tetragonia trigyna*; *Panax Sinclairii*; *Corokia buddleoides*; *Loranthus tenuiflorus*; *Coprosma* (9), *spathulata*, *tenuicaulis*, *grandifolia*, *petiolata*, *propinqua*, *Colensoi*, *depressa*, *repens*, and *microcarpa*; *Nertera* (2), *Cunninghamii*, and *setulosa*; *Olearia* (4), *furfuracea*, *Forsteri*, *albida*, and *Solandri*; *Lagenophora lanata*; *Cassinia retorta*; *Brachycome odorata*; *Senecio* (5), *latifolius*, *Colensoi*, *Greyii*, *perdicoides*, *glastifolius*, and *elwagnifolius*; *Forstera Bidwillii*; *Pratia perpusilla*; *Gaultheria* (3), *Colensoi*, *fugifolia*, and *oppositifolia*; *Epacris Sinclairii*; *Dracophyllum* (4), *latifolium*, *squarrosom*, *subulatum*, and *recurvum*; *Myrsine* (3), *salicina*, *montana*, and *divaricata*; *Logania depressa*; *Exarrhena petiolata*; *Veronica* (5), *pubescens*, *diosmaefolia*, *nivalis*, *spathulata*, and *elongata*; *Utricularia* (3), *Novæ Zelandiæ*, *Colensoi*, and *protrusa*; *Plantago uniflora*; *Chenopodium pusillum*; *Pimelea* (3), *buxifolia*, *arenaria*, and *prostrata*; *Libocedrus Doniana*; *Phyllocladus trichomanoides*; *Acianthus Sinclairii*; *Prasophyllum* (3), *tunicatum*, *pumilum*, and *nudum*; *Thelymitra* (2), *Colensoi*, and *imberbis*; *Pterostylis* (4), *micromega*, *foliata*, *trullifolia*, and *puberula*; *Cordylina Punitio*; *Astelia* (2), *linearis*, and *Banksii*; *Arthropodium cirrhatum*; *Juncus capillaceus*; *Luzula Colensoi*; *Chaetospora* (4), *Tendo*, *Brownii*, *concinus*, and *nitens*; *Gahnia xanthocarpa*; *Carex* (4), *acicularis*,

\* Those prefixed thus \* are also found at Norfolk Island.

*dissita*, *Lambertiana*, and *vacillans*; *Uncinia* (3), *rubra*, *cæspitosa*, and *ferruginea*; *Agrostis setifolia*, and *Danthonia* (2), *bromoides*, and *nuda*. And of Ferns:—*Cyathea Cunninghamii*; *Trichomanes elongatum*; and *Adiantum Cunninghamii*.

11. In considering the vegetation of the North Island, in lateral areas nearly corresponding with its degrees of south latitude, the distribution of genera and species peculiar to each area, (in a few instances overlapping,) will be found very nearly thus:—

(i.) The Northern area, from 34° to 35° south, contains, *Drosera pygmaea*, *Colensoa physaloides*, *Cassytha paniculata*, *Hibiscus trionum*, *Cassinia retorta*, *Ipomœa pendula*, and *Todea Africana*.

(ii.) The Bay of Islands area, from 35° to 36° south, contains, *Barbarea australis*; *Melicytus macrophyllus*; *Pittosporum* (4), *cornifolium*, *umbellatum*, *reflexum*, and *pinelcooides*; *Hoheria populnea (vera)*; *Phebalium nudum*; *Pomaderris elliptica*; *Eugenia Maire*; *Quintinia elliptica*; *Aekama rosæfolia*; *Sinclairii*; *Corokia buddleoides*; *Alseuosmia*, several species; *Lagenophora lanata*; *Epacris pauciflora*; *Dracophyllum latifolium*; *Sapota costata*; *Geniostoma ligustrifolium*; *Rhabdothamnus Solandri*; *Gratiola pubescens*; *Glossostigma latinooides*; *Veronica* (2), *diosmæfolia*, and *elongata*; *Pisonia Brunoniana*; *Atriplex Billardieri*; *Tetranthera calicaris*; *Nesodaphne Turairi*; *Santalum Cunninghamii*; *Elatostemma rugosum*; *Peperomia Urvilleana*; *Libocedrus Doniana*; *Sparganium simplex*; *Prasophyllum pumilum*; *Thelymitra imberbis*; *Pterostylis trullifolia*; *Gleichenia* (2), *semivestita*, and *flabellata*; *Loxsonia Cunninghamii*; *Lomaria* (2), *membranacea*, and *Fraseri*; *Doodia media*; *Schizæa dichotoma*; *Marattia salicina*, and *Phylloglossum Drummondii*.

(iii.) The Thames area, from 36° to 37° 30' south, contains, *Cardamine divaricata*; *Pomaderris Edgerleyi*; *Panax anomala*; *Corokia cotoneaster*; *Epacris* (2), *purpurascens*, and *Sinclairii*; *Dracophyllum squarrosum*; *Coprosma crassifolia*; *Veronica pubescens*; *Spiranthes australis*; *Pterostylis* (2), *puberula*, and *squamata*; *Pellæa falcata*; *Pteris Endlicheriana*; *Gymnogramma leptophylla*; and *Psilotum triquetrum*.

(iv.) The East Cape area, from 37° 30' to 39° S., contains *Clematis hexasepala*; *Pittosporum rigidum*; *Epilobium* (3), *microphyllum*, *glabellum*, and *melanocaulon*; *Erechtites prenanthoides*; *Senecio* (2), *odoratus* and *perdicoides*; *Gaultheria sagifolia*; *Dracophyllum subulatum*; *Culcolaria Sinclairii*; *Euphrasia cuneata*; *Myosotis* (2), *Forsteri* and *spathulata*; *Utricularia* (2), *Colensoi*, and *protrusa*; *Lemna gibba*; *Adenochilus gracilis*; *Callixene parviflora*; *Arthropodium candidum*; *Hymenophyllum* (2), *pulcherrimum* and *æruginosum*; *Trichomanes Colensoi*;

*Davallia Novæ-Zelandiæ*; *Lomaria nigra*; *Dicksonia* (2), *antarctica* and *lanata*; *Polypodium sylvaticum*; *Nephrolepis tuberosa*; *Polystichum vestitum*; and *Leptopteris superba*.

(v.) The Hawke's Bay and Taranaki area, from 39° to 40° S., (excluding plants from above 4000 feet altitude, which will be noticed separately hereafter), contains *Ranunculus geraniifolius*; *Melicytus lanceolatus*; *Drosera* (2), *Areturi* and *spathulata*, var. *pusilla*; *Pittosporum* (2), *Colensoi*, and *fasciculatum*; *Stellaria* (2), *parviflora*, and *elatinoides*; *Colobanthus Billardieri*; *Aristotelia fruticosa*; *Stackhousia minima*; *Carmichaelia* (3), *odorata*, *flagelliformis*, and *juneæ*; *Acaena microphylla*; *Panax* (2), *simplex* and *Colensoi*; *Ligusticum aromaticum*; *Angelica geniculata*; *Loranthus* (2), *Colensoi*, and *flavidus*; *Coprosma* (8), *foetidissima*, *Colensoi*, *parviflora*, *cuneata*, *linariifolia*, *depressa*, *repens*, and *pumila*; *Asperula perpusilla*; *Olearia* (4), *Colensoi*, *ilicifolia*, *nitida*, and *dentata*; *Celmisia* (2), *coriacea*, and *glandulosa*; *Lagenophora* (2), *petiolata*, and *pinnatifida*; *Leptinella squalida*; *Gnaphalium prostratum*; *Senecio elæagnifolius*; *Pratia perpusilla*; *Wahlenbergia saxicola*; *Gaultheria* (2), *Colensoi*, and *oppositifolia*; *Cyathodes Colensoi*; *Epaeris alpina*; *Draeophyllum filifolium*; *Logania depressa*; *Gentiana montana*; *Calceolaria repens*; *Mazus Pumilio*; *Veronica* (6), *Colensoi*, *lævis*, *buxifolia*, *Lyallii*, *cataraetæ*, and *Anagallis*; *Ourisia macrophylla*; *Myosotis* (2), *antarctica* and *Forsteri*; *Exarrhena* (2), *petiolata* and *saxosa*; *Polygonum* (2), *aciculare*, and *Dryandri*; *Muhlenbeckia ephedroides*; *Chenopodium pusillum*; *Atriplex patula*; *Pimelea* (2), *buxifolia*, and *Lyallii*; *Zannichellia palustris*; *Cyrtostylis* (2), *rotundifolia*, and *macrophylla*; *Pterostylis foliata*; *Corysanthes rotundifolia*; *Hypoxis pusilla*; *Chrysobaetron Hookeri*; *Herpolirion Novæ-Zelandiæ*; *Astelia nervosa*; *Juncus* (2), *Novæ-Zelandiæ*, and *capillaceus*; *Calorophus minor*; *Isolepis cartilaginea*; *Schænus* (4), *pauciflorus*, *Brownii*, *concinus* and *nitens*; *Cladium articulatum*; *Carex* (4), *inversa*, *Colensoi*, *stellulata*, and *teretiusecula*; *Uncinia* (5), *distans*, *divaricata*, *rubra*, *cæspitosa* and *ferruginea*; *Mierohenia* (2), *stipoides* and *polynoda*; *Danthonia* (2), *nuda*, and *Raoulii*; *Poa* (2), *lævis*, and *Colensoi*; *Gymnostichum gracile*; *Gleichenia dicarpa* var. *alpina*; *Alsophila Colensoi*; *Asplenium Trichomanes*; and *Riccia* (2), *aeuminata*, and *nataus*,

(vi.) The Southern, or Wellington area, from 40° to 41° 40' S. (Cook's Straits) contains *Myosurus aristatus*; *Gypsophila tubulosa*;

*Arenaria media*; *Carmichaelia pilosa*; *Epilobium tenuipes*; *Gunnera prorepens*; *Myrtus* (2), *obcordatus* and *Ralphii*; *Tillea purpurata*; *Tetragonia trigyna*; *Pozoa trifoliolata*; *Eryngium vesiculosum*; *Crantzia lineata*; *Aciphylla* (2), *squarrosa* and *Colensoi*; *Angelica Gingidium*; *Coprosma petiolata*; *Nertera setulosa*; *Olearia* (2), *virgata*, and *Forsteri*; *Leptinella pusillum*; *Senecio Greyii*; *Calystegia marginata*; *Mimulus rudicans*; *Utricularia Novæ-Zelandiæ*; *Plantago spathulata*; *Atriplex cinerea*; *Urtica* (2), *Australis* and *ferox*; *Asearina lucida*; *Prasophyllum nudum*; *Apera arundinacea*; *Agrostis parviflora*; *Danthonia bromoides*; *Adiantum formosum*; *Aspidium oculatum*; *Gymnogramme rutæfolia*; *Grammitis rufus-villosa*; *Riccia fluitans*; and *Parmelia* (2), *perforata*, and *chrysoptabna*.

12. In further endeavoring to show the distribution of the Plants of the North Island by zones surrounding the same, the more noteworthy and stable genera and species alone will be noticed. These will be divided into eight zones, as follow:—

- i. Maritime and littoral.
- ii. Coast, mostly within a few yards above high water mark.
- iii. Lowland—from the Coast to an altitude of 500 feet.
- iv. Midland,—from 500 to 1500 feet altitude.
- v. Upland,—from 1500 to 2500 feet altitude.
- vi. Mountainous,—from 2500 to 3500 feet altitude.
- vii. Sub-Alpine,—from 3500 to 4500 feet altitude.
- viii. Alpine,—from 4500 to snow line.

(i.) The maritime and littoral zone contains *Myosurus aristatus*; *Ranunculus acaulis*; *Lepidium* (2), *oleraceum* and *incisum*; *Plagianthus divaricatus*; *Fuchsia procumbens*; *Metrosideros tomentosa* (c.); *Mesembryanthemum australe*; *Tetragonia* (2), *expansa* and *trigyna*; *Apium* (2), *filiforme*, and *australe*; *Coprosma* (2), *retusa*, and *petiolata*; *Senecio lautus*; *Goodenia repens*; *Calystegia soldanella*; *Avicennia officinalis*; *Myoporum latum*; *Samolus littoralis*; *Plantago spathulata*; *Chenopodium* sp.; *Atriplex* sp.; *Salicornia indica*; *Euphorbia glauca*; *Desmoschœnus spiralis*; *Leptocarpus simplex*; *Carex littorea*; and *Spinifex hirsutus*.

(ii.) The Coast zone contains: *Hymenanthera crassifolia*; *Pittosporum crassifolium*; *Hibiscus Trionum*; *Entelea arboreseens*, *Disearia Toumatou*; *Corynocarpus laevigata* (4); *Gunnera procrepens*; *Sieyos angulatus*; *Eryngium vesiculosum*; *Meryta Sinclairii*; *Coprosma acerosa*; *Cassinia retorta*; *Senecio* (2), *Greyii* and *Colensoi*; *Colensoa physaloides*; *Pratia perpusilla*; *Sapota costata*; *Dichondra repens*; *Mimulus repens*; *Veronica* (4), *macroura*, *speciosa*, *parviflora*, and *diosmaefolia*; *Pisonia Brunoniana*; *Muhlenbeckia ephedroides*; *Suaeda maritima*; *Pimelea arenaria*; *Piper excelsum*; *Peperomia Urvilleana*; *Triglochin flaccidum*; *Arthropodium cirrhatum*; *Bromus arenarius*; *Triticum seabrum*; and *Parmelia chrysothralma*.

(iii.) The Lowland zone, from the coast to an altitude of about 500 feet, contains: *Clematis hexasepala*; *Ranunculus* (4), *plebeius*, *hirtus*, *incisus*, and *rivularis*; *Drosera* (2), *pygmaea*, and *auriculata*; *Pittosporum umbellatum*; *Plagianthus betulinus*; *Linum monogynum*; *Hoheria populnea*; *Aristolelia racemosa*; *Alectryon excelsum*; *Dodonaea viscosa*; *Dysoxylum spectabile*; *Melicope ternata*; *Clianthus puniceus*; *Carmichaelia* (2), *australis*, and *junecea*; *Metrosideros* (3), *florida*; *hypericifolia*, and *scandens*; *Myrtus* (3), *bullata*, *obcordata*, *Ralphii*; *Carpodetus serratus*; *Quintinia serrata*; *Aekama rosafolia*; *Weinmannia sylvicola*; *Angelica* (2), *gingidivum*, and *rosafolia*; *Daucus brachiatus*; *Panax arborea*; *Aralia Lessonii*; *Schefflera digitata*; *Corokia* (2), *buddleioides*, and *Cotoneaster*; *Loranthus tetrapetalus*; *Tupeia antarctica*; *Coprosma* (5), *lucida*, *tenuicaulis*, *rhamnoides*, *divaricata*, and *propinqua*; *Calceolaria Sinclairii*; *Tetranthera calicaris*; *Cassytha paniculata*; *Hedycarya dentata*; *Pimelea* (4), *longifolia*, *virgata*, *prostrata*, and *Urvilleana*; *Elatostemma rugosum*; *Ascarina lucida*; *Podocarpus daerydioides*; *Freyinetia Banksii*; *Hypoxis hygrometrica*; *Loxsona Cunninghamii*; *Adiantum* (2), *aethiopicum*, and *fulvum*; *Lomaria* (3), *lanecolata*, *Banksii*, and *Fraseri*; *Asplenium* (3), *flabellifolium*, *obtusatum*, and *bulbiferum*; *Doodia caudata*; *Nephrodium* (2), *decompositum*, and *squamulosum*; *Polypodium sylvaticum*; *Gymnogramme* (2), *rutaefolia*, and *leptophylla*; *Schizaea* (2), *bifida*, and *dichotoma*; *Leptopteris hymenophylloides*; *Marattia salicina*; *Phylloglossum Drummondii*; *Lycopodium* (4), *Billardieri*, *densum*, *laterale*, and *volubile*; and *Psilotum triquetrum*.

(iv.) The Midland zone, embracing an altitude of from 500 to 1500 feet, contains: *Ranunculus* (2), *multiseapus*, and *macropus*; *Drosera spatulata*; *Pittosporum* (2), *tenuifolium*, and *eugeniioides*; *Elaeocarpus*

(2), *dentatus*, and *Hookerianus*; *Pennantia corymbosa*; *Carmichaelia* (2), *odorata*, and *pilosa*; *Metrosideros* (2), *Colensoi*, and *robusta*; *Myrtus pedunculata*; *Weinmannia racemosa*; *Ixerba brexioides*; *Panax* (2), *anomala*, and *Edgerleyi*; *Alseuosmia* sp.; *Coprosma* (2), *grandifolia*, and *robusta*; *Olea* (2), *Cunninghamii*, and *lanceolata*; *Senecio* (2), *lagopus*, and *glastifolius*; *Leucopogon fusciculatus*; *Rhabdothermus Solandri*; *Ourisia macrophylla*; *Nesodaphne Turairi*; *Knightia excelsa*; *Persoonia Toro*; *Santalum Cunninghamii*; *Epicarpurus microphyllus*; *Fagus Solandri*; *Libocedrus Doniana*; *Hymenophyllum* (4), *dilatatum*, *erispatum*, *flabellatum*, and *æruginosum*; *Trichomanes Colensoi*; *Davallia Nova-Zelandiae*; *Adiantum formosum*; *Pteris vespertilionis*; *Lomaria* (4), *fluvialis*, *vulcanica*, *elongata*, and *nigra*; *Asplenium Trichomanes*; and *Polystichum coriaceum*.

