ART. XXXIX.—*On the large Number of Species of Ferns noticed in a small Area in the New Zealand Forests, in the Seventy-mile Bush, between Norsewood and Danneverke, in the Provincial District of Hawke's Bay.* By. W. COLENSO, F.L.S.

[*Read before the Hawke's Bay Philosophical Institute, 8th May*, 1882.]

OUR adopted country, the colony of New Zealand, has long borne a great name for its Ferns, owing, perhaps, as much to their being everywhere so common (exclusive of the ubiquitous brake fern, *Pteris esculenta*), from the lowest level on the sea-shore, its rocks and cliffs, up to nearly the highest point of vegetation on the alpine ranges,—as to their large number of genera or of species; although the surpassing beauty and novelty of some of them have justly served to raise their fame. In respect to their number of species, New Zealand is very far ahead of our British Islands, which only contain 48 species of true ferns; but then this truly natural order is but poorly represented in Europe. On the other hand, the neighbouring larger Australian colonies contain nearly twice the number of species hitherto found in this colony. In their natural state, the open plains and hills of New Zealand were almost everywhere covered with the common rusty-looking *Pteris esculenta;* and the woods were filled with numerous species and genera, not merely terrestrial, growing on the ground like other plants, and including several fine and famed arborescent species (commonly called tree-ferns), but also a good number of epiphytical ones, only found growing on trees, and then only in the deepest umbrageous and damp recesses of the forest; there, alike protected from winds and heat, and unvisited by animal ravagers in the shape of cattle, they flourished in charming profusion.

According to Dr. Sir Jos. Hooker's "Handbook of the New Zealand Flora," there were, at the time of its publication (in 1864), 120 species of ferns (exclusive of varieties) found in New Zealand, belonging to 31 genera. Of those 120 species, 5 should be deducted, as having been only hitherto detected in the off-lying islets in what is called the New Zealand botanical region, viz., the Auckland, Campbell's, Lord Howe's, and Kermadec Islands; thus leaving 115 species described in the "Handbook" as pertaining to New Zealand proper.

During the last few years I have made a practice of visiting the woods and forests of this district several times in the year, and on each visit have become more and more impressed with the almost unlimited resources of bountiful Nature—especially in her botanical productions, and particularly in what is called her lower forms, viz., of Cryptogams. It would require a series of papers, and that from far abler pens than mine, to give a mere list

of her manifold beautiful treasures in the natural orders of *Musci*, *Hepaticæ*, *Lichenes*, and *Fungi*, with which our New Zealand forests everywhere teem, not a few of which are still unknown to science; although a large number of them have already been published by Dr. Hooker in the "Flora Novæ Zealandiæ," and in the later work above-mentioned, and some others since in several of the later volumes of the "Transactions of the New Zealand Institute."

It has ever been a pleasing thought with me to consider what great, what new, what expansive ever-growing delight awaits the future generation of zealous nature-loving New Zealand naturalists in this particular branch of natural science. When the Mosses, the Liverworts, the Lichens, the Fungi, and the Algæ (including the invisible Desmideæ) of New Zealand shall have been, in the course of future years, discovered and drawn and accurately described,—much as similar botanical research and work has been done in our fatherland,—in the Hepaticæ of Sir W. Hooker ("British Jungermanniæ," and in "Musci Exotici"), and of Mitten; the Bryologia of Wilson; the Lichens of Babington, Lauder-Lindsay, and Leighton; the Fungi of Berkeley, Greville, and Cooke; the Marine Algæ of Professor Harvey; the Fresh-water Algæ of Hassall; and the Desmideæ of Ralfs*;—when this is all accomplished, as it ought to be under the increasing light of science (and so done it will be), then the generation of that day, and subsequent ones, will have much, very much, to be thankful for and to admire.

On the present occasion, however, I shall strictly confine my few remarks to some of the ferns of those woods, which, on various visits of mine thither, have caught and rivetted my attention.