(v) The Upland zone, embracing an altitude of from 1500 to 2500 feet, contains: *Ranunculus geraniifolius*; *Drimys axillaris*; *Viola filicaulis*; *Meliccytus micranthus*; *Drosera Arcturi*; *Pittosporum Colensoi*; *Aristolelia fruticosa*; *Geranium potentilloides*; *Carmichaelia flagelliformis*; *Acæna microphylla*; *Epilobium* (2), *glabellum*, and *melanoecaulon*; *Metrosideros lucida*; *Coprosma* (2), *fetidissima*, and *pumila*; *Asperula perpusilla*; *Olearia Colensoi*; *Celmisia coriacea*; *Gnaphalium prostratum*; *Gaultheria* (2), *rupestris*, and *oppositifolia*; *Epacris alpina*; *Olea montana*; *Gentiana montana*; *Logania depressa*; *Calceolaria repens*; *Veronica* (2), *lævis*, and *buxifolia*; *Exarrhena*; *saxosa*; *Anthericum Hookeri*; *Herpobolium Nova-Zelandiae*; *Calorophus minor*; *Uncinia* (2), *distans*, and *ferruginea*; *Poa lævis*; *Gymnostichum gracile*; *Gleichenia dicarpa* var. *alpina*; *Cyathea Smithii*; *Alsophila Colensoi*; *Hymenophyllum* (2), *bivalve*, and *pulcherrimum*; *Lomaria* (3), *alpina*, *imbricata*, and *minor*; *Polystichum vestitum*; and *Lycopodium* (2), *varium*, and *clavatum*.

(vi.) The Mountainous zone, comprising an altitude of from 2500 to 3500 feet, contains: *Pittosporum rigidum*; *Coriaria thymifolia*; *Geranium breviaule*; *Carmichaelia nana*; *Epilobium linnæoides*; *Ligusticum aromaticum*; *Panax* (2), *simplex*, and *Colensoi*; *Oreomyrrhis Colensoi*; *Coprosma* (2), *microcarpa*, and *cuneata*; *Olearia dentata*; *Celmisia incana*; *Wahlenbergia saricola*; *Gaultheria Colensoi*; *Cyathodes Colensoi*; *Myrsine montana*; *Gentiana pleurogynoides*; *Veronica diffusa*; *Pimelea Gnidia*; *Fagus Menziesii*; *Pterostylis foliata*; *Callicene parviflora*; *Cordylino indivisa*; *Schœnus* (2) *pauciflorus*, and *concinus*; *Uncinia* (2), *divaricata*, and *rubra*; *Hierochloa alpina*; *Danthonia Cunninghamii*; *Hymenophyllum*

unilaterale; *Leptopteris superba*; *Lycopodium scariosum*; and *Andraea rupestris*.

(vii.) The Sub-alpine zone, embracing an altitude of from 3500 to 4500 feet, contains: *Caltha Novæ-Zelandiæ*; *Aciphylla Colensoi*; *Celmisia spectabilis*; *Forstera Bidwillii*; *Cyathodes empetrifolia*; *Pentachondra pumila*; *Myrsine nummularia*; *Veronica tetragona*; *Ourisia* (2), *cæspitosa*, and *Colensoi*; *Euphrasia* (2), *antarctica*, and *revoluta*; *Plantago* (2), *unifolia*, and *earnosa*; *Fagus Cliffortioides*; *Podocarpus nivalis*; *Dacrydium* (2), *Colensoi*, and *laxifolium*; *Phyllocladus alpinus*; *Caladenia bifolia*; *Astelia linearis*; *Cartha alpina*; *Carex acicularis*; *Uncinia filiformis*; *Agrostis* (2), *parviflora*, var. *perpusilla*, and *setifolia*; and *Usnea melazantha*.

(viii.) The Alpino zone, or area, comprising an altitude of from 4500 feet to the line of permanent snow, contains: *Ranunculus* (2), *insignis*, and *nivicola*; *Geum parviflorum*; *Abrotanella pusilla*; *Raoulia grandiflora*; *Gnaphalium (Helichrysum) Colensoi*; *Senecio* (2), *rotundifolius*, and *Bidwillii*; *Helophyllum Colensoi*; *Dracophyllum recurvum*; *Veronica nivalis*; *Drapetes Dieffenbachii*; *Alepyrum pallidum*; *Oreobolus pectinatus*; *Carex pyrenaica*; *Uncinia scabra*; *Ehrharta Colensoi*; *Catambrosa antarctica*; and *Stereocaulon Colensoi*.

13. After all there are still several plants remaining unclassified, as to geographical distribution—*habitat* or altitude—not a few of which are among the most noble and useful of all our vegetable productions. These have hitherto not been classed as to area or zone, from their being more or less ubiquitous. The principal of them will therefore have now to be briefly considered in three separate divisions, *viz.*, (i.) Plants common to the whole North Island;—(ii.) Plants (unenumerated as to area or zone) not found in the South parts of the Island;—and, (iii.) Plants (also unenumerated as to area or zone) not found in the North parts of the Island.—

(i.) *Plants common to the whole North Island.*—among these the following may be noticed:—*Cardamine hirsuta*, in all soils and situations, to the alt. of 2500 feet. *Elæocarpus dentatus*; *Aristotelia racemosa*; *Alectryon excelsum*; *Dodonæa viscosa*; *Pelargonium clandestinum*, from the sea coast to 2000 feet; *Oxalis corniculata*, in all soils from the sea to 2000 feet; *O. Magellanica*, from 500 to 5000 feet; *Edwardsia grandiflora*, in all soils from the sea to 2500 feet; *Coriaria ruscifolia*, in all soils (but not *in* woods) from the sea to 3000 feet; *Rubus australis*, in all soils from the sea to 2500 feet; *Acæna Sanguisorbæ*, in all soils from

the sea to 3000 feet; *Fuchsia excorticata*, from the coast to 2000 feet; *Epilobium nummularifolium*, and *E. rotundifolium*, ascending to 3500 feet; *E. alsinoides*, *junceum*, and *pubens*, to 1000 feet; *Leptospermum scoparium*, in all soils from the sea to 3000 feet; *Coprosma lucida*, *grandifolia*, *robusta*, and *tenuicaulis*; *Nertera depressa*; *Brachyglottis repanda*; *Sonchus olivaceus*, everywhere; *Wahlenbergia gracilis*, from the sea to 3000 feet; *Gaultheria antipoda*, from the coast to 3000 feet; *Myrsine salicina*, *australis*, and *divaricata*; *Olea Cunninghamii*; *Parsonsia*, sp.; *Solanum aviculare*, and *nigrum*, from the sea to 1500 feet; *Veronica salicifolia*, from the sea to 2500 feet; *Mentha Cunninghamii* ascending to 500 feet; *Nesodaphne Tawa* from 500 to 2000 feet; *Atherosperma Novæ-Zelandiæ*, from near the coast to 1500 feet; *Hedyocarya dentata*, *Knightia excelsa*, *Pimelea prostrata*, and *P. Ureilleana*, from the coast to 1000 feet; *Podocarpus ferrugineus*, from near the coast to 3000 feet; *P. spicata*, from 500 to 2500 feet; *P. Totara*, from the sea coast to 3000 feet; *P. dacrydioides*, from the coast to nearly 1000 feet; *Dacrydium cupressinum*, from 500 to 2500 feet; *Phyllocladus trichomanoides*, ascending to 3000 feet. The Orchideous genera, *Eurina*, *Dendrobium*, *Bolbophyllum*, *Thelymitra*, *Microtis*, and *Acianthus*. *Phormium tenax*, and *P. Colensoi*, and their *vars.*, in all soils and situations, from the sea coast to 4000 feet; *Cordyline australis*, in all soils and situations, from the coast to 3000 feet; *Areca sapida*, from 200 to 1500 feet; *Rhipogonum parviflorum*, in woods, from coast to 2000 feet; *Arundo conspicua*, in all soils and situations, from the coast to 2500 feet; *Cyathca medullaris*, and *C. dealbata*, from 200 to 2000 feet; *Dicksonia squarrosa*, from 500 to 1500 feet; *Hymenophyllum multifidum*, *dilatatum*, *polyanthos*, and *demissum*; *Trichomanes reniforme*, and *T. venosum*; *Pteris esculenta*; in all soils not wholly wet, from the coast to 3000 feet; *Lomaria procera*, and its *vars.*, in all soils and situations, from the coast to 4000 feet; *Niphobolus rupestris*; *Botrychium Virginicum*, in open lands, from the coast to 1600 feet; and *Tmesipteris Forsteri*, epiphytal, in forests from 300 to 2500 feet.

(ii.) Northern plants, occupying more than one area or zone, not found in the South parts of the Island.—among these, are,—*Drosera binata*, a Bay of Islands plant, has been very sparingly detected so far South as 39° 30'. *Dysoxylum spectabile*, not uncommon from the Bay of Islands to the Thames, has also been detected as far south as the river Mohaka in Hawke's Bay; extreme altitude, 1000 feet. *Metrosideros tomentosa*, a littoral plant from the North Cape to Tolaga Bay, (c.) *Alseuosmia*, sp.

whose chief habitat is around the Bay of Islands, where, in shady dry woods, it is plentiful; *A. macrophylla*, was found at Te Whau, Manukau Bay, in 1841; and, subsequently, a few plants of *A. Banksii* in one spot in the dense forest between the river Manawatu and Wairarapa, but none intermediate! ascending to nearly 1000 feet. *Geniostoma ligustrifolium*, abundant at the Bay of Islands, and farther north, ascending to 1200 feet; a straggling plant (having thicker leaves) has been seen as far south as the woods at Hawke's Bay; the only plant, however, noticed south of the East Cape. *Vitex littoralis*, a tree very plentiful at the north, extending quite across the Island, and growing as diffusely on the immediate sea coast as on the high lands, ascending to 1500 feet; is little known south of the East Cape; one tree however is said to be on the islet Mokoia in the large lake at Rotorua, and one is also at Table Cape (north side), its extreme southern limit. *Avicennia officinalis*, a maritime plant, very plentiful from the North Cape to about  $37\frac{1}{2}^{\circ}$  south; the mouth of the Waikato river on the west, and within Tauranga harbour on the east coast, being its south limits. *Persoonia Toro*, has not been met with south of Whangarei Bay. *Santalum Cunninghamii*, and its *vars.*, plentiful at the north, has not been noticed south of  $38^{\circ}$ ; yet, at the head of the Wairarapa valley, (just at the entrance of the long forest,) in about  $41^{\circ}$  south, two trees were most unexpectedly found standing together; no more however were detected in a journey of 3—4 days through that forest, performed on several occasions. *Trophis opaca*, (or, *Epicarpurus microphyllus*), has its south limits at Tolaga Bay, or about  $39^{\circ}$  south. *Dammara australis*, which grows from the sea side to an altitude of 1500 feet, in nearly all soils and situations, (though its favorite soil is a stiff sterile clay,) is very plentiful quite across the Island from the North Cape to the Thames, but has its limits on the east coast at  $37\frac{1}{2}^{\circ}$  south, and on the west coast at Kauri river (Kawhia),  $38^{\circ} 4'$  south, where are a few stunted trees. The writer well remembers seeing, in 1841, a straggling tree on the west bank of river Waikato, a little below Ngaruawabia. *Libocedrus Doniana*, keeps always in the interior on high ground (500 to 2000 feet), from  $35^{\circ}$  to the Thames seems to be its limits. It is, however, strongly suspected, that there are *two* species of this genus in the North Island; the *Libocedrus* growing in dense thickets on the Ruahine Mountains, has never yet been found in fruit,\* and appears in foliage different from the Bay of Islands plant, which is also of more robust growth.

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\* Since made a new species by Dr. Hooker:—*L. Bidwellii*.

*Phyllocladus trichomanoides*, which is plentiful at the north, from about 35° south, (where it has been observed growing from the sea-side to 1200 feet altitude,) has its southern limits at 39½° south, in the mountains inland west from Hawke's Bay. *Artropodium cirrhatum*, a common littoral north plant, has its south limits at Cape Kidnappers, in 38° 50' south. *Trichomanes elongatum*, has not been met with south of the Thames. *Lorsoma Cunninghamii*, for a long time only found at one spot (the noted Kerikeri waterfall in the Bay of Islands,) has been also met with at Whangarei, and in the Coromandel ranges. *Doodia caudata* (or, *media*), so very common at the north, has not been seen south of the Thames, except in *one* locality near Napier; which plant, however, may prove to be a distinct species. *Gymnogramma leptophylla*, plentiful near the head of Manukau Bay, has only been again met with at Ahuriri and Cape Kidnappers. *Lygodium articulatum*, a northern plant, has not been noticed south of the East Cape; and *Schizaea dichotoma* appears to be wholly confined to the *Dammara* (Kauri) forests.

(iii.) *Plants found plentifully in the southern parts of the North Island, but rarely, if ever, extending north beyond the East Cape.*—Among these the following may be noticed:—*Elaeocarpus Hookerianus*, extends north to Tolaga Bay; *Hypericum gramineum*, from the coast to 600 feet altitude, has not been noticed north of Table Cape. *Coriaria thymifolia*, (several varieties), from the sea coast (Hawke's Bay) to 4000 feet, has not been generally met with north of Poverty Bay; but the very small leaved species, *C. angustissima*, was found, in 1838, on Mount Hikurangi, East Cape, and, subsequently, near the summits of the Ruahine range, at an altitude of 4500 feet. *Discaria Youmatou*, a coast plant, has not been detected north of Poverty Bay. *Potentilla anserina*, and *Geum Magellanicum*, extend from Cook's Straits to the East Cape. *Aciphylla squarrosa*, found from the sea coast to 3500 feet altitude, has not been noticed north of 40° 30' south. *Cruspedia fimbriata*, several varieties, from the coast to 1000 feet, extends north to the East Cape. *Microseris Forsteri*, common near the coast, has its north limit about Poverty Bay; where, too, it is very plentiful. *Taraxacum Dens-leonis* growing sparingly with the former, but often rising to much higher elevation of 3000 feet, has not been detected north of Tolaga Bay. *Ourisia macrophylla*, found plentifully at from 1500 to 3000 feet, has not been seen north of Poverty Bay. *Calceolaria Sinclairii*,

and *Euphrasia cuneata*, coast plants, (rising, however, to 500 feet,) have their north limits at the East Cape. *Myosotis*, and *Exarrhena*, several species, met with in both dry and damp spots, from the sea coast to an altitude of 2000 feet, are unknown north of the East Cape. *Fagus fusca*, found in the interior at an altitude of from 500 to 2500 feet, has not been seen north of Poverty Bay (e.); while *F. Solandri*, a species found much nearer the sea, and attaining to a higher elevation of 4000 feet, reaches nearly to the East Cape. *Zannichellia palustris*, has not been noticed north of Table Cape; while its aquatic congener, *Lemma gibba*, reaches Poverty Bay. Of Ferns, peculiar to the Southern parts of the Island, may be noticed,—*Hymenophyllum bivalve*, *H. pulcherrimum*, and *H. aruginosum*, which extend throughout damp forests in the interior, at an elevation of 2000 feet, to about 38° south their north limit. *Davallia Nova-Zelandia*, has been found as far north as the Bay of Plenty. *Lomaria elongata*, and *L. nigra*, at an elevation of 1000 to 1600 feet, extend plentifully north, from Wairarapa near Wellington, to 38° south. Small specimens, however, of *Lomaria elongata* have lately been found near Wellington. *Polypodium sylvaticum*, (a scarce fern,) at a lower elevation, from Wellington to Tolaga Bay 38° 30' south; and *Leptopteris superba*, at an altitude of from 2000 to 3000 feet, extends north to about 38° south.

14. It has already been shown, how widely spread and common many of the plants of this North Island are; nevertheless, there are some, both genera and species, which (as far as is known) are peculiarly local. This, it is believed, is a characteristic feature in the Botany of New Zealand; one which (if hereafter proved to be real) will be worthy of deep consideration,—as to the why such should be. A few of the more strikingly local plants, hitherto only found in one small spot, are here enumerated, with their their known habitats:—*Clematis depauperata* (n.), near Hawke's Bay. *Myosurus aristatus*, Palliser Bay. *Ranunculus geraniifolius*, (n.) between Mount Tongariro and Ruahino mountain range. *Drosera pygmaea*, Cape Maria Van Diemen; *Drosera Arcturi*, at Taupo, near the base of Tongariro. *Stachysia minima*, (n.) Hawke's Bay, *Geum parviflorum*, summit of Ruahino range, east side, 5,000 feet altitude. *Gunnera prorepens*, (n.) Flat Point South East coast. \**Meryta Sinclairii*, (n.) Whangaruru Bay. \**Angelica geniculata*, Hawke's Bay. *Loranthus Colensoi*, (n.) Waikare Lake. *Coprosma repens*, (n.) between

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\* NOTE.—Of those marked with a star (\*) before them, a single plant only has been seen; the letter n. after the name, denotes such to be a new species.

Mount Tongariro and Ruahine range; and *C. petiolata*, (*n.*) between Castle Point and Pahawa. *Cotula perpusilla*, (*n.*) Turakirae, Pallisor Bay. *Abrotanella pusilla*, (*n.*) near the top of Ruahine range. *Gnaphalium (Helichrysum) Colensoi*, (*n.*) summit of Ruahine range, east side. *Forstera Bidwillii*, west side of Ruahine range, 4000 feet altitude. *Helophyllum Colensoi*, (*n.*) summit of Ruahine range, 5000 feet altitude. *Myrsine nummularia*, (*n.*) west side of Ruahine range, 4500 feet altitude. \**Logania depressa*, (*n.*) between Taupo and Ruahine. *Calceolaria repens*, (*n.*) west base of Ruahine. *Ecarrhena saxosa*, (*n.*) Hawke's Bay. *Utricularia protrusa*, (*n.*) Bay of Plenty. *Cassytha paniculata*, near Mount Camel. *Ascarina lucida*, (*n.*) three trees growing together in a swamp, at Wairarapa. *Spiranthes australis*, Upper Waikato. *Adenochilus gracilis*, (*n.*) near Lake Waikare. *Anthericum Hookeri*, (*n.*) between Mount Tongariro and the west base of Ruahine. *Hymenophyllum unilaterale*, (according to Dr. Hooker, but a *sp. nov. miki*.) on one tree only, but plentiful upon it;—in the dense forest, west side of Ruahine range, 3000 feet altitude. *Trichomanes Colensoi*, (*n.*) near Lake Waikare. *Adiantum formosum*, only in one spot in the dense forest between Wairarapa and Manawatu. *Hypolepis millefolium*, (*n.*) near the top of Ruahine range, east side. *Asplenium Trichomanes*, Hawke's Bay. *Gymnogramma rufosolia*, near Cape Palliser. *Grammitis rufusvillosa*, (*n.*) three specimens only, growing together in the dense forest, east base of Tararua range. *Riccia natans*, in the little lake Roto-akiwa, Hawke's Bay; and *Riccia fluitans*, at the head of Wairarapa valley.

15. The North Island of New Zealand also contains several well-known European plants, which were found here by her earlier scientific visitors;—(exclusive of the host of common plants which have come in with colonization);—some of which, curiously enough, have not been found elsewhere in the Southern Hemisphere. Those European plants (several of which are cosmopolites) are of the following natural orders, *viz.*:—Cruciferae, 3; Caryophyllaceae, 2; Malvaceae, 1; Geraniaceae, 2; Oxalidaceae, 1; Coriariaceae, 1; Rosaceae, 2; Onagraraceae, 1; Haloragaceae, 1; Compositae, 5; Solanaceae, 1; Chenopodiaceae, 4; Naidaceae, 3; Aroidaceae, 4; Juncaceae, 3; Cyperaceae, 6; Gramineae, 4; Filices, 7; and, Lycopodiaceae, 1;—total species, 57. It is worthy of remark, that not a single species is hard-wooded, scarcely even a shrub, save *Coriaria ruscifolia*;—and that many of them are sea-side and water plants, identical to those found in Great Britain.

16. Before, however, any comparison is attempted between the Botany of New Zealand (North Island) and that of other lands, it will be advantageous further to consider such genera and species peculiar to the Island—or to the New Zealand groupe—as are real and well-developed; and which, united, form the characteristic New Zealand Botany. Not but that a genus may be (and often is) quite as well developed by a single species, as by a number. (Witness, that unique New Zealand plant, *Phylloglossum Drummondii*; which single species, at present, not only constitutes a genus, but which, by eminent continental Botanists, had very nearly been made the type of a new Natural order!) A genus, although not endemic, may properly enough be said to be “well-developed” in New Zealand, if better species are found, or if more abundantly met with, here than in other countries;—if, in fact, New Zealand clearly seems to be its centre, its home. Several of our New Zealand genera were created by her first Botanical visitors;—Banks and Solander, and by Forster aided by Sparrmann (*f.*); the younger Linnæus, D’Candolle, and R. Brown, also made a few. A. Cunningham increased the number considerably from the Bay of Islands’ plants; and, more recently, Dr. Hooker has both confirmed their genera, and added considerably thereto. Already (*pars.* 9 and 10) the phænogamic genera and species endemic to the North Island, as far as known, have been enumerated; and it now remains to show the well-developed New Zealand genera, and peculiar species of the North Island, comprising those which mainly give that peculiar contour—*tout-ensemble*—to her vegetation, in order to the better contrasting of her Botany with that of other lands.

17. The phænogamic genera which are truly and pre-eminently New Zealand, are:—\**Melicactus*, *Hoheria*, *Entelea*, *Melicope*, *Corynocarpus*, *Carmichaelia*, *Carpodetus*, *Aekama*, *Ilex*, *Aciphylla*, *Griselinia*, *Corokia*, *Tupeia*, *Alseuosmia*, \**Coprosma*, (also found in Tasmania, but here it has upwards of twenty-five species), *Raoulia*, *Helophyllum*, *Colensoa*, *Geniostoma*, *Rhabdothamnus*, *Teueridium*, *Nesodaphne*, *Knighia*, *Elatostemma*, *Earina*, *Adenochilus*, *Nematoceras*, and \**Phormium*;—yet, of these twenty-eight genera, scarcely half of the number are of that class which give the characteristic appearance or stamp to New Zealand Botany. Of those which are more noticeable, several are either very local in area, or only occasionally met with. It is, then, to the distinct New Zealand species of genera which her Botany has in common with other lands, that so much is due for characteristic

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\* NOTE.—The genera marked thus \*, are also found in Norfolk Island.

vegetable appearance as well as for utility, At the same time, not a few of these will be found to be confined (so to speak) to the New Zealand Botanical region. Among the more important and prominent of such species are the following :—*Drimys axillaris*; *Hymenanthera crassifolia*; *Pittosporum*, upwards of 10 species; *Plagianthus*, 2 species; *Elaeocarpus*, 2 species; *Aristolelia*, 3 or 4 species; *Pennantia corymbosa*; *Alectryon excelsum*; *Dysoxylum spectabile*; *Pelargonium clandestinum*; *Coriaria*, 3 or more species; *Pomaderris*, 3 species; *Discaria Toumatou*; *Clianthus puniceus*; *Edwardsia grandiflora*; *Acacia* 3 species; *Fuchsia*, 2 species; *Epilobium*, nearly 20 species and well-marked varieties; *Haloragis*, 4 species; *Metrosideros*, 10 species; *Leptospermum*, 2 or more species; *Myrtus*, 4 species; *Weinmannia*, 2 species; *Ligusticum* and *Angelica*, 16 species; *Panax*, 10 species; *Olearia*, 20 species; *Celmisia*, 24 species; *Forstera*, 2 species; *Dracophyllum*, 14 species; *Myrsine*, 5 species; *Calceolaria*, 2 species; *Veronica*, 40 species; *Ourisia*, 6 species; *Vitex littoralis*; *Myoporum laetum*; *Laurelia Novæ-Zelandiæ*; *Trophis opaca* (or, *Epicarpurus microphyllus*); *Pimelea*, 10 species; *Fagus*, 5 species; *Dammara Australis*; *Libocedrus*, 2 species; *Podocarpus*, 5 species; *Dacrydium*, 3 species; *Phyllocladus*, 2 species; *Rhipogonum parviflorum*; *Anthericum Hookeri*; *Cordyline*, 5 or more species; *Astelia*, 5 species; *Areca sapida*; *Arundo conspicua*; *Cyathca*, 4 species; and *Dicksonia*, 3 species.

18. Those genera principally belong to the south temperate zone, where their habitat is mostly insular, and not unfrequently of the same meridionals with the New Zealand groupe. This is in strict accordance with what might have been expected—that from Norfolk Island in the north down to the Antarctic Islands in the South, including the Chatham Islands, the same genera would be found; and, in many instances, there are not only the same genera to be met with, but the same species. Moreover, it should not be forgotten that the majority of those genera are very small, some having only two species each, (as *Alectryon*, *Dysoxylum*, *Knightia*, and *Rhipogonum*) others, only three or four, (as *Hymenanthera*, *Pennantia*, *Clianthus*, *Edwardsia*, *Atherosperma*, *Dammara*, and *Phyllocladus*.) and these are only found as single species in their various habitats; and of others, containing from 5 to 10 species each, (as, *Plagianthus*, *Aristolelia*, *Forstera*, *Ourisia*, *Cordyline*, *Astelia*, *Podocarpus*, and *Dacrydium*.) the greater number of species of each genus are to be found in New Zealand; so that New Zealand (the North Island) may not inaptly be

deemed their centre, or home. Further still, (in the midst of much apparent dissimilarity, which, however, is daily lessening,) there is a very great concord, or botanical affinity, between the vegetation of the various islands lying in or about the same parallels of south latitude. A belt around the globe, containing the Chatham Islands, Juan Fernandez, South Chili, the Fuegian and Falkland groupes, Tristan d'Acunha, the Cape, Kerguelen's Land, St. Paul's Island, Tasmania, the South-east coast of Australia, Lord Howe's Island, the Middleton group, and Norfolk Island, all contain the same genera, and in not a few instances (particularly in the smaller islands) the very same species. And this will be much more evident when the *whole* of the Botany (*i. e.*, including the numerous smaller cryptogams,—*Musci*, *Hepaticæ*, *Algæ*, *Fungi*, and *Lichenes*) of those countries is collectively considered; particularly of those, however distant from each other, which partake the same isothermal and humid climate. If, instead of writing on the Botanical Geography of the Northern Island *alone* of the New Zealand groupe, I were writing on that of the *whole* groupe, and, at the same time, possessed that necessary intimate botanico-geographical and geognostical knowledge of the interior of the Middle and Southern Islands which I possess of the Northern Island—I should be in a far better position for comparing the botanical geography of New Zealand with that of other lands, lying within or near the same parallels of south latitude than I now am; and, from what I already know, I believe that hereafter, and only in some such way, can the botanical geography of the New Zealand groupe be truly and efficiently shown and compared. Nevertheless, this cannot presently be done; for (to use the words of Dr. Hooker) “the subject is one that cannot be fully worked out without far more materials than have hitherto been collected.....When the floras of the mountains of South Chili, New Zealand, South Tasmania, the Australian Alps, the Crozets, Prince Edward's Island, Amsterdam Island, St. Paul's Island, and Macquarrie Island,” [and of all other islets lying south of 27° south.] “shall have been properly explored,” [together with their geology and climate,] “the great problem of representation and distribution in the South Temperate and Antarctic Zone will be solved.\*

19. Referring again to those genera, which, though not endemic, possess characteristic New Zealand species, the following will be found to be their geographical distribution,—including, also, a few species that are identical—*Myosurus aristatus*, a plant of the Chilian Andes;

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\* Introductory Essay, *Flora Nov. Zel.*, vol. I., p. xxxiii.

*Drimys*, a small genus of only three species, one of which, the celebrated Winter's Bark (*D. Winteri*), is confined to Fuegia, and another has recently been found so far north as the alpine mountains of Borneo; but the New Zealand plant, (*D. axillaris*) is very closely allied to a kindred plant much nearer home (one of another very small genus of two or three species,) the *Tasmania aromatica* of Tasmania. *Hymenantha*, (a genus of only four species,) has a species in New Zealand, one in Norfolk Island, another in Tasmania, and another in Australia. *Pittosporum*, has about a dozen species in Australia, and one in Tasmania, but "the maximum of this genus will probably be found in the Pacific Islands."\* *Colobanthus Billardieri*, is also found in Tasmania and Campbell's Island. *Plagianthus* has a few species in New Holland and Tasmania. *Elaeocarpus* has several species in tropical India and the Pacific Islands, and one species in New South Wales. *Aristotelia* has species in Chili, and one in Tasmania. *Pennantia*, a genus of only three species, one of which (*corymbosa*) is in New Zealand, one in Norfolk Island, and one on the coast of West Australia. *Alcetryon excelsum* is said (by D'Candolle, with some degree of doubt) to have a single allied species in New Holland—*Dysoxylum (Hartighsea)*, has a species in Norfolk Island, and (perhaps) another on the east coast of New Holland. *Pelargonium clandestinum* is also found in Tasmania, Tristan d'Acunha, and the Cape; to which countries this extensive genus is almost wholly confined. *Oxalis Magellanica* is also found in Tasmania and Fuegia. *Coriaria*, two, at least of its species, are common in south Chili. *Pomaderris* has several species in New Holland and Tasmania. *Discaria*, a small genus, is found in South America, Australia, Tasmania, and the Gallapago Islands. *Clianthus*, another small genus, is only again met with in Norfolk Island and New Holland. *Edwardsia (Sopflora) grandiflora*, is common in Chili, Chiloe, and Juan Fernandez; but, curiously enough, the genus is not found in Tasmania or Australia, where plants of the same natural order are so very common; this small genus only possesses some six or seven species, two of which, according to D'Candolle, are confined to the Isle of Bourbon. *Acena* has two species in Tasmania and Australia, (one of them being the common New Zealand one,) and several in South America, and in the Antarctic and Kerguelen's Islands. *Fuchsia*, a large genus; yet, out of New Zealand, is only found in South America, from Mexico to the Straits of Magellan. *Epilobium*, an extensive European genus, is also found in

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\* Flora Tasmania, vol. I., p. 38.

South-east and South-west Australia, in western South America, in the Antarctic Islands, and in Tasmania; but "is more abundant in New Zealand than in any other part of the globe;"\* the six species found in Tasmania are all natives of New Zealand. *Haloragis*, is found in South-east Australia, Tasmania and Juan Fernandez. *Metrosideros*, in South Chili, the Cape and Australia. *Leptospermum*, in South-east Australia and Tasmania. *Myrtus* in Chili and at Cape Horn. *Montia fontana*, the only plant of this genus, is also abundant at Cape Horn, Kerguelen's Land, the Antarctic Islands and Tasmania. *Weinmannia*, at the Cape, Madagascar, the Isle of Bourbon, Tahiti, and South Chili. *Ligusticum* and *Angelica*, several species in the Antarctic Islands. *Panax*.—Our New Zealand species have close alliance with species in the Antarctic Islands and Chili; one small species alone of this genus is found in Tasmania, the only representative in that island of the natural order (*Arabiaceæ*) to which it belongs! of which order also, only 8 or 10 species are found in Australia! *Meryta*, a singular genus of only 4 or 5 species, two of which are found in Norfolk Island, and one in Tahiti. The fine Composite genera, *Olearia* and *Celmisia*, are also found in Australia and Tasmania; the latter genus, however, so well developed in New Zealand, is only feebly so by a single species in each of those two countries. Of the smaller Compositæ, *Lagenophora*, a small genus, is also found in Antarctic America, the Falkland Islands, Australia and Tasmania. *Abrotanella* is confined to New Zealand, Tasmania, the Antarctic Islands, Fuegia, and Kerguelen's Land; and *Microseris*, a genus of only two species, is found in Tasmania and West Chili. *Olea* has a closely allied species in Norfolk Island, and others at the Cape, Mauritius, and Bourbon. *Sapota costata* is also found in Norfolk Island. *Forstera* is confined to New Zealand, Tasmania, and Fuegia. *Dracophyllum*, so well developed in New Zealand, extends south to the Antarctic Islands, east to the Chatham Islands, and north to New Caledonia; one species is also found in New South Wales. The large tropical genus *Myrsine*, containing above 80 species, of which 50 are Brazilian and Indian, and 30 insular,—from the West India Islands to the Sandwich Islands and Borneo, and southwards in Norfolk Island, New Zealand, and the Antarctic Islands, is not found in Tasmania, (where there are no plants of the whole natural order,) and has only three species in Australia. *Geniostoma*, a small and wholly insular genus of only 3 species, one of which is found in the Isle of Tanna, and another in the Isle of

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\* Flora Tasmaniae, vol. i., p. 116.