In one spot in particular, deeply secluded in the quiet recesses of the grand old forest,—(a spot very dear to me! one which I have almost invariably visited several times, and every time with increasing delight, on each of my journeys inland),—I have repeatedly noticed and pleasingly contemplated a large number of species of ferns; more than I had ever seen growing together in all my wanderings in New Zealand; and all, too, flourishing luxuriantly. Within this circumscribed area of, say, one-eighth of a mile each way, or even less, I have found 48 species of ferns, and more,† belonging to 15 genera; or nearly half of the number given in the "Handbook" as being inhabitants of New Zealand proper. This, as I take it, is

* I am well aware of what has been so largely and efficiently done in all those natural orders by many eminent continental cryptogamists, as Schimper, C. Müeller, Hedwig, and Schwœgrichen, Gottsche, Lindenberg, and Nees, Acharius, Fee, and Nylander, Fries, Corda, and Tulasne, Agardh, and Kutzing, and others; but I have purposely confined my remarks to British cryptogamic botanists.

† *Vide infra*, including the lately-discovered *new* species.

surprising, bearing in mind that several of our described ferns are, as far as is known at present, particularly local; some species, indeed, having been only detected in one or two places, and there scarce; while others are chiefly confined to the South Island. Of all those rarer ones I give here a brief list, setting them down pretty nearly in the sequence of their scarcity, or of their little-known habitats.

Gymnogramme rutæfolia.
Nephrolepis tuberosa.
Todea africana.
Adiantum formosum.
Loxsoma cunninghamii.
Aspidium ocellatum.
,, *cystostegia.*
Nephrodium molle.
,, *thelypteris* var. *squamulosum.*
Asplenium richardi.
Cystopteris fragilis.
Lomaria pumila.
,, *fraseri.*
Trichomanes malingii.
Hymenophyllum minimum.
,, *lyallii.*
,, *unilaterale.*
Marattia salicina, and
Alsophila colensoi (in the North Island).

And this is still the more surprising (as we shall see) when we consider the entire absence from this small limited locality of some genera more or less common to different places in New Zealand which are not included in the above list—viz., *Gleichenia*, *Lindsæa*, *Cheilanthes*, *Doodia*, *Nothochlæna*, *Lygodium*, *Schizæa*, *Ophioglossum*, and *Botrychium;* of these nine genera half of them have but one species each (in New Zealand), and of the former brief list, six genera, also, each contain but one New Zealand species; so that, of the whole number of absent genera from that one locality (fifteen), no less than eleven contain only one New Zealand species each.

And here I may be permitted briefly to mention, for the especial benefit of my lady and young hearers, and also of strangers (if any) who have not yet realized the great advantages of diving into the depths of our New Zealand forests,—that to see our ferns in all their natural beauty, they should be visited in their cool sequestered retreats and bowers and grots at *two* seasons of the year, namely, in the spring and early summer, and in the autumn verging into winter. At the *first* of these two seasons many of them

will be found elegantly evolving their delicate new circinnate fronds,—the consummate grace and beauty of which no pen can adequately describe; while at the *second*, their mature fronds will generally be found loaded with fruit, all curiously and variously yet methodically arranged, according to their several natural genera. At the same time, I should observe, this natural evolution, perennial growing, and display, is, in some damp and suitable woods and spots, almost ever recurring.

And just as it is often with us in towns on especial occasions of meeting, —in the grave senate and in religious assemblies, as well as in the lighter ones of the concert, the ballroom, and the theatre,—the accessories, the environment, when in good taste and keeping, add much grace to the scene, the place, and the proceedings,—so it is at those two natural seasons I have mentioned. Nature must be seen in her various dresses, as well as in her different moods, to be fully appreciated. I well know that the mind only sees what the mind brings; or, in other words, it is the *feeling* that teaches or evokes the *true seeing;* for, whoever possesses the heart to feel will also have the eye to see. Bryant, an American poet, has a beautiful and truthful sentence (among many others) in the opening of his poem *Thanatopsis*, highly appropriate here—one that I have often thought on and repeated* (*solus*):

> "To him who, in the love of Nature, holds
> Communion with her visible forms, she speaks
> A various language."

I trust, however, to point out to you in a few short imperfect sentences, a little of what there—in those woods, in that great temple of Nature, and in that loved spot in particular of which I have spoken—are the principal and more striking botanical aids, and charms and draperies, pertaining to and surrounding that lovely natural fernery.

First, then, I should tell you there is a large open space in the forest, of an oblong or an irregular oval shape, sheltered from all high winds; the centre of this oval is pretty clear of trees, save two or three large and

* I may be permitted to make a brief allusion to my own invariable mode of acting on revisiting those grand old woods, where fancy leads me to imagine that the trees and plants, ferns, mosses, and flowers both recognize and smilingly welcome me. Although in my saying this I lay myself open to be laughed at rather than to be followed, "wearing my heart upon my sleeve for daws to peck at," I take off my hat and salute them feelingly, aud so again on leaving them for the last time. I also take care not wantonly to break off or pull up to cast aside any specimens, and always tread carefully among the lovely ferns, mosses, etc. Feelings of a similar nature must have possessed the ancient Greeks, as well as the ancient New Zealanders, who always made a deprecatory speech, addressed to the guardians (or *genius loci*) of those grand old unfrequented woods, whenever they entered them to fell a tree for a canoe or any particular purpose.

ancient pines, whose huge and irregularly-buttressed trunks, and high, ridgy, uneven, and grotesque roots, all thickly dressed in climbing feathery ferns and other plants, add to the picturesque beauty of the scene. Here and there also, in the centre and in the foreground, scattered in clumps and standing singly, are several handsome tree-ferns, while the larger herbaceous ferns prominently show themselves in big tufts and masses, with the smaller ones growing thickly among them, and, as it were, under their sheltering wings. This is a very brief outline of the centre of that pleasing natural garden. It is not often that such a large and clear open space is to be met with in the midst of a thick forest. I daresay in that small piece of ground there are more than a hundred tree-ferns of nearly all sizes; some, as I said before, in the midst, and some intermixed among the trees and shrubs around it.

In the spring-summer season, in great plenty in the fore-back-ground, growing with the tree-ferns, that truly handsome shrub or small tree *Aristotelia racemosa*, is found in flower; this is one of the elegant trees of New Zealand, in its fine airy shape, in its variously coloured leaves, and in its profusion of lovely flowers, which, like the leaves, all vary in their tints and colours. With it also grow those three handsome small trees of the *Pittosporum* genus (*P. tenuifolium*, *colensoi*, and *eugenioides*), with their fancy-coloured elegant glistening leaves and dark purple blossoms; and with them fine old plants of the New Zealand *Fuchsia* (*F. excorticata*), which here attain to a large size, with their numerous variegated blossoms set off to advantage by their drooping silvery-lined foliage; with here and there among them that particularly healthy-looking shining green-leaved small tree *Drimys axillaris*, one of the gems of the shaded secluded forest!* Among them also, but more sparingly found, is the graceful twining *Parsonsia* (sps.), climbing and rambling over the lower shrubs and bushes, with its slender, nodding sprays of cream-coloured blossoms. Behind all those, in the back-ground, and towering far above them, are the taller trees of *Plagianthus*, *Elæocarpus*, *Alectryon*, and *Knightia*, all differing largely in the forms and hues of their foliage, and all bearing in profusion their showy and curious flowers; while all around, standing out, as it were, in bold *alto-relievo*, and often rendered doubly conspicuous by their clean white bark displayed in large patches, are stately robust trees of *Weinmannia racemosa*, bearing their

* I don't know if any colonist (whether private gentleman or horticulturist), being an admirer of elegant and handsome shrubs, has ever attempted to cultivate this beautiful plant. Indeed, I doubt of its thriving, save in a very shaded, sheltered, and damp shrubbery. The beholding of this tree in its beauty has often served to remind me of the famed Plane-tree on the banks of the Meander, which, on account of its extreme beauty, Xerxes adorned with chains of gold, and assigned it a guard of honour, on his invasion of Greece.—(*Herodotus*, *Polymnia*, § xxxi.)