Bourbon. *Calceolaria* (another curious instance like that of *Fuchsia*,) is only found besides in Western South America, where it is common. *Veronica*, a large cosmopolite genus, is comparatively scarce in Tasmania and Australia, it abounds however throughout the New Zealand groupe and the Antarctic Islands, and is also found in the Falklands. *Ourisia* is found in Fuegia, and has one small species in Tasmania. *Myoporum* in Tasmania and South East Australia. *Atherosperma*, a very small genus containing only 3 other species, one of which is found in Tasmania and one in South Chili. *Pimelea* is well represented in Australia and Tasmania, while *Knightia* has only one other species, and that in New Caledonia. *Drapetes*, a small genus of only 4 species, one of which is found in Fuegia, and another as far north as the alpine mountains of Borneo. *Australina*, a curious small genus of only 2 species, one of which is in Tasmania. *Elatostemma*, another small genus, has a second species in the Society Islands. *Euphorbia glauca* is also found in Norfolk Island. *Piper excelsum* is also found in Norfolk Island, and has allied species in the Fiji, and other South Sea, Islands; so also has *Peperomia*. *Ascarina*, a small genus of only 2 species, one of which is in the Sandwich Islands. *Lugus*, a genus in the Southern Hemisphere, confined to South Chili, Fuegia, Tasmania, and New Zealand. *Dammara*, a small genus, one species of which is found so far north as La Perouse's, or Vanieolla, Island, (11° 40' S. 167° 0' E.,) which, with another species said to be in the Fiji Islands, are all that are known in the Southern Hemisphere. *Libocedrus* (*Thuja*) *Doniana*, is closely allied to the "Alerce," a highly useful species (*Thuja tetragona*) found in South Chili. *Podocarpus* is found in South Chili, and one small bushy species is found in Australia and Tasmania. *Dacrydium* has one noble species in Tasmania (the celebrated "Huon Pine"), and several in the Polynesian Islands. *Phyllocladus*, a small genus of 4 species, one of which is in Tasmania, and one has lately been discovered so far north as the alpine mountains of Borneo. Most of the New Zealand Orchideous genera (and some of the species) are found in Australia, Tasmania, and the Antarctic Islands. *Rhipogonum* (a genus of only 2 species) has one species in New Holland. *Callicene*, a genus of only 3 species, has two species in South Chili and in Fuegia. *Phormium* is only found besides in Norfolk Island (g). *Cordyline* has a few species in Norfolk Island, and one species in Australia. *Astelia* is found in Fuegia, Oahu, and Tasmania. *Areca sapida* is believed to be confined to New Zealand and to

Norfolk Island, but the genus is found in some islands of the Malay Archipelago. The 3 genera of the New Zealand Tree Ferns, *Cyathea*, *Alsophila*, and *Dicksonia*, are also found in Norfolk Island, and in Tasmania; and of the New Zealand Ferns generally, it may be said, their southern genera and species (excluding those few which are endemic) are also found in Norfolk Island, Tasmania, South America, and, the Antarctic Islands; and, more sparingly, in Juan Fernandez, Chiloe, the Falkland group, Tristan d'Acunha, Kerguelen's Land, and the Cape.

20. Moreover, of the 3 great Natural Orders, *Leguminosæ*, *Myrtaceæ*, and *Proteaceæ*, so very common in Australia, and tolerably so in Tasmania, but very few are found in New Zealand, and, curiously enough, these few do not belong to any of the great Australian genera, such as, *Acacia*, *Eucalyptus*, *Melaleuca*, *Grevillea*, and *Hakea*. The Australian and Tasmanian species alone of the genus *Acacia* are upwards of 260 in number; and of *Eucalyptus*, *Melaleuca*, *Grevillea*, and *Hakea*, each genus numbers above 100 species. Not a single species however of those great genera has been found in New Zealand! Of *Leguminosæ*, of which order Australia has upwards of 900 known species, and Tasmania nearly 70, New Zealand possesses some 7 or 8 species, belonging to 3 small genera; one of which, *Casimichælia*, (having 5 of the 8 species), is confined to New Zealand; and of another, *Edwardsia*, (if separated from *Sophora*, a very small genus), the New Zealand species, *E. grandiflora*, (as has been already shown, par. 19,) is only found in Juan Fernandez and South Chili. Of *Myrtaceæ*, (of which order Australia has upwards of 650 known species, and Tasmania 36,) New Zealand has only 15 species, belonging to 4 distinct genera; of which genera, only one (*Leptospermum*) is found in Tasmania; and another of them (*Myrtus*), which has 4 species in New Zealand, is also not found in Australia. Of *Proteaceæ*, (of which order Australia has also 650 known species, and Tasmania 22), only 2 species are found in New Zealand. Of the whole 24 or 25 species, of those 3 great natural families, found in New Zealand, only *one* species, the common "Tea-tree" (*Leptospermum scoparium*) is found in Tasmania and Australia; while those countries possess upwards of 2,200 known species!

21. Darwin, indeed, states, that "New Zealand in its endemic plants is much more closely related to Australia, the nearest main-land, than to any other region."\* Dr. Hooker, however, (in his elaborate Intro-

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\* *Origin of Species*, chap. xii.

duetory Essay to the *Flora Tasmaniae*\*), does not go so far as this, although he, too, says, "that 216 or one-fourth of the New Zealand Phanogams are natives of Australia, and of these 115 species are confined to these two countries;" and, "that of the 115 specimens peculiar to Australia and New Zealand, only 26 belong to genera peculiar to those countries, and only 6 to the long list of Australian genera which contain upwards of 20 species each." Nevertheless it is believed that this comparison will be very materially altered, when the *whole* of the Flora of New Zealand (and the many other Polynesian Islands) shall be fully known. Already, since the publication of the *Flora Nova-Zelandiae*, have many new species been discovered in New Zealand, particularly in the Middle Island; where too, are several South American genera hitherto not detected in the North Island, (as *Donatia*, *Rostkovia*, *Gaimardia*, &c.), and, consequently, not referred to in this Essay. And of those 26 species belonging to genera at present only common to Australia and New Zealand, may it not reasonably be expected, that some of these will be also found in the many unexplored sub-tropical islands? Again, seeing that the striking characteristic Australian genera (whilo found in Tasmania) are wholly wanting in New Zealand; and that the characteristic New Zealand genera are also (as such) wanting in Australia; is it not evident, that it is not so much from what *is* (the positive), as from what is *not* (the negative), that the better comparison can in this case be drawn, and the truer Botanical affinity deduced? Reviewing, then, what is already known of New Zealand and Southern insular Botany, and looking forward expectingly to future kindred revelations, it is not unreasonably believed, that the Botany of the New Zealand group will be found to be peculiar, and *not* so closely related with the nearest main-land (Australia), as with many other small islands, and therefore, forming with them a Southern Botanical insular region, of which New Zealand is probably about the existing centre.

22. In bringing this necessarily imperfect outline of the Botanical Geography of the North Island to a close, many such thoughts as the following present themselves for consideration:—

Is there a natural law affecting the dissemination of plants?

Is a climatic, or geognostic, difference, of greater value than a mere geographical one?

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\* Page lxxxviii.—An admirable work, well worthy the serious study of every student of New Zealand Botany.

Did cosmopolite genera, or species, proceed from a single germ, or centre? and, if so, how did they reach the extreme outposts?

Did endemic genera and species proceed from a single germ or centre? and, if so, can that centre be found?

How is it, that of some insular genera (*e.g.* *Coprosma*), there are many species and varieties; while of others (*e.g.* *Corynocarpus*, *Geniostoma*, *Carpodetus*), there is only one?

Were all such genera created simultaneously? and the large genus with all its species and varieties?

Are genera having many species older than those having only one; or *vice versa*?

May not the several species and varieties of an insular, or endemic, genus, be validly considered as having originally sprung from one species or plant?

Why are several species of the numerous-seeding and easily-distributed Natural Order *Compositæ* so comparatively scarce and very local? *e.g.*, several species of the genus *Celmisia*; the New Zealand "daisies," *Brachycome Sinaclairii*, and *B. odorata*; *Gnaphalium prostratum*, and *G. Colensoi*; *Senecio Greyii*, and *S. perdicoides*; and *Taraxacum Dens-leonis*? *Senecio perdicoides* has not been found by any Botanist since Cook's visit. *Senecio Greyii*, although producing its fine flowers by hundreds, is very local, hitherto only met with in one rocky spot. And the small indigenous *Taraxacum Dens-leonis* is, comparatively, very scarce; while the larger introduced plant is rapidly becoming a perfect pest, growing, together with the English daisy, by hundreds and thousands.

Does New Zealand (with the islets lying north and south) possess a peculiar Botany of her own?

Is New Zealand the centre of this Botanical region, at least as regards New Zealand species found north and south of her?

How is the isolation of certain species to one peculiar plant, spot, or locality, (as stated in par. 14), to be accounted for? This last thought is never more strongly felt, than when on the tops of a secluded mountain range, or in the depths of a deep untrodden glen, one, or a few plants of any species are found, but no more; perhaps no more in the island! or, at all events, no more have been detected after several years of diligent research. How is this to be accounted for, if all present species were created as they now are, and at one time? There, in its *habitat*, everything has for years—or ages—combined to favor the growth and spread of that plant; but, although flourishing,

it has not spread. Are we to infer from its scarcity, that it is but a creation of yesterday? or, the lingering relic of a past race? or a new form, or a sportive hybrid of Nature?

Lastly: May futuro varieties in certain species be hereafter the more reasonably expected to take place in New Zealand,—or *vice versa*,—through Colonization, and through the introduction of con-generic plants, of honey-making insects, and of insectivorous birds?

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### § III.—ECONOMIC.

23. In considering the Economic Botany of this Island, the past should not be wholly omitted. It cannot, at least, be uninteresting to know something of those plants which, for a long period, were of the utmost importance to the race which preceded the Colonists on these shores; and to which a large population was mainly indebted for food, for clothing, and for numerous articles of utility and of ornament. Such an enquiry, however brief, is become the more necessary from the fact, that, owing to the great and growing disuse of many of those plants, which were formerly prized and sought after, the knowledge of their qualities and uses is rapidly becoming forgotten. It is therefore proposed to shew, with reference to the past,—(i.) the plants used as food; and (ii.) those of utility and ornament, to the New-Zealander of former days.

(i.) The vegetable articles of food not introduced by Europeans used by the Natives of this Island were tolerably numerous, however inferior the qualities of many of them might be. Most, however, were only obtained through much labour; which, no doubt, contributed not a little towards the robust health of the consumers. Those food-yielding plants may be thus placed:—(1.) Main articles of food; and (2.) smaller fruits and vegetables commonly used, including those only resorted to in times of great scarcity.

(1.) The main, or staple, articles of vegetable food, were but few in kind. They comprised, those cultivated, and those which were wild. The cultivated vegetables were only three in number; and which (curiously enough, and like the garden produce of many other countries), were not indigenous. These were—two roots, and one gourd-like fruit; the Kumara, or sweet potato, (*Convolvulus Batatas*), the Taro (*Caladium esculentum*), and the Hue, a large kind of gourd, a

species of *Cucurbita*. Of the first, the Kumara, they had a large number of varieties, widely differing from each other in quality, appearance, and colour; which, of itself, is a highly puzzling problem, seeing the plant in this country never flowers. Of this root, most valuable to them, they must have raised immense quantities annually. An operation requiring unceasing care and toil on their part, as they generally fresh gravelled their plantations every year; and which, combined with the great care required for the raising, keeping, and preservation of this root, could only have been effectually done through the beneficial influence of the *taboo* (tapu). Of the second, the Taro, they had also several distinct varieties (exclusive of the inferior kind called by them, Taro-hoia, which, with many other roots, was introduced by Europeans); they also ate the thick succulent stems of this plant, as well as its root, and sometimes its leaves. A large flourishing Taro plantation is one of the most beautiful cultivations the writer has ever seen. These were planted in regular quincunx,—the soil evenly laid, and strewed with white sand, and patted with their hands, giving such a relief to the elegant large shield-like dark-green versatile leaves of the Taro, drooping gracefully from their thick clean red-brown stalks,—and were scrupulously kept in perfect order. This plant very rarely flowers, and it has never been known to produce seed. The third, the Hue, which is only propagated by its seeds, is very constant to its kind, although it varies much in size and shape, and has no varieties. The staple uncultivated articles of vegetable food were three fruits,—the well-known Fern-root, and the wild Sow-thistle. Those three fruits are peculiar to the country, and comprised the Hinau (*Eleocarpus dentatus*), the Karaka (*Corynocarpus laxigata*), which was often planted about their villages; and the Tawa (*Nesodaphne Tawa*). Those berries (*drupæ*) were not however, such as are generally known to civilized nations by the name of edible fruits; being scarcely so (especially those parts of them which were mainly used), save through long and necessitous habit. Although those fruits were yielded spontaneously and in abundance where the trees producing them grew, yet the gathering, preparing, and storing them, so as to be kept fit for food, was no light labour. The kernels of the Karaka, after due preparation, would remain sound some time in a dry store, but not near so long as those of the Tawa. Much labour, too, was required to procure and fit the Aruhe, or root of the common Fern of New Zealand (*Pteris esculenta*) for food; while the spots producing fern-root of best quality were by no means common. The Puwha, or

Milk-thistle (*Sonchus oleraceus*), the large-leaved variety, was common, though not (it is reasonably suspected) too plentiful; and this was abandoned for the smaller leaved European kind (after its introduction) as being less bitter and more palatable.

(2.) The smaller fruits and vegetables invariably used while in season comprised, (a.) those which were largely and commonly used:—*viz.*, the fruit of the Tutu, or Tupakihi (*Coriaria ruscifolia*), the pleasant juice of which in the early summer was drunk with avidity in large quantities. The berry of the Kohutuhutu, or Kotukutuku (*Fuchsia excorticata*); the Kohohe, or Poroporo, (*Solanum aviculare*), which, too, was sometimes planted; the fruits of the five following timber trees, —the Miro (*Podocarpus ferruginea*), the Matai (*P. spicata*), the Totara (*P. Totara*), the Kahikatea (*P. daerydioides*),—the fruit of which was called Koroj,—and the Rimu (*Daerydium eupressinum*); and also the fruit (Ureure) and sugary bract-like spadices (Tawhara) of the climbing plant Kiekio (*Freyinetia Banksii*). The watery honey from the perianths of the Korari (*Phormium tenax*, and *Ph. Colensoi*), was also eaten and collected in large quantities; and so was a similar substance from the flowers of the Pohutukawa (*Metrosideros tomentosa*.) (b.) those which were less often used:—the curious red fruit (*arillus*) of the Titoki, or Titongi, (*Alectryon excelsum*); the fruit of the Tutu-papa (*Coriaria thymifolia*); of the New Zealand Bramble, Tataramoia, (*Rubus australis*); of two of the New Zealand Myrtles, the Ramarama (*Myrtus bullata*), and the Rehutu (*M. pedunculata*); of several species of *Coprosma*,—particularly of the Karamu (*C. lucida*, and *C. robusta*), of the Papaauma (*C. grandifolia*), and of the two littoral species, Taupata (*C. retusa*), and Tatarahoko (*C. acerosa*); of the Koropuku (*Gaultheria depressa*); of the Poroporo (*Solanum nigrum*); of the Kawakawa (*Piper excelsum*); and of the Kareao, or Pirita, (*Rhipogonum parviflorum*). The pollen also of the flowers of the large Bulrush (*Typha angustifolia*), was extensively collected in its season by the Southern tribes, and made into large gingerbread like cakes, called Pungapunga. Besides which the following roots and plants were often eaten, *viz.*, the roots (cooked) of the Panahi (*Calystegia sepium*); of the Maikaika (*Arthropodium cirrhatum*); the tubers of several small Orchideous genera, such as several specimens of *Thelymitra*, of *Mierotus porrifolia*, of *Orthoceras strictum*, and of *Gastrodia Cunninghamii*, containing “salep;” the roots of the little sugary Ti-koraha (*Cordyline stricta*), of the large Ti, or “Cabbage Tree” (*C. australis*), and of the large Fern, Para, (*Marattia salicina*). Also, the cooked leaves and herbaceous tops of

the Toi (*Barbarea Australis*), and of the Poroporo, or Raupeti (*Solanum nigrum*); and the baked inner stems and sago-like pith of the large black fern tree, Koran, or Mamaku, (*Cyathca medullaris*). The young succulent unexpanded shoots of several ferns, such as those of *Pteris esculenta*, *Asplenium lucidum*, and *A. bulbiferum*, and *Botrychium Virginicum*; several *Fungi*, chief among which were the four following, which grow on trees,—the Harori (*Agaricus adiposus*), the Hakeke, and the Popoiahakeke (*Polyporus* species), and the Pekepekiore (*Hydnum clathroides*); also, three terrestrial ones,—the Paruwhatitiri (*Neodictyon cibarium*), the Pukuran (*Lycoperdon Fontainesii*), and the curious species *Aseroe rubra*. The young inner blanched leaves and heart of the Ti, or “Cabbage-tree” (*Cordyline australis*), and of the Nikau, or New Zealand Palm, (*Areca sapida*), were eaten both raw and cooked. A few also of the sea-weeds were eaten; such as, the Karengo, (a tidal species of *Laminaria* found plentifully from the East Cape to Cape Turnagain), the Relia, the Rimurapa (*D’Urvillea utilis*), and some others, including *Porphyra vulgaris*; some of which were also used exclusively to thicken the sweet juice of the Tupakihi, or Tutu, (*Coriaria ruscifolia*). While the small berries of the Makomako (*Aristotelia racemosa*), of the heath-like Totara (*Leucopogon Fraseri*), and of two species of *Muhlenbeckia*, *M. ulpressa*, and *M. complexa*, of the Ngaio (*Myoporum letum*), of two species of *Pimelca*, (*P. prostrata*, and *P. arenaria*), and the large plum-like fruit of the Tarairo (*Nesodaphne Tarairo*), fine-looking but not very gustable, were eagerly sought after in their season by children; who also, with adults, thought highly of a sugary manna-like exudation (of doubtful vegetable origin) called Pia-Manuka, and found in the summer occasionally on the branches of the *Leptospermum scoparium*. The aromatic root and stem of the Papai (*Aciphylla squarrosa*), and the insipid watery Koroirei, or roots of *Typha angustifolia*, were also eaten raw; while in times of great scarcity the roots of the Matuakumara (*Geranium dissectum*), and of the Ririwaka (*Scirpus maritimus*) were also eaten.

(ii.) The plants of utility and ornament were very numerous—from the giant pine to the tiny moss. These may be conveniently classed thus:—(1.) Clothing, or fibre-yielding plants; (2.) Timber trees, and other plants, whence they obtained their canoes, war and husbandry implements, and vessels; and (3.) Plants and vegetable substances used as ornament. (1.) Of the clothing, or fibre-yielding plants, one only

was generally cultivated, and that, too, was not indigenous; *viz.*, the Aute, or Paper-Mulberry tree (*Broussonetia papyrifera*); this shrub, or small tree, was assiduously planted, but only for the purpose of obtaining white fillets for the hair of the Chiefs. It has long been nearly, if not quite, extinct. The Harakeke, or New Zealand flax (*Phormium tenax*, and *Ph. Colensoi*), of which there are many varieties, was sometimes planted, but not largely so; more to have it handy, or to secure a prized variety, than with a view to cultivation or to improve its fibre. The leaves of these valuable plants were universally used, both scraped and unscraped, and the fibre prepared in various ways,—by scraping, soaking, beating, dyeing, and twisting,—for clothing for both sexes. From it the Chiefs' elegant and ornamented silky Paipairoa, and the shaggy bee-butt looking Pake and Ngeri,—with their many intermediate kinds of clothing mats,—were alone manufactured. Common articles of clothing and war-mats of defence were also woven from the leaves of the Kiekie (*Freyinetia Banksii*), and from those of the Ti (*Cordyline australis*); while from the fibres of the handsome large-leaved mountain Ti, (*Cordyline indivisa*), very strong and heavy mats for apparel, called Toi, were made; which, dyed black, are still greatly prized. A few superior articles of apparel were also made, by the Northern tribes, from the leaves of the Neinei (*Dracophyllum latifolium*). Of the bright yellow leaves of the Pingao (*Desmoschænus spiralis*), strong and useful folding girdles were woven; and from the inner bark of the Aute-taranga (*Pimelea arenaria*), small white cloth-like strips were also obtained, for fastening up the hair, or wearing as ornament in the ears. (2.) The timber trees and other plants of various degrees of utility, comprised the following:—For canoes, the Natives from the Thames northwards generally used the Kauri (*Dammara australis*), and the Southern Natives the Totara (*Podocarpus Totara*), which was preferred by all; the Kahikatea (*P. dacrydioides*), was also often used for this purpose. Troughs, trays, and other large vessels were also made of Totara and of Mataii (*P. spicata*.) The framing of the principal houses was of Totara timber; while their roofs, and sometimes their sides, were often covered with its bark, obtained from the living tree and laid on in large slabs. The bark of the Manuka (*Leptospermum scoparium*) was also used for covering the roof, but is greatly inferior. The carved work of the Chiefs' houses was made out of both Totara and Mataii; but for the carved figure-heads of their canoes the Pukatea (*Atherosperma Novæ-Zelandiæ*) was generally used; while the ornamental carved work of the sterns was made of

Mataii, or Totara. The Titoki (*Alectryon excelsum*) furnished handles for light axes; and sometimes the Kowhai (*Edwardsia grandiflora*) was used, particularly for the heavier ones. The Ake (*Dodonaea viscosa*), and the Maire,\* (*Santalum Cunninghamii* at the North, and *Olea sp.* at the South,) supplied hardwood for war implements, and for carved walking-staves; and of another hard wood, Manuka (*Leptospermum scoparium*), husbandry implements, canoe paddles, and spears for war and taking fish were made. Long war-spears were also made of Rimu (*Dacrydium cupressinum*); but the very long bird-spears (30-36 feet) were made of Tawa (*Nesodaphne Tawa*): the working of which out of a large tree with only their stone implements, obtaining, as they did, but two spears from a single tree, was indeed a most patient and admirable performance, often taking two years for its completion! The hard-wooded Maire-tawhake, (*Eugenia Maire*.) was also prized, and used by the Northern tribes (among whom alone it grew) for husbandry implements. The channelled stems of the Neinei (*Dracophyllum latifolium*), and the red young saplings of Toatoa, or Tanekaha (*Phyllocladus trichomanoides*), made valued walking-sticks. The long straight young trees of Manukā, and of Tawa, were used for battens for the sides and roofs of their houses; stems of the Kareao (*Rhipogonum parviflorum*) and also Kakaho reeds (*Arundo conspicua*), and slips of Totara timber, were often used for the same purpose. The creepers, Aka, (*Metrosideros scandens*.) and Kareao or Piritā, (*Rhipogonum parviflorum*.) were extensively used for tying up fences, platforms, and the heavy frame-work of houses. Sometimes other creepers (*Passiflora tetrandra*, and *Parsonsia, sp.*), were used, but not commonly; and, among the Northern tribes, the creeping fern Mangemange, (*Lygodium articulatum*), was generally used to bind the outward thatch securely on the roof of their houses. The Raupo, or large Bulrush (*Typha angustifolia*) was universally used to cover the frame-work of their houses; the outer thatch being Toetoe, (*Cyperus ustulatus*), or Rautahi (*Carex ternaria*.) or Ririwaka (*Scirpus maritimus*), or of two kinds of Wiwi, or Rushes (*Juncus maritimus*, and *effusus*); sometimes, however, a hard-jointed rush, (*Leptocarpus simplex*.) was advantageously used; being by far the best of all the Rushes or Sedges for thatching, on account of its durability. The leaves of the 'Ti, or "Cabbage tree," (*Cordyline australis*.) were also used for this purpose; but, for the inner work of roofs, sides, partitions, &c., the large fronds of the Nikau, or

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\* See par. 26 (viii.)

New Zealand Palm, (*Areca sapida*.) and the handsome Reed, Kakaho, (*Arundo conspicua*.) were extensively used. The interior of the verandahs and sides of their Chiefs' houses was often neatly ornamented with chequered work of various regular patterns and designs, caused by interlacing narrow strips of the leaves of the bright orange-colored Pingae (*Desmoschoenus spiralis*.) with the greyish-green Kiekie (*Freycinetia Banksii*), and the olive-colored Harakeke (*Phormium tenax*.) which, worked regularly, had a very pleasing effect. Sometimes, especially in the interior, the outside of their better houses was formed of hard fibrous slabs cut from the stout red-brown fern-tree, Wikiponga (*Dicksonia australis*); and, in other parts of the Island, smaller pieces cut from the trunk of the black fern tree, Korau, or Mamaku, (*Cyathea medullaris*.) were closely placed like a plinth around the lower part of the house, especially if it were a sweet potatoe store, to keep out the rats. Their large and small fish-traps, or creels, were very strongly and skilfully made of the flexible stems of two species of *Muhlenbeckia*, (*adpressa* and *ephedroides*.) and also of the long fibrous roots of the New Zealand flax (*Phormium*); the stems of the twining fern (*Lygodium articulatum*.) were also extensively used for this purpose by the Northern tribes. Their fishing nets, of all sizes of mesh, (some of which nets were very long, and most skilfully made, the admiration of Cook and of all early voyagers), were made of the split but unscraped leaves of the New Zealand flax (*Phormium*); for floats, the light wood of the small tree Whau, or Hauama, (*Entelea arborescens*.) was used, and sometimes the leaves of the Raupo, or large Bulrush, rolled up; and for net-ropes the tough stringy bark of the Houhere, and also of the Whauwhi or Houi, (*Hoheria populnea*, and of its varieties,) was plaited together; leaves of *Phormium* were also used for this purpose. Excellent fishing-lines, of various lengths and sizes, were capitally spun by the hand from the dressed fibre of the New Zealand flax; and for hooks, the tough naturally curved stems of the climbing fern (*Lygodium articulatum*.) and the roots of the shrub Taubinu (*Pomaderris ericifolia*.) hardened by fire, were sometimes used; human bone, however, being always preferred. Canoe sails were manufactured from the leaves of the Raupo, laced across with the fibres of New Zealand flax; while the Hume, or downy pappus of the seeds of the Raupo, was used for caulking and plugging holes in their canoes. Useful floor and sleeping mats of all sizes, and of several patterns and kinds, were woven of leaves of New Zealand flax (*Phormium*), of Kiekie (*Freycinetia Banksii*.) and some-

times of Toetoe (*Arundo conspicua*). Baskets, large and small, plain, and highly ornamented, and dyed, for all manner of uses, were woven of the same materials; and sometimes the leaves of the Ti (*Cordyline australis*), and of the Nikau Palm (*Areca sapida*), were also used for the same purposes. Their sitting and sleeping places were strewed with the leaves of the Toetoe, or of Raupo; with the soft fragrant grass Karetu (*Hierochloa redolens*), when in season, and sometimes with the leaves of the Papauma, (*Coprosma grandifolia*); for visitors of rank, however, the fronds of the different tree ferns were used, particularly of the Ponga (*Cyathea dealbata*). The New Zealanders were often curiously particular as to what plants were used tied around, or under and over, their vegetable food in their cooking ovens in the earth; for instance, the roots of the Tikoraha (*Cordyline stricta*), were tied separately for baking in bundles of Hangelange (*Geniostoma ligustrifolium*); for their Kao, or prepared sweet potatoes, they used the leaves of the Parataniwha (*Elatostemma rugosum*); generally, however, they used the fronds of the larger ferns, *Lomaria procera*, and *Goniopteris pennigera*. Fire, by friction, was obtained from several woods; the Kaikomako (*Pennantia corymbosa*) was, however, the one most prized, and also the Pate (*Schefflera digitata*); and a trunk stem of the Kohia (*Passiflora tetrandra*) was often sought to carry fire on a journey, as it had the quality of a slow-burning match. The green leaves and branches of the Kawakawa (*Piper excelsum*), were gathered and laid in rows in their plantations of Kumara, or sweet potatoes, between the beds, and there slowly burnt, that the insects which injured the growing plant might be destroyed by the disagreeable bitter smoke. The Hue, or gourd, (a species of *Cucurbita*), gave useful Calabashes, and vessels of several kinds and sizes, from a gill to three gallons, for many purposes. Sometimes, however, large sections of the great sea-weed, Rimurapa, (*D'Urvillea utilis*) were inflated and used as Calabashes, called Powha, particularly for holding cooked animal food in its own fat, and for oil. The bark of the Totara was also skilfully made up into neat vessels, for holding and carrying of water. (3.) Of Plants and vegetable substances used as Ornament, &c., the following are the principal:—For Dyes, the bark of the Hinan, and of the Pokaka (*Elaeocarpus dentatus*, and *Hookerianus*), and also of the Makomako, (*Aristolelia racemosa*), were used for black; and the bark of the Tauekaha, or Toatoa, (*Phyllocladus trichomanoides*), for red. Oil, for anointing, was expressed from the beaten seeds of the Titoki or Titongi, (*Alectryon excelsum*), and also

from the seeds of the Kohia (*Passiflora tetrandra*). A gum-resin, used to perfume their oil, was obtained from the Kohuhu, and the Tarata, (*Pittosporum tenuifolium*, and *P. eugenioides*), and also from the Taramea, (*Aciphylla Colensoi*), which last was very highly prized. The strong smelling ferns, *Hymenophyllum villosum*, *Doodia media*, and *Polypodium pustulatum*, were also used for the same purpose of perfuming, and for scenting oil; and so were a few fragrant Mosses, and *Hepatica*, called Kopura,—especially *Lophocolea Nova-Zelandia*, and *allodonta*. The aromatic leaves of the Raukawa, a very scarce small tree, sparsely growing in the high dense forests, (*Panax Edgerleyi*), were also sought for a similar purpose; particularly to rub their limbs and bodies. The daisy like flowers of the Roniu (*Brachycome odorata*), and the flowering tops of the sweet-scented grass Karetu (*Hierochloa redolens*), were worn around the neck, enclosed in fibrous leaves, as a scented necklace. Elegant female head-dresses were formed of flowering wreaths of various species of *Clematis*, (particularly *hexasepala* and *Colensoi*), and of the graceful Waewaekonkou (*Lycopodium volubile*). Sometimes the snow-white downy fibres from the under side of the leaves of the Kowharawhara, and the Kahakaha, (*Astelia Cunninghamii*, and *Solandri*), and the thin transparent epidermis from the leaves of the mountain Tikumu (*Celmisia coriacea*), were also used by females to ornament the hair and head. The fresh gum-resin from the Kauri (*Dammara australis*) was commonly chewed as a masticatory (*h.*), so also was that obtained from the Tawhiwhi, or Kohuhu, (*Pittosporum tenuifolium*), mixed with the inspissated juice of the Puwha, or Sow-thistle, (*Sonchus oleraceus*), ingeniously collected. Combs were made of Mapara and Kapara, the hard dark woody tissue, or heart wood of Rimu, (*Dacrydium cupressinum*), which was assiduously sought for in the forest among old prostrate rotting Rimu trees; they were also carved out of Matai and Manuka woods. The spines of the Tunatakuru, or New Zealand Thorn, (*Discaria Toumatou*), were sometime used for tattooing, though instruments of bone were preferred; the black pigment for the same operation being obtained from the soot of old and hard Kapia, or Kauri resin, dug out of the earth; and also from the ashes of the curious vegeto-caterpillar fungus, the Hawhato (*Cordyceps Robertsii*), which was sometimes mixed with the black juice of the Mahoe berry (*Meliclytus ramiflorus*). Flutes were made of the woody stems of the Kohoho or Poroporo, (*Solanum aviculare*), and of the Tupakihī or Tutu (*Coriaria ruscifolia*). Ornamental boxes for holding

feathers, &c., with their covers, were generally carved out of Matai wood; and flying-kites were very ingeniously made of the Toetoe (*Cyperus ustulatus*). After the introduction of flint and steel, the pith of the flowering stems of the New Zealand Flax, served for tinder; and so did the Putawa, a fungus (*Boletus*) of enormously large growth, often found on the upper branches of the Tawhai-rau-nui (*Fagus ?fusca*). On the New Zealanders learning to write, they used the juice of the root of the New Zealand flax as ink; the crimson juice of the berry of the Kokihi, (a species of *Tetragonia*—*T. trigyna*,—) and the dark juice of the berries of *Schefflera digitata*, were also used for the same purpose. Sometimes they used a green leaf of New Zealand Flax for writing on, etching on it with a nail, or style of hard wood, thus unknowingly imitating their Asiatic neighbours. It is highly doubtful whether the New Zealanders ever used any vegetable as an internal medicine before their intercourse with Europeans; for severe burns, however, they applied outwardly the ashes and charcoal dust of burnt fern fronds, (*Pteris esculenta*), and the fine reddish dust of the large decaying fungus Pukurau (*Lycoperdon Fontainesii*). The blanched bases of the leaves of the Harakeke (*Phormium*), and the roots of the Rengarenga or Maikaika, (*Arthropodium cirrhatum*), were sometimes roasted and beaten to a pulp, and applied warm to unbroken tumours and abscesses. As a cataplasm for ulcers they used the leaves of the Kohoho or Poroporo, (*Solanum aviculare*),—and for wounds and old ulcerated sores, they used the large leaves of the Pukapuka, or Rangiora, (*Brachyglottis repanda*), and also the Hune, or Pappus down of the large Bulrush, but merely as a protection against dust, &c. Layers of dry Totara bark, and the lower parts of stout green flax leaves, served admirably as splints, in cases of broken bones; the New Zealanders being far better Surgeons than Physicians. And the leaves of several particular plants were in request for their rude steam, or vapour, baths, for Rheumatic, and other stubborn and chronic complaints; but it is highly questionable whether the benefit derived from such baths did not arise entirely from the warm vapour. They sometimes rubbed the fresh juice of the Ngaio (*Myoporum latum*) over their skin, to keep off the persecuting Namu (Sandfly); and for several years they have used as purgative medicines, the juice of the root of the New Zealand Flax (*Phormium*), and the bark of the Kowhai (*Edwardsia grandiflora*);—as a tonic, the leaves of the Kohekohe (*Dysoxylum spectabile*); as a demulcent, in colds, &c., the bark of the Houhere (*Hoheria populnea*); as a diaphoretic, *Mentha Cunninghamii*; and, as slightly alterative, a decooc-

tion of the bark and stems of the Pikiarero (*Clematis hexasepala*), and the root of the Taturahake (*Coprosma acerosa*.)