innumerable fine and drooping racemes of flowers, their long and stout spreading branches frequently descending low down from a great height in graceful curves, after the manner of growth of the horse-chestnut of our English parks; having growing in their topmost forks and branches the curious tufted long-leaved epiphytical plant *Astelia*, somewhat resembling huge crows'-nests, and serving to remind the English observer of a rookery; while from their upper trunks and limbs hang, in long drops and festoons, the handsome and showy species of climbing *Metrosideros* (*M. pendens* and *M. subsimilis*), with their pendent flowering branchlets terminating in beautiful tasselled bunches of white blossoms waving in the air; and still higher up, here and there, as if gazing down from its dark-green bowers, is the Spring Beauty of the Woods! the large-flowered lofty-climbing *Clematis* (*C. indivisa*), whose big white star-like sweet-scented flowers (often 4 inches in diameter), and many together in garlands and festoons high up in the trees by the highway-side in those forests, are the admiration of every traveller in the spring season. And, lastly, (to enumerate no more), on the ground, in the few open spaces between the larger and the tufted-growing ferns, is to be seen that graceful living green-matted plant, *Pratia angulata*, with its profusion of peeping curious snow-white flowers.

I should not, however, omit to tell you something, though briefly, of the many minor beauties of those secluded spots in the deep forests; of the numerous dear little gem-plants of the smaller Cryptogams,—the Mosses, the Liverworts, and the Lichens, which I have already in the beginning of this paper alluded to. For these, by their great number, their densely close compacted manner of growth, and every variety of shape and hue and colour, minute though they severally are, yet, united, form and present a most striking and interesting feature; while closely intermingled among them grow luxuriantly many of the smaller filmy and feathery ferns. The colours of many of them, especially of the Lichens, are both striking and vivid; generally displaying their organs of fructification, and fruits, in profusion, and to very great advantage; and then their elegant structure, so lovely and complex, and yet so simple, on closer examination, is wondrous. To see them on the large trunk of an aged tree, some scores,—or hundreds, it may be,—of those minute plants of many hues and kinds overlying one another, growing on and in each other (stratum super stratum) so that they cannot be separated without pulling them to pieces, and yet all alike living, healthy, and in harmony, where they have been so growing together for many years,—perhaps, in some cases, a century or more,—is both curious and pleasing, and brings strongly to recollection (as do also the bigger ferns and other plants flourishing

around) the modern well-known saying of "the survival of the fittest,"—where, however, *all* seem alike to be fitting. I have often thought, when contemplating a fine and beautiful patch of richly-coloured Cryptogams (like this I have just attempted to describe, or, rather, faintly to outline)—especially on seeing it in all its freshness, just after rain, and with the sun shining on it—that, should the art of fixing colours and hues in perfection by photography ever be attained, such a delightful living picture as this would assuredly early be taken, and excite great admiration, and not unlikely be largely copied in the way of mural house-decoration.

I give up all attempts at describing the few New Zealand birds to be seen there at this early season, although such greatly add to the living beauty of the scene. Prominently among them, if you keep yourself quietly hidden under the thick shrubs, is to be observed to perfection that eminently handsome and musical bird the tuii (*Prosthemadera novæ-zealandiæ*) flitting about from branch to branch in quest of honey, with its shining metallic plumage of many hues glancing in the sun, not unfrequently accompanied by a lively pair of the fan-tail flycatcher (*Rhipidura flabellifera*); and then there is the changing light of the sun itself, peering down through the lofty trees, ever and anon flecked and checquered by the passing summer clouds. One dear little black-and-white very small bird of the size of a canary (*Petroica toitoi*) I must however mention—not because of its great beauty or its song, for it is mute (or, at all events, although I have often seen it, I have never once heard its note), but because of its peculiar habit of inquisitiveness, or something of that nature; for, as sure as I have quietly seated myself to rest awhile or to examine a specimen, this little fellow will suddenly and quietly make his appearance, and hop up from twig to twig quite close, and then sit and watch intently (and with seeming gratification) all my doings. I have sometimes thought that he had previously been narrowly observing all my movements through the forest. At such times, too, queer fancies and old weird stories of the transmigration of souls, etc., come rushing into one's mind, and carry one perforce away with them to far-off thoughts of many things. Altogether it is a scene of surpassing beauty—to be contemplated in order to be well-conceived or believed.