24. Touching the Economic Botany of the present time—or era of New Zealand Colonization—not a little has been already done by the early Settlers to show the uses, qualities, and values of many of the Timbers, and other vegetable substances, of the North Island of New Zealand. Indeed, several of her Botanical productions are better known in the old world than those of much older Colonies. In now considering these, it is proposed to do so, more with reference to their utility, &c., than to their Botanical sequence or arrangement. Consequently, the principal timber trees will be first noticed.

(i.) The Chief timber-producing trees,—*i.e.*, those which are usually sawn into boards for common purposes,—are seven in number; all being Botanically classed under the natural family, *Conifera*; although really possessing among them only one true Pine. This is the far-famed and justly celebrated Kauri, (*Dammara australis*), the largest and most useful of all the New Zealand timber trees. This stately tree grows commonly to the height of 140—150 feet, a few reach to 170, or even 200 feet. In general it has a clean trunk fifty to sixty feet in height, before reaching the branches, (which are enormously large, and diverge around the stem from one spot,)—with a barrel of eight or nine feet, tapering gradually to five or six feet. The largest clean and perfect barrel *seen* by the writer was twelve feet in diameter; and the largest spar recorded, was cut at the Hokianga River in 1839, it measured 106 feet in length, without a knot, and was two feet square at the smaller end. In a Kauri forest the spar trees are in proportion as one to four, or five, to the trees fit for sawing. Of this timber there are three varieties known in the market,—the white, the red, and the mottled, (the last being rather scarce,) which are not Botanically distinct. The light-coloured wood has the straightest grain, and is said to be less brittle when dry, and easier to work; the darker kind will admit of a good polish, and is a handsomer wood than the former, but it is only the mottled variety that can be considered a fancy wood; this kind sometimes resembles bird's-eye maple, or knotted oak, and makes really handsome picture-frames, and pannelling, and takes a good polish. The colour of the varieties of Kauri wood, varies from a light straw to a reddish light-brown; fancy pieces may often be met with delicately marked and variegated, with a wavy flowing appearance, which also take a beautiful polish. Its detriment, however, as a wood, is its great

tendency to shrink and contract in length as well as in breadth, and this it does, however old or seasoned, when freshly planed. It is largely used by the Shipwright, the House-builder, and the Cabinet Maker; two-thirds of the houses in the North Island, and all the many vessels and boats, are mainly, if not entirely, built of this timber; and from a time long before the date of the Colony, many cargoes of Kauri spars were taken to England for the purposes of the Royal Navy. The demand for this timber is very great, and has ever been increasing. The quantity *exported* from Auckland and the Northern ports of the Auckland Province, in 1863, was,—of spars and rickers, 270 tons, value £1,953; of sawn timber, 1,552,636 feet, and of squared wood, 1,641 loads, the value of the two last items being £16,000. Although confined to the northern parts of the North Island,—see, par. 13, (ii.),—it grows in all soils, and at several altitudes from the sea-side to 1,500 feet, preferring, however, the dry and sterile clays of the hilly districts. It is still very plentiful, and is likely to meet all demands for 50 future years; although, as a matter of course, it is yearly getting less accessible. Many miles of valuable Kauri forests have been from time to time thoughtlessly consumed by fire; which fires, it is sincerely hoped, will not hereafter be so frequent as they have been. There are few sights more impressive of grandeur, than an untouched forest of this stately tree; few more impressive of misery and devastation, than a worked-out and abandoned one!

(ii.) The next valuable tree of this class, and scarcely less so than the Kauri pine, is the Totara (*Podocarpus Totara*); which, while generally found throughout the North Island, abounds in the Provinces of Hawkes' Bay, and Wellington, where it forms fine forests. It often attains the height of 120 feet, and upwards, with a clean trunk of from fifty to sixty, or even to seventy, feet, without a knot; having a diameter of five, or even six feet, tapering gradually to twenty inches. It is not generally found near the sea, (although it has been met with overhanging the tidal rocks,) and flourishes most on rich alluvial levels. The wood of this tree is hard, and generally of a dark dull pink colour, resembling pencil cedar; it works freely, and when polished is handsome, and very suitable for massy ornamental interior work. In the southern parts of the North Island, (particularly Wellington,) the better and more durable houses, churches, &c., are generally built of it. It is the best New Zealand wood for bridges, wharfs, piles, &c.; as it possesses the valuable property of resisting rot, more especially in wet

situations. It splits well, and makes excellent shingles for roofs; and is very extensively used for posts in fencing. The heavier articles of furniture are sometimes made of it; and the portion of its wood which grows under a "knot," (or large warty excrescence, often seen on its trunk,) is peculiarly veined, owing to its grain there being very tortuous, and when polished highly beautiful. Those "knots" are eagerly sought after for veneering purposes in England, but the supply hitherto has been very scanty. (*Vide* § iv. *sequente*.)

(iii.) The Kahikatea, or White, or Swamp, Pine, (*Podocarpus daeroides*,) is the next commonly used timber tree. It is the most generally diffused throughout the North Island of all the timber trees, often forming large forests; and is almost invariably found in wet spots and swampy situations, and often on the low banks of rivers, at a much lower elevation than its congeners. It often grows to the height of 100 feet, and as its trunk is generally clear from living branches, it presents a tolerably clean barrel of from 50 to 70 feet. Its trunk, however, is frequently not so regularly formed as those of the other *Podocarpus* and the Kauri, being sometimes largely ribbed or buttressed for some distance upwards from its base. This tree is anything but handsome when growing in the close forest; often, however, a single tree is met with standing alone and forming a very beautiful object. The timber of this tree has been, and is, pretty extensively used for all common purposes, apart from exposure or wet. It is the most easily obtained of all the New Zealand timbers; but, owing to its tendency to rot when exposed, and to its scarcely ever seasoning, (continually contracting and expanding with the state of the weather,) it is only used when others are not to be had. For in-door work, however, it is often advantageously used. It is straight-grained, and where free from knots works easily. It has been used for spars for small vessels; and is sometimes split for fence-rails, and for roof shingles. It is often found having fissures in the wood, filled with a hard dry adhesive gum-resin, which is difficult to cut or remove. It is said, that trees which have grown on a slope, or on gravelly land, possess closer-grained and more durable timber, than those of the low wet lands. Choice parts of the wood of this tree, from its light yellow colour, and rich changeable sparkling grain, are sometimes advantageously used as a contrast wood by the Cabinet Maker, to set off the darker coloured woods.

(iv.) The Rimu, or Red Pine, (*Dacrydium cupressinum*,) another large size timber tree, is also common throughout the North Island; but

is never met with forming forests, almost always scattered and single. In its young state,—owing to its light green colour, graceful shape, fine foliage, and long drooping pendent branches,—it is a truly elegant object, often rivetting, for a few moments the entranced beholder; especially when seen standing out to advantage in bold relief on the slope of some secluded sunny dell in the virgin forests! forcibly reminding him of Xerxes and the beautiful plane-tree on the Mæander.\* In the northern parts of the Island this tree affects much higher ground than the foregoing; it attains to the height of from 50 to 70 feet, with a diameter of from 4 to 5 feet; and is lower branched than its congeners. Its wood is tolerably close-grained and hard, and varies considerably in colour, from yellowish to a dull red interspersed with dark-brown streaks. It makes handsome furniture, takes a good polish, and is suitable for finished inside work; although it is often rather difficult to work, owing to its natural fissures (frequent in the best wood) filled with a hard resinous concretion much like some wood of the Kahikatea, or White Pine, already mentioned. Its wood is in general use by the Cabinet Maker and Turner, and by the Carpenter and House-builder; and is sometimes used by the Joiner and Millwright. At the North, where it is more plentiful than Totara, it is often used for fence posts, being tolerably durable. From published official sources we learn that the quantity of sawn timber (*kind* not specified, but supposed to comprise the last three mentioned kinds, Totara, and White, and Red Pine,) exported from the Port of Wellington, in the year 1863, was 2,143,303 feet, value, £19,705.

(v.) The Matai (*Podocarpus spicata*), another large-sized timber tree, is also common throughout the North Island, but (like the Rimu) is generally found alone. It is sometimes found growing in forests with the Rimu, but often it affects lower grounds; preferring rich alluvial soil. It grows to a height of 70—90 feet, and a diameter of 4—5 feet, with a straight clean trunk and few branches. The wood is variously coloured, sometimes reddish, and sometimes variegated; it is easily worked, is hard, and pretty durable; and is used for Wheelwrights' and Millwrights' work, and for Cabinet Making and pannelling.

(vi.) The Miro (*Podocarpus ferruginea*), is also a timber tree pretty general throughout the Island, but not so common as the Matai. It grows to a height of from 40 to 60 feet, but is small in girth, rarely reaching 3 feet in diameter. The wood is smooth, close grained, and

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\* Herodotus, *Polymnia*, § 81.

dark, splits freely, and is very durable. It is used for spokes, and for Carpenter's work; and would no doubt be more extensively used if it were of larger dimensions, and more easily obtained.

(vii.) The Tanekaha or Toatoa, (*Phyllocladus trichomanoides*), is also a timber tree of the same Natural Order as the last five trees, but very different from them in size and appearance. It is one of the "Celery-leaved Pines," and being an ornamental tree of regular growth, often has a very handsome appearance. It is plentiful on dry hilly lands in the North parts of the Island, but scarce in its more Southern parts. Its average height is from 45 to 50 feet, and from 2 to 3 feet in diameter. It is used for all kinds of outside work, as posts, rails, and floors of verandahs, and is greatly preferred for decks of vessels. The wood is rather too heavy for spars, although it has been occasionally used for masts and booms. In colour it is a darker yellow than the Kauri, has a closer grain, and a turpentine like smell. It is a very valuable wood, but, from its small size and not being easily accessible, it has not been so largely used as it deserves.

25. Those other large timber trees which are commonly split for use, or chopped, or sawn into short junks, (rarely into boards, or planks) for the market, are six in number, and comprise the following:—

(i.) The Puriri, or New Zealand Oak, or Teak, (*Vitex littoralis*), is a large tree of irregular growth. It grows to the height of from 50 to 60 feet, with a clear trunk of 20 feet, or more, and varies from 12 to 25 feet in circumference. Much larger trees, however, are occasionally met with. Several are often found growing near each other, forming a handsome dark green clump of wood. It is confined to the North parts of the Island, (see par. 13, § ii.,) where it prefers a rich soil, and is sometimes met with overhanging tidal rocks and beaches. From its earliest growth this tree is subject to the borings of a large larva like insect, which makes long clean cut holes throughout the hardest part of the wood, large enough to admit a man's small finger. Of course this gives the wood a most unsightly appearance, yet it is but little injured thereby. The wood is heavy, of an olive, or brownish colour, close in the grain, splits freely, and works well; it is extensively used for knees in ship-building, for piles in house-building, for gate and fencing posts, and for every purpose where solidity, strength, and exemption from rot is required. It is estimated as being about equal with English Oak, in stiffness, strength, and toughness.

(ii.) The Kahikatoa or Manuka, (*Leptospermum Scoparium*,) is a tree common throughout the North Island. It grows in the poorest as well as in the richest soil, but prefers steep and dry hill sides. It sometimes attains to a height of 40, or even 45 feet, and to a diameter of 2 feet. Often a large patch, or small forest, of this tree will be found growing closely together, without any other tree among them. The wood is very hard, and of a dark colour, varying from yellow to red and dark brown; and is admirably fitted for the Cabinet Maker and Turner. It makes good axe handles, and is extensively used as rails for fencing, for which purpose it is one our best New Zealand woods. It is also excellent fuel, and many thousands of tons of it as firewood, are annually used in and exported from Auckland.

(iii.) The Tawhai, and Tawhai-rau-nui, or Black and Red Birches, (*Fagus Solandri* and *F. Fusca*,) often form large and sometimes handsome trees. Though plentiful in the South parts of the Island, with one exception they are not found north of the East Cape; yet, where they flourish, especially in the higher mountainous grounds, they often form large forests. They run from 80 to 100 feet in height, and (according to the species and soil) from 3 to 7 feet in diameter. The wood, unfortunately, is not of great use or value as timber, yet is sometimes used for boat-knees, and for cask staves. That of the Black Birch, however, is extensively used for fence rails in the Province of Wellington; and is said, when well dried, to make good firewood.

(iv.) The Pohutukawa, (*Metrosideros tomentosa*,) is another large hard-wooded tree of diffuse irregular growth. Its *habitat* is the immediate sea-shore of the North parts of the Island; where, on rocky headlands and cliffs, sometimes pendent, it forms a striking and picturesque object. It is very robust, sometimes being 4, or even 5, feet in diameter, but the trunk and branches are invariably more or less crooked. Nevertheless it is a very valuable tree, especially for ship-building purposes, where its gnarled and crooked character make it highly serviceable for timbers, knees, breast-hooks, &c.,—it is also used for making ship's blocks, and for building piles. This wood presents a very handsome grain, a rich rose colour, and a high polish, when worked up by the Cabinet Maker, and choice pieces are in great demand. The area, or zone, in which this valuable tree is found being very limited, its wood will soon be exhausted unless some means are speedily made use of to preserve or economise it.

(v.) The Rata, (*Metrosideros robusta*,) a tree very closely allied generically to the Pohutukawa, is one of the largest of the New Zealand forest trees, often attaining a height of 120 feet, of which from 60 to 80 feet forms its trunk; which is sometimes very bulky,—one having been measured which was 54 feet in girth. Unlike the preceding, however, it is mostly found inland, at a tolerably high elevation, and is pretty general throughout the Island. Its growth is both regular and irregular, mainly arising from situation and soil. Its wood is heavy, red, close-grained, and durable; and is very valuable to the Wheelwright and to the Ship-builder, on account of its strength and toughness, owing to the peculiar twisting of its fibres; the roots and branches as well as the trunk affording excellent materials for naves, timbers, and knees. It is also a handsome wood for the purposes of the Cabinet Maker; and will answer well for all uses where Oak and Beech are required.

(vi.) The Aka, (*Metrosideros scandens*,) although (in bulk) a small tree, or climber, may also here be noticed; as it not only belongs to the same genus with the two preceding, and to the same sub-section, but is also very closely allied to them in its qualities and uses. This plant is generally common in all woods, and may be known as a large stout climber ascending to the tops of the highest trees, and often hanging like loose ropes from them. Like the others of the genus already noticed, it is heavy, close-grained, and tough, and is principally used for timbers for boats.

26. The trees which follow, though many are small and scarcely timber trees, comprise some which are very useful to the Manufacturer.—

(i.) The Kowhai, or New Zealand Acacia, (*Sophora*, or *Edwardsia grandiflora*,) is a small tree, sometimes reaching to the height of 30 or 35 feet. Its wood is hard, and of two or three colours or varieties, varying from a bright yellow, in some specimens, to that of a light olive, or a dull Indian pink, in others. It is well fitted for the purposes of the Cabinet Maker and the Millwright.

(ii.) The Hinau, (*Elæocarpus dentatus*,) a tree generally common in the drier woods in the interior, attains to the height of from 50 to 60 feet, and 3 feet, or upwards, in diameter. The wood, in general, of this tree is inferior, but the crooked parts of the wood, with the knots and warty excrescences, have a very beautiful marbled grain, and are therefore valuable to the Cabinet Maker.

(iii.) The Towai, and Tawhero, (*Weinmannia sylvicola*, and *W. racemosa*,) are small trees which are found throughout the interior. Their average height is 40 feet, and about 2 feet in diameter. Their wood is said to be heavy, close-grained, and red, and to answer all purposes to which Mahogany, or New South Wales Cedar, is applied.

(iv.) The Titoki or Titongi, (*Alectryon excelsum*,) is a tree general throughout the Island. It is of lofty growth, sometimes reaching 60 or 70 feet, and 3 feet in diameter; it has a pleasing appearance, and is low branched. Its wood is straight in the grain, and is very tough, and is much like that of the English Ash. It is used by Wheelwrights and Shipwrights, and may be applied to like purposes with that of the Ash.

(v.) The Kohekohe, (*Dysoxylum spectabile*,) is a handsome tree which is only found plentifully in the North parts of the Island. (See par. 13, § ii.) It reaches to the height of 50 or 60 feet, having its trunk clear of branches to the height of 30 or 40 feet, and of 3 feet diameter. Its wood is fine-grained, of a pale reddish colour, and is heavier than the New South Wales Cedar. It is used in the making of Furniture.

(vi.) The Tangeao or Mangeao, (*Tetranthera calicaris*,) is a small tree, also confined to the Northernmost parts of the Island, where it is tolerably abundant. It reaches to the height of 45 feet, but its trunk is seldom above 18 inches in diameter. Its wood is of a dark reddish brown colour, and admits of a good polish; it is said to equal that of the Elm in lightness, durability, and extraordinary toughness. It is used for Agricultural Implements, Bullock Yokes, and Oars, and (lately) for Ship's Blocks, for which last purpose it is likely to be very valuable. It would probably make good spokes and eogs.

(vii.) The Rewarewa, (*Knightia excelsa*,) is a handsome tree of peculiar fastigate—or poplar-like—growth. It is much more plentiful in the North than it is in the South parts of the Island. It is generally found in dry woods, and often attains to the height of 60 feet, although its diameter is rarely 3 feet. Its wood is beautifully variegated and mottled, reddish on a light-brown ground; and is used for Picture Frames, and Fancy Work. It splits freely, and is therefore used for fence pales.

(viii.) The Maire:—two, or more, very distinct genera, containing several trees, (*Santalum Cunninghamii*, and *Olea* sp.,) are confounded under this Native name; although the Natives themselves generally

distinguish them pretty clearly,—calling the *Olea*, Maire-rau nui. Both were by them called Maire, from the fact of both being hard-wooded, and formerly used by them for the same purposes. One of the trees (*Santalum Cunninghamii*) is confined to the North parts; while the various species of *Olea* are more general, and much more plentiful in the South parts of the Island. It is highly doubtful whether the true Northern Maire (*Santalum Cunninghamii*,) is yet much known in the Arts and Manufactures; it is a small tree, belonging to the Sandal-wood family, and the species is confined to a very limited area. (See par. 11, § ii.) The large Maire tree, or Maire-rau-nui of the Aborigines, comprise 3 known species of Olive, (*O. Cunninghamii*, *lanccolata*, and *montana*,) one species being found generally throughout the Island. It commonly forms a large tree, 60 to 70, or even 100 feet high, and 4 feet, or more, in diameter. It is very closely allied to the European Olive, and to the “Iron-wood” of Norfolk Island,—all being species of the same genus. There are two kinds known to the Manufacturer;—a dark variety fit for Cabinet-Making, and a white variety fit for sheaves, and cogs, and for Wheelwrights’ work. The dark kind has a handsome grain, and polishes well; but its brittleness and great weight prevent its being more generally used.

(ix.) The Pukatca, (*Atherosperma Nova-Zelandiæ*,) is among the largest trees of New Zealand, sometimes reaching the height of 150 feet, and a clear diameter of 5 to 7 feet, besides having immensely thick buttresses at the base. The wood, however, is soft, and will not split; and (at present) is little used save in boat-building; it is highly serviceable for the bottom boards of boats, as in case of striking a rock, only the spot so struck is staved: a nail might be driven into the wood without splitting or boring.

(x.) The Tawa, (*Nesodaphne Tawa*,) is a fine tree, common throughout New Zealand, especially in the interior, often attaining to the height of 70 feet. Its wood is light and splits easily, and soon rots if exposed to wet; notwithstanding, from its freeness of splitting, it is used for fence rails, and for shingles, in places where it abounds.

(xi.) The Taraire, (*Nesodaphne Tarairi*,) another species of the same genus, but confined to the North parts of the Island, (*vide* par. 11., § ii,) is a handsomer and still larger tree; yet its wood, being similar in quality, is of little use.

(xii.) The Ake, or New Zealand Lignum Vitæ, (*Dodonæa viscosa*,) is a small tree, or large shrub, seldom attaining a greater diameter than 1 foot.

It is found generally on dry ground throughout the Island, but is both more plentiful and larger at the North parts. Its wood is very hard and very heavy, (being by far the heaviest of all the New Zealand woods,) is of a reddish colour, and is often variegated with dark streaks, or mottled with a succession of knots, giving it a peculiarly beautiful appearance. It is used for Sheaves, Axe-handles, &c.

(xiii.) The Tipau, or Mapau, (*Myrsine australis*), is a small leafy tree, 15 to 20 feet high, found sparingly throughout the Island, but more plentiful at the North. Its wood resembles Beech, and is used for Chair making, Carpenters' tools, Walking sticks, &c.

(xiv.) The Wharangi, or Wharangi-piron, (*Melicope ternata*), is a small tree, 12—15 feet high, generally found throughout the Island. Its wood resembles Satin-wood, and is used by the Cabinet Maker for inlaying Fancy work.

(xv.) The Kawaka, (*Libocedrus Doniana*), is a middle-sized hardwooded tree of the Pine family. It is sparingly found and generally at much higher elevations than the larger timber trees, hence it is not much known. It is confined to the North parts of the Island, where it attains to a height of from 30 to 40 feet, (or more,) and from 2 to 3 feet in diameter. Its wood is dark coloured, beautifully grained, close and heavy; well suited for picture frames. In the lower part of its trunk the wood is said to resemble the "tulip-wood" of New South Wales. This tree is very closely allied to the famed "Alerce" (*Thuja tetragona*) of South Chili and the Straits of Magellan; and is believed to be a very valuable wood.

27. There still remains to be noticed a few more indigenous vegetable substances known in commerce; foremost among which as valuable exports are two of world-wide fame, though peculiar to the Island, *viz.*—the New Zealand Flax, and the Kauri Gum.—

(i.) The New Zealand Flax, or fibre of the *Phormium tenax* and of *Ph. Colensoi*, and of their varieties, (Muka of the Natives, as the dressed fibre of the Harakeke, or Flax Plant,) has long been too well known, to require any lengthened remarks here. The plants are common in every situation and soil throughout the Island, or the New Zealand groupe, (including also Norfolk Island,) where alone the *Phormium* is found indigenous. (g.) Some swamps, or low grounds, possess it as almost the only plant, growing continuously for miles. Formerly it was hand-dressed in large quantities by the Aborigines, both for home consumption among themselves and for sale, and was exported very largely. As an

article of export it has greatly diminished, but this is entirely owing to the Natives having generally given up the dressing the plant for sale,—to the dearth of hand labour—and to the difficulty in properly preparing its fibre for use by machinery; which difficulty, however, will without doubt be eventually overcome. From official statistical papers it is gathered, that the export of hand-dressed Flax, during the 10 years ending 1852, from the port of Wellington alone, amounted to 523 *tons* 15 *cwt.*, value £7,200: of which, nearly one-fourth, or 128 *tons* 10 *cwt.* 85*lbs.*, was exported in one year, 1850. Of late years the export of this article has been very small compared with what it once was, and with what (it is firmly believed) it will yet be.

(ii) The Kapia, or Kauri Gum, is (as its colonial name shows) a Gum, or rather a Resin, from the Kauri Pine (*Dammara australis*); it is not however obtained in the present living Kauri Pine forests, but only in the North parts of the Province of Auckland, where (it is believed) such trees formerly grew,—yet of such ancient forests no other trace generally remains than the resin itself slightly buried in the soil. Large tracts of the country north of Auckland (particularly of the more barren spots,) is of this description; and much of it has been already dug over, (carelessly perhaps,) and the resin collected. It is now about 20 years since the Kauri gum was first noticed as an article of export; and it has been mainly, if not entirely, gathered by the Aborigines from the Thames to the North Cape. The quantity exported from Auckland, in 1863, was 1,400½ *tons*, worth £27,026; and the total quantity exported from that Province, during the 10 years ending 1862, amounted to 13,575 *tons* 18 *cwt.* 84*lbs.*, worth £174,148. The largest quantity exported in any one year (1857), was 2,464 *tons* 10 *cwt.*, worth £34,550.

(iii.) Another peculiar article of export, which has also been extensively used in the Colony for tanning, is the bark of the Towai (*Weinmannia racemosa*). This tree (or a closely allied species), is more or less common throughout the Island, but it is much more abundant in the Northern parts, where, too, its Bark has been more particularly gathered for use, and exported for tanning purposes.

(iv.) Other indigenous vegetable substances, which have been both successfully used and brought to market, are,—the Kareao, or Supplejack creeper (*Rhipogonum parviflorum*), as coarse Basket and Wicker work; Brooms, for ship and domestic purposes, made of the twiggy Manuka (*Leptospermum scoparium*); the woody stems of the white Mangrove (*Avicennia officinalis*), for soapmaking; the downy *pappus*

Hune from the fruiting heads of the large Bulrush, (*Typha angustifolia*,) for beds, bolsters and pillows; and Honey;—since the introduction of Bees and their becoming wild. Of this last article a large quantity increasing every year, (particularly at the North,) finds its way into the market.

28. It is reasonably believed, that there are yet several indigenous plants and vegetable substances which may prove to be valuable both for use and export; some of which are all but quite unknown to Arts and Manufactures: a few of them will be here mentioned.—

(i.) OF TIMBERS:—(a. *known hard woods*.) The Mairatawhake, (*Eugenia Maire*); the Rohutu (*Myrtus pedunculata*), especially the larger Southern tree; the Maire (*Santalum Cunninghamii*), a small tree with dark bark, of the Sandal-wood genus, scarcely averaging 30 feet in height, only known as growing in the dry forests Northward of 36° South; the Manoao (*Dacrydium Colensoi*), a small hard-wooded pine, incorruptible, (according to the Natives,) found sparingly in high and dry forests on the East Coast, north of Whangarei, and also in the mountainous country near Taupo; and the long leaved *Myrsine* (*M. salicina*), being the next species to the well-known and valued beech-like Tipau or Mapau, (*M. australis*), and also a much larger tree.

(b. *trees supposed to be hard-wooded*.) The Tawari (*Ixerba brexioides*), the Toro (*Persoonia Toro*), the Kohuhu, and the Tarata, (*Pittosporum tenuifolium*, and *P. eugenioides*), and the Porokaiwhiri (*Hedyccarya dentata*); besides which there are, the white-wooded Horoeka (*Aralia crassifolia*), the Kaikouako (*Pennantia corymbosa*), the large species of *Plagianthus* (*P. betulinus*), and the *Epicarpurus microphyllus* (or *Trophis opaca*); all these, from their known affinities, are well worthy of a trial.

(ii.) OF BARKS: a. *for dyeing*; the Hinau, and the Pokaka, (*Eleo-  
carpus dentatus*, and *E. Hookerianus*), for dyeing black; and the Makomako (*Aristolelia racemosa*), for a blue-black.—b. *for tanning*; the Toatoa, or Tanekaha (*Phyllocladus trichomanoides*), the Makamaka (*Ackama rosafolia*), so closely allied to the Towai; and the Maanawa, or White Mangrove (*Avicennia tomentosa*), the bark of which is said to be extensively used for tanning at Rio Janeiro.

(iii.) SUNDRIES: The living bark, branches, stumps and roots, and even leaves, of the Kauri pine would yield a large amount of Kauri resin under proper management. The fibrous leaves of the Kiekie (*Freycinetia Banksii*), is an excellent article for

men's hats,—far better than the largely imported common “Cabbage-tree” hat, and but little inferior to a coarse Leghorn or Manilla one, (as the writer knows from experience.) A serviceable Oil\* could be largely extracted from the seeds of the Titoki (*Alectryon excelsum*); and from the aromatic leaves and bark of the Pukatea (*Atherosperma Nova-Zelandiae*), a valuable essential oil might also be extracted, seeing that from a closely allied Tasmanian plant (*A. moschata*), an essential oil, called “Sassafras Oil,” has been obtained; and Dr. F. Mueller has recently strongly recommended the bark of that tree as “deserving extensive adoption into Medicine.” Several Dye-Lichens are abundant in the Island, viz.—*Usnea*, *Ramalina*, and *Parmelia*, (*P. conspersa*, *saxatilis*, *parietina*, and *perlata*.) The pure semi-liquid Gum, found in such large quantities at the bases of the leaves of the New Zealand Flax, may yet be collected and form a matter of export; and *Zostera*,—useful for stuffing mattresses,—(the recently proposed substitute in England for manufacturing Paper,) is very plentiful in many of our tidal waters.

29. Having thus briefly noticed the *utile*, the *dulce* must not be overlooked; rather, (in the words of Goethe,)—“Let us look closely after the beautiful, the useful will take care of itself.” Not a few of the Plants and Ferns of New Zealand have long been cultivated in England, from the time of her first British Visitors, and the number of those plants is annually increasing. Still, several highly ornamental and striking plants, (chiefly confined to forests in the interior, or to sub-alpine solitudes,) are believed to be unknown both to European and to Colonial Gardens. The most prominent and worthy of them will be now mentioned:—(i.) LARGE SHRUBS, AND SMALL TREES. *Pittosporum*, several species; *Hoheria populnea*, and *H. Lyallii*, with their several strongly marked ornamental varieties; *Melicope simplex*; *Pluebalium nudum*; *Leptospermum ericoides*; *Myrtus*, 2 or 3 species; *Ixerba brexioides*; *Senecio*, several sp.; *Leucopogon fasciculatus*, and its varieties; *Dracophyllum latifolium*; *Librocedrus Doniana*, and *Dacrydium Colensoi*. (ii.) SMALL SHRUBS. *Carmichaelia odorata*, and *C. flagelliformis*; *Fuchsia procumbens*; *Alseuosmia*, several sp. and vars.; *Coprosma*, several sp.; *Olearia*, several sp.; *Senecio Greyii*; *Gaultheria*, several sp.; *Cyathodes Colensoi*; *Dracophyllum*, several sp.; *Veronica*, several sp.; *Pimelea*, several sp.; and *Cordylina*, 2 or 3 species. (iii.) HERBACEOUS PLANTS. *Ranunculus insignis*, and *R. nivicola*, among

\* In 1849 the writer sent 2 bottles of this Oil to the Kew Museum of Economic Botany; one was cold-drawn, and the other expressed by heat.

the largest species of the genus ; *Drosera binata* ; *Aciphylla Colensoi* ; *Celmisia*, several sp. ; *Colensoa physaloides* ; *Wahlenbergia saxicola* ; *Gentiana montana*, and *G. pleurogynoides* ; *Calceolaria Sinclairii* ; *Ourisia*, several sp. ; *Callixene parviflora* ; *Forstera Bidwillii* ; *Helophyllum Colensoi* ; and several of the peculiar orchideous plants, both terrestrial and epiphytical.

30. Lastly, of indigenous Medicinal plants and vegetable substances, a few will be here mentioned ;—a future time may prove their value.

(i.) *Those which have already been usefully tried* :—the root of the Harakeke (*Phormium tenax*), as an anthelmintic and cathartic ; the leaves and bark of the Kohokohe (*Dysoxylum spectabile*), as a tonic ; the roots of the Kareao (*Rhipogonum parviflorum*), as an alterative,—this plant is very closely allied to the Sarsaparilla plant (*Smilax sarsaparilla*), and its roots have been beneficially used in New Zealand instead of that medicine which is so commonly adulterated (i) ; the bark of the Houhere (*Hoheria populnea*), as a demulcent ; the fragrant herb *Mentha Cunninghamii*, as a diaphoretic ; the aromatic leaves of *Angelica rosæfolia*, as a diuretic and remedial in syphilitic cases ; and the roots of *Taraxacum Dens-leonis*, as an alterative.

(ii.) *Those which, from their known natural affinities, are believed to be valuable* ; from such the following are selected :—the spicy bark of the Horopito (*Drimys axillaris*), a species ranking next to the well-known *D. Winteri* of Cape Hern, which produces the valuable Winter's Bark ; the intensely bitter bark of the Kowhai (*Sophora*, or *Edwardia grandiflora*),—it is worthy of notice, that both African and East-Indian *Kino* is produced by plants of an allied genus of the same sub-order ;—the leaves of the Wharangi-pirou (*Melicope ternata*),—as allied naturally to the genus *Diosma*, species of which genus produce the well-known *Buchu* leaves, which the New Zealand *Melicope* also resemble in taste and smell ;—the Kawakawa (*Piper excelsum*),—many closely allied species of this genus (and of the next genus *Cubeba*), are extensively used as Medicines in various parts of the world ;—the aromatic succulent stems and roots of various species of *Panax*, and of *Aralia*,—of which genera several species are used in medicine, and the roots of *P. Quinque-folium* (a plant closely allied to some of our *Panaces*), are sold by the Americans to the Chinese for real Ginseng root (*P. Ginseng*) ;—the astringent bark and diuretic seeds of *Sapota costata* ;—the roots of the 2 Mountain Gentians, which are just as purely bitter as those of the officinal *Gentiana lutea* ;—the aromatic bark of the Tawa (*Nesodaphne*

*Tawa*,) a plant belonging to the same Natural Order with those producing the Cinnamon, Cassia, Sassafras, Benzoin, and Camphor of commerce; and, lastly, the Waiwatua (*Euphorbia glauca*,) may also prove useful as a medicine, seeing so very many species of the same genus have long been medicinally employed.