In the later autumnal season all this living environment is changed—just as in our gardens and orchards, our shrubberies and woodlands—yet still beautiful; nature under another aspect—

> "Ever changing, ever new,
> When will the landscape tire the view?"

Now, around, at that same spot, instead of spring flowers we have autumn fruits, and though but small, and not belonging to the edible and useful

class, are, nevertheless, both striking and handsome as to colour; the charming and perennial (I was about to write everlasting) ferns continuing much the same.

First and foremost, at this season, to attract attention, are the hanging panicles of globular rich scarlet-coloured fruits of the twining and lofty climber *Rhipogonum scandens* (the "supplejack" of the colonists), their flowers in the spring season being much too small and neutral-coloured to be easily distinguished; the massy bunches of dark claret-coloured fruits, disposed in large spreading umbels, and half hidden under their still larger dark thick and quaint leaves, of the *Panax* (*P. arboreum*), which small tree also abounds there, are now very conspicuous; the flowers too of this tall shrub were not prominently seen displayed in the spring, for a similar reason with that of the last; the bright orange-coloured berries of the shining-leaved *Drimys axillaris*, always growing together in tiny clusters of three, now show themselves here and there on its coal-black bark branches;* the numerous black woody capsules, like little nuts, of the three *Pittosporum* trees (generally soon splitting broadly open into three equal valves), are now shown to perfection among their light-coloured and semi-translucent leaves; and, when in full fruit, and bursting, the highly curious and showy berries (*axils*) of *Alectryon excelsum*, somewhat resembling a red raspberry with a big glossy black eye in its centre (its seed); while the evergreen flat mat plant below, overrunning the face of the ground, the dear little humble *Pratia angulata*, which so coyly displayed its numerous white flowers in the spring and all through the summer, now shows in their stead its peculiar crowned fleshy carmine-coloured fruits, which, though (like its flowers) modestly half-concealed, will be sure to be quickly detected and noticed.

But I must no longer detain you, but proceed to give the promised list of the ferns I saw in that small plot of ground, which, indeed, is the main subject of my paper, but which alone is, I fear, to some, the driest part of it, unless they happily happen to know the ferns whose names are herein given; some of them, however, I have formerly exhibited here at our ordinary meetings.

* Having mentioned the "coal-black bark" of this pretty tree, I would also give in a note an after-thought (which has occurred to me since I left the forests), viz., that I scarcely recollect ever having seen its trunk and branches bearing any lichens or mosses, where almost all trees and shrubs (not having deciduous bark) bear them thickly in countless profusion: and the same peculiarity, I think, obtains with another small tree possessing piquant bark, viz., *Piper excelsum*. If I am correct in my remark, what is such a bare state, or lack of living drapery, to be attributed to? Can it be owing to the extreme pungency of their barks?

List.

Of *Cyathea*, 3 species—dealbata, medullaris, and smithii.
,, *Dicksonia*, 3 species—squarrosa, fibrosa (? "antarctica," *H.B.K.*), and lanata.
,, *Hymenophyllum*, 10 species—tunbridgense, bivalve, multifidum, javanicum, rarum, dilatatum, polyanthos *var.* sanguinolentum, demissum, scabrum, and flabellatum.
,, *Trichomanes*, 2 species—reniforme and venosum.
,, *Davallia*, 1 species—novæ-zealandiæ.
,, *Adiantum*, 1 species—cunninghamii.
,, *Hypolepis*, 2 species—tenuifolia, and distans.
,, *Pteris*, 4 species—esculenta, tremula, scaberula, and incisa.
,, *Pellæa*, 1 species—rotundifolia.
,, *Lomaria*, 4 species—procera, fluviatilis, lanceolata, and discolor.
,, *Asplenium*, 4 species—lucidum, falcatum, bulbiferum, and flaccidum.
,, *Aspidium*, 3 species—vestitum, richardi, and coriaceum.
,, *Nephrodium*, 2 species—decompositum, and hispidum.
,, *Polypodium*, 7 species—grammitis, rugulosum, pennigerum, rupestre, tenellum, pustulatum, and billardieri.
,, *Leptopteris* (or *Todea*), 1 species—hymenophylloides.