31. Although the fitness and suitability of many parts of the North Island for producing all Cereals, and Edible Roots and Vegetables, and most European fruits, has long been well-known, and its great fruitfulness proved by its former large exports of the same,—after providing a sufficiency for its own people; still it would scarcely be proper to close this Essay without some reference to such productions. It is greatly to be lamented, that, with the exception of Potatoes, there has been no export of Agricultural produce for the last 3 years; owing, in part, to the war, and to the very great increase of consumers with less producers. For several years, however, before the present war commenced, the export of *Cerealia* from this Island had been steadily decreasing annually; as the following statement, compiled from official papers, will show.

*Value in Money, of Grain, (Wheat, Barley, Oats, Maize, and Flour,) and of Potatoes, exported annually from the Provinces of the North Island of New Zealand, for the 10 years ending 1862.*

YEARS.	AUCKLAND.				TARANAKI.				WELLINGTON AND HAWKE'S BAY.			
	Grain, &c.		Potatoes.		Grain, &c.		Potatoes.		Grain, &c.		Potatoes.	
	£	s. d.	£	s. d.	£	s. d.	s. d.	£	s. d.	£	s. d.	
1853	12,495	0 0	18,460	15 0	2,456	10 0	3,078	0 0	1,175	1 9	3,667	0 0
1854	27,589	3 8	35,255	10 0	5,181	16 6	5,076	10 0	6,907	11 6	16,137	13 0
1855	61,194	2 6	44,496	10 0	3,907	0 0	15,168	19 0	5,706	17 0	17,686	9 0
1856	12,934	6 0	11,133	0 0	..	..	1,200	0 0	5,839	0 0	1,349	0 0
1857	17,884	19 0	8,136	0 0	274	0 0	1,582	0 0	2,575	10 0	6,552	0 0
1858	5,859	14 0	13,043	0 0	552	2 6	4,350	0 0	623	0 0	4,303	0 0
1859	5,987	0 0	6,568	0 0	525	0 0	2,819	0 0	2,643	0 0	240	0 0
1860	1,013	0 0	7,562	0 0	61	0 0	273	0 0	1,223	0 0	2,720	0 0
1861	174	0 0	1,760	0 0	..	..	..	..	68	0 0	150	0 0
1862	60	0 0	7,445	0 0	..	..	..	..	..	..	1,942	0 0
TOTALS £	144,291	5 2	153,888	15 0	12,057	9 0	33,552	9 0	26,516	0 3	54,887	2 6

(The quantity of Potatoes exported from Auckland in 1863, was 508 tons, value, £3,233.\* It is believed, that this falling off is mainly owing (apart from the war,) to much too little attention being given to tillage; which noble and necessary occupation is neither followed nor encouraged as it should be. At present, this Island is greatly too dependent on foreign countries for Grain; which is now being brought not only from Australia and Chili, but even from California and England! It is hoped, that this growing evil may be clearly and timely discerned, and put a stop to; or, the consequences resulting therefrom may, some day, be unexpectedly and highly disastrous to the whole Island.

32. It is also believed, that a future generation will derive great advantages from the extensive cultivation of certain plants which cannot be successfully cultivated in the open air in Great Britain, some of which have been already naturalized in this Island;—such as, the Vine, the Mulberry, the Castor-oil plant (*Ricinus communis*), the Olive (*Olea Europæa*), the Cochineal Cactus, (*Opuntia*, sp.), the Tobacco, and the Maize;—the last both for the sake of its spathes and leaves for Paper-making, (*for which it seems admirably adapted*), as well as for its grain. The Northern parts of this Island,—especially the warm climate and rich volcanic soils north of the Thames,—will, doubtless, produce Wine and Oil in abundance, and, perhaps, Silk; as the climate is well known to be suited to the Mulberry; and the European Olive might be advantageously grafted upon the several indigenous Olives of the island. Further: it is not improbable, that Cochineal, Cinchona, and Coffee, may also be successfully cultivated in the warm climate of the Northern districts; seeing these two last mentioned plants have very near Botanical relations in the many species of the genus *Coprosma*, everywhere common and flourishing among us. Those parts of the Island possessing Limestone soils, and, at the same time, not below the necessary isotherm, seem admirably adapted for raising Tobacco; a plant, which, like Clover and Lucerne, requires a deal of Lime in the soil to bring it to perfection; its ashes containing more than 20 per cent. of Lime and Magnesia Salts.—While the more equable and temperate climate and rich alluvial soils of the Southern parts of the Island, will also continue to produce and export as heretofore, all British Grain, and Fruits, and Edible Roots, very abundantly.—

“Hic segetes, illic veniunt felicius uvæ;  
Arbori fetus alibi, atque injussa virescunt  
Gramina.”—

—VIRG. *Georg.* l. i.

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\* No potatoes were exported in 1863 from the other Provinces of the North Island. — ED.

## NOTES.

Par. 6. *Note, a.*—*Hoheria populnea*: the Botanist Allan Cunningham, (who first visited this North Island of New Zealand in 1826, and who created this genus,) was an accurate and enthusiastic observer of Nature; he thus characteristically and truly notices the beauty of this tree, in drawing up its generic character, (published in 1836.)—"Arbuscula, spectabilis, sempervirens et maxime ornata in sylvis naturalibus iis."—*Ann. Nat. Hist.*, vol. iii. p. 319.

Par. 8. *Note, b.* I had also drawn a *third* division, or classification, of many of the plants of the North Island, according to its geognostic formation; but I have been obliged to abandon it, chiefly through want of space. No doubt, hereafter, it will be both interesting and useful to show the geognostic *habitats* of the various species,—whether on Clay or Alluvial Soils,—on Limestoue, Sandstone (*Palaeozoic*.) or Volcanic formations, &c. I feel assured, that much more attention is absolutely needful to this branch of the science than has hitherto been given it, as a necessary step towards the solving of the great problem concerning the Distribution of Plants. I remember well (in 1845) being forcibly struck with seeing certain Bay-of-Islands plants, (*e. g.* *Metrosideros scandens*, *Gaultheria antipoda*, *Cordyline stricta*, *Lindsaea linearis*, *Lycopodium volubile*, &c.,) on the clayey hills near Wellington.—Plants, which I had not before seen south of the Thames. I may also mention that, in 1844, Dr. Hooker published (in the "London Journal of Botany," vol. III.) the names, &c., of a Collection of 123 Plants made in the neighbourhood of Wellington by a visitor, of which number only 2, or perhaps 3, were not identical with the Bay of Islands plants. Hence arose a suspicion, that the North Island of New Zealand possessed but few species, seeing that the same plants were collected in latitudes so far apart. But the fact is, that the same geologic features obtain on those hills, as at the Bay of Islands, although but rarely intermediato. And many of those species (as far as I know,) are not elsewhere found between 35° South and Cook's Straits.

Par. 12. (i.) *Note, c.* The Pohutukawa (*Metrosideros tomentosa*) is truly a littoral plant; and yet (in 1841,) I detected it growing on the Sandstone rocks of the high inland lake Waikare, about 70 miles from the sea; and I find, from Dieffenbach, (vol. i. p. 384,) that he too had observed it growing on the trachytic cliffs of the inland lake Tarawera, (1075 feet alt., *apud* Hochstetter,) at about the same distance from the sea.

Par. 12. (ii.) *Note, d.* The Karaka (*Corynocarpus laevigata*) is naturally a coast plant; but it is sometimes found growing in the interior, in clumps or singly,—particularly in the more Northern parts, and on the shores of lake Taupo,—where it has been planted as a fruit-bearing tree by the New-Zealanders.

Par. 12. (iii.) *Note, e.* "*Fagus fusca* has not been seen north of Poverty Bay." In 1839, however, I visited a small isolated wood of *Fagus* at the head of Whangarei Bay, but failed in getting any fruiting specimens. That plant, from its veneration, is believed, by the writer, to be a different species, or, at all events, a marked variety. (*Vide*, "London Journal of Botany," vol. III., p. 20.) The same tree grows also near Kaitaia Mission Station, North of 35° South. By the Northern Natives, it is called *Hutu*.

Par. 16. *Note, f.* Dr. Sparmann seems scarcely to have been done justice to; no New Zealand plant bears his name. G. Forster, however, in his "Voyage round the World," (vol. i. p. 67, 4to. ed., speaking of his father and himself, while collecting specimens at the Cape, on their voyage out with Captain Cook,) says—"Our abundant harvest gave us the greatest apprehensions that with all our efforts, we alone would be unequal to the task of collecting, describing, drawing, and preserving (all at the same time) such multitudes of species, in countries where every one we gathered would in all probability be a nondescript. It was therefore of the utmost importance, if we meant not to neglect any branch of natural knowledge, to endeavour to find an assistant well qualified to go hand and hand with us in our undertakings. We were fortunate enough

to meet with a man of science, Dr. Sparmann, at this place; who after studying under the father of Botany, the great Sir Charles Linne, had made a voyage to China, and another to the Cape, in pursuit of knowledge. The idea of gathering the treasures of nature in countries hitherto unknown to Europe, filled his mind so entirely, that he immediately engaged to accompany us on our circumnavigation; in the course of which I am proud to say, we have found him an enthusiast in his science, well versed in medical knowledge, and endowed with a heart capable of the warmest feelings, and worthy of a philosopher." And, the father, J. R. Forster, in the preface to his classic "*Genera Plantarum*," (among much laudatory language) also says—"Sparmannus plantas describat, filius eisdem delineabat.—Verum dum Sparmannus plantas accuratius examinaret, filius et ego saepe in consilium vocati in eommate consulebamus, &c." It is hoped, that future Botanical describers and nomenclators of New Zealand plants will remember this. No man can read G. Forster's "Voyage," or the "Observations" and Botanical works published by his father, J. R. Forster, without perceiving how much they (we?) were indebted to Dr Sparmann; who also did so much at the Cape for the advancement of Natural Science. His memory has been justly commemorated by Thunberg, in the South-African genus, *Sparmannia*,—a genus very closely allied to the New Zealand *Entelea*.

Par. 19. Note, g. "*Phormium* is only found in New Zealand and Norfolk Island." Since writing the above I have seen the following in an Auckland paper, (*New Zealander*, Sept. 2, 1864,)—"AUSTRALIAN PHORMIUM TENAX.—The *Pastoral Times* of the 13th inst. says,—Large quantities of this plant have been found growing in the mallee scrub on the Lachlan plains. The flax is three or four feet high, and from one inch to two broad. It is stronger in its fibres than the New Zealand flax, and would seem to be exempt from the oily (*sic*) properties which render the New Zealand flax so difficult to convert into useful purposes. It is believed that by the aid of the small steamers running up our rivers, we shall be enabled to collect vast quantities of the article. Some specimens have already been forwarded to Melbourne for the purpose of being tested." I have great doubts, however, of its being *Botanically* correct.

Par. 23. (iii.) Note, h. This chewing of the fresh gum resin of the Kauri pine by the New Zealanders, explains the error made by Forster, (from Crozet, *Voyage de M. Marion*.) who had named the Mangrove (*Avicennia officinalis*, L.) *A. resinifera*; believing, that the gum chewed by the Natives had been obtained from that tree! Forster says, "Gummi ex hac arbore exsudans forte idem est, quo barbari Novae Zelandiae homines vescuntur, ut patet e diaris navarchi gallici Crozet." This error has been since repeatedly printed; and, strange to say, more recently by Lindley (who even improves upon it) in his noble "*Vegetable Kingdom*," where (p. 665,) speaking of the Mangrove, he says,—"It exudes a kind of green aromatic resin, which furnishes a miserable food to the barbarous natives of New Zealand." (!)

Par. 30. (i.) Note, i. Such is the demand for sarsaparilla, and the limited area where it grows, that (as is well known,) it is greatly adulterated. The true Sarsaparilla is obtained from *Smilax Sarsaparilla*, but several distinct species are used, known in commerce as producing the Peruvian, Brazilian, Lisbon, and Jamaica Sarsaparillas,—and, perhaps, really but little inferior. Another kind, *Smilax glycyphylla*, has also of late years been introduced into medical use from New Holland; while the roots of 3 sedges, (*Carex arenaria*, *hirta*, and *intermedia*.) are collected to make German Sarsaparilla! The New Zealand plant (*Rhipogonum parviflorum*.) is not only very nearly allied to the genus *Smilax*, but was by its first discoverers, Banks and Solander, and subsequently by Forster, classed under that genus—from which it only slightly differs. From its having been successfully (privately) used in New Zealand, and from its natural affinity, it is confidently hoped, it will prove a useful and valuable article of export; at all events, a far better substitute for the true Sarsaparilla than the 3 German *Carices*.

## A T A B L E

Shewing the relative strength, weight, &c., of some of the most useful woods indigenous to the North Island of New Zealand.\*

NAME OF PLANT, OR WOOD.		Stiffness.	Strength.	Toughness.	Weight per cubic foot.	Specific Gravity
BOTANICAL NAME.	MAORI NAME.					
<i>Dammara anstralis</i> ..	Kauri .. ..	90	99	102	lbs. oz. 25 8	.403
" .. (best specimen)	" .. ..	"	"	"	26 13	.429
<i>Podocarpus Totara</i> .. ..	Totara .. ..	49	61	57	39 5	.629
<i>Podocarpus daerdyioides</i> ..	Kahikatea ..	54	63	85	31 1	.497
<i>Dacrydium cupressinum</i> ..	Rimu .. ..	90	81	95	34 6	.560
<i>Podocarpus spicata</i> .. ..	Matahi .. ..	73	67	61	..	..
<i>Podocarpus ferruginea</i> ..	Miro .. ..	"	"	"	48 4	.773
<i>Phyllocladus trichomanoides</i>	Tanekaha ..	98	103	124	36 7	.583
<i>Vitex littoralis</i> .. ..	Puriri .. ..	100	100	100	52 5	.837
<i>Leptospermum scoparium</i>	Manuka .. ..	"	"	"	57 9	.921
<i>Metrosideros tomentosa</i> ..	Pohutukawa ..	126	109	94	52 2	.831
<i>Metrosideros robusta</i> ..	Rata .. ..	89	103	138	..	..
<i>Edwardsia grandiflora</i> ..	Kowhai .. ..	"	"	"	43 13	.701
<i>Weinmannia racemosa</i> ..	Towai .. ..	"	"	"	43 6	.674
<i>Weinmannia sylvicola</i> ..	Tawhero .. ..	93	96	99	..	..
<i>Dysoxylum spectabile</i> ..	Kohokoho ..	81	72	60	..	..
<i>Tetranthera calicaris</i> ..	Tangao .. ..	89	119	160	..	..
<i>Knightia excelsa</i> .. ..	Rewarewa ..	54	60	85	53 15	.683
<i>Olea Cunninghamii</i> .. ..	Mairo raunui ..	"	"	"	34 5	.549
<i>Nesodaphne Tawa</i> .. ..	Tawa .. ..	"	"	"	35 4	.561
<i>Nesodaphne Tarairi</i> .. ..	Tarairo .. ..	"	"	"	35 12	.572
<i>Dodonæa viscosa</i> .. ..	Ake .. ..	"	"	"	63 3	1.011
<i>Myrsine australis</i> .. ..	Tipau .. ..	78	92	103	..	..

NOTE.—The first 3 columns of figures are from the "Church Almanac" for 1847; in which *Vitex littoralis* was made the standard of comparison.—The last 2 columns are from W. W. Saunders's Catalogue, in "Report of Juries," Exhibition, 1851.

\* See, "The Results of a Series of Experiments on the Strength of New Zealand and other Colonial Woods; by James M. Balfour, C.E.; Appendix C, JULIUS' REPORTS of the New Zealand Exhibition, 1865."

## A COMPARATIVE TABLE OF WEIGHT AND SPECIFIC GRAVITY.

NAME OF WOOD.	WEIGHT PER CUBIC FOOT.	SPECIFIC GRAVITY.	REMARKS.
English Oak .. .. .	lbs. oz. 40 14	.654	Epping.
Do. .. .. .	39 0	.625	Sussex.
Do. .. .. .	40 10	.714	Wandsworth.
American Oak .. .. .	42 9	.681	
English Beech .. .. .	41 2	.658	From Oxfordshire.
Do. .. .. .	27 6	.488	From Epping.
Riga Fir .. .. .	37 10	.602	
Malabar Teak .. .. .	37 14	.606	
Ceylon Teak .. .. .	47 3	.755	

P.S.—The writer of this Essay wishes to return his best thanks to those few gentlemen who so kindly and promptly responded to his appeal to them. He would most particularly thank His Honor the Superintendent of Auckland (Robert Graham, Esq.,) and the Chief Provincial Surveyor of that Province, (C. Heaphy, Esq.); also the gentlemen composing the Chamber of Commerce at Wellington. To Mr. Heaphy he is largely indebted for much useful information in Colonial Economic Botany, as well as for that portion of the First Table containing the Weight and Specific Gravity of Woods, and the whole of the last Table herein given.

W. C.

Napier, New Zealand,  
October 26, 1864.