Total, 48 species of those published in the "Handbook."

Subsequently, 5 additional species (and one marked variety), all belonging to 4 of those same genera, have been discovered in that same small area of woodland by me, and described in the Trans. N.Z. Inst., vols. xi. and xii., viz. :—

*Cyathea polyneuron.**

* As I was writing, primarily, on the number of those ferns published in the "Handbook N.Z. Flora" which I had found in this one spot, I purposely omitted any reference to this tree-fern (*C. polyneuron*) when remarking on the lovely scenery of that place; this plant being a recent discovery. But this large and graceful fern-tree, with its ample drooping fronds, adds much to the living beauty of that landscape.

One of the prettiest fairy-like scenes I ever saw in our New Zealand woods, I have, on more than one occasion, witnessed, when reclining on the grass under the shade of one of these tree-ferns. It was noon, and the summer sun was high, and the view, on looking up through the interlacing overhanging foliage softly waving in the breeze, was truly enchanting, every vein and veinlet being highly translucent [hence, I had very nearly specifically named it *translucens*], and then the green of its arched fronds was of such a delicate hue, such a truly sparkling living green without a blemish. The finely-marked ever-changing traceries, and glints and gleams of vertical sun-light peering down through the many myriad veins in that living bower, on those occasions, were far beyond language! At such times one no longer wonders at our forefathers deeming those evergreen recesses and bowers to be the beloved haunts of wood nymphs and dryads, fays, fairies, and pixies —a belief also firmly and pleasingly held by the ancient New Zealander.

Dicksonia sparmanniana.
Hymenophyllum erecto-alatum.
,, *pusillum.*
Trichomanes venustula.

Making in all a gross total of 53 species of ferns found growing together in a very small plot of ground, being several more than the whole number of species of ferns found in the British Islands. And I have good reasons for believing that the following additional species may yet be found there also, as I know they are growing in profusion not far off, viz.,—*Lomaria nigra*, *Polypodium cunninghamii*, *Adiantum diaphanum.*

Of one thing respecting this beautiful and justly-prized order of plants I feel pretty certain, namely,—that there are several still unknown and undiscovered species yet to be found in New Zealand.* For I am yearly becoming more and more convinced of the correctness of my old belief† in the very circumscribed locality of not a few of our New Zealand plants; and, therefore, as the many still unexplored mountains and valleys, forests and plains of New Zealand come to be visited and known,—especially to men of science,—their many botanical novelties will become known also; though I much fear that cattle and fire, and introduced plants, will certainly destroy many. Such, indeed, has been the case here already in not a few places in Hawke's Bay.

Art. XL.—*Descriptions of a few new Indigenous Plants.*

By W. Colenso, F.L.S.

(*Read before the Hawke's Bay Philosophical Institute, 9th October*, 1882.)

Class I. Dicotyledons.

Order XXII.‡ LEGUMINOSÆ.

Genus 1. **Carmichælia,** *Br.*

Carmichælia corrugata, sp. nov.

An exceedingly small glabrous *shrub*, 2–3 inches high; *branches* leafless, 1–2 inches long, 1 line wide, mostly simple, rarely forked, flat, linear, obtuse, striated (almost ridged) and grooved longitudinally, slightly flexuous,

* As a further proof, I may here mention that I have this year detected four new species of ferns,—two of them being also tree-ferns,—in another unfrequented portion of these grand old forests, some ten miles south of this spot; of which a full description will be given in a future paper.

† See "Trans. N.Z. Institute," vol. i.,—Essay "On the Botany of the North Island of New Zealand," §§ 14, 22.

‡ The numbers here attached to both orders and genera are those of "The Handbook of the New Zealand Flora."