

Fig. 3. Panicle in a more advanced state, showing the shortly stalked pendulous unripe fruit.

Fig. 4. Side view of a flower separated from the axis, showing double perianth.

Fig. 5. Fully expanded flower, as seen from above,—showing 6 parts of the perianth, 6 stamens with thickened filaments, and 3 stigmas.

Fig. 6. Longitudinal section of young pistil.

Fig. 7. Longitudinal section of pistil in more advanced state.

Fig. 8. Side view of nearly matured triangular fruit.

The Flowering Plants of New Zealand, and their Relation to the Insect Fauna. By GEORGE M. THOMSON, F.L.S. Communicated by Professor BALFOUR.

(Read 8th July 1880.)

The problems which meet the student of nature in New Zealand, and demand solution at his hands, if he would know the why and the wherefore of the most common things he sees around him, are very numerous and varied.

The total absence in these islands of terrestrial mammals, the former occurrence of their peculiar wingless birds, the singular forms which now occur among the birds and reptiles, and the poverty of some very commonly distributed forms of other animals, have often been remarked and commented upon. Among other singular features which have been noticed are the want of brilliantly-coloured flowers, of sweet-scented flowers, and of insect life. I am of opinion, however, that in regard to these three latter points, which are necessarily related together, a certain amount of misconception prevails, and that the fact of the statements which have given rise to this misconception having been made by eminent authorities, has led to their not being sufficiently examined into. I have in the course of my botanical rambles in Otago been brought face to face with so many instances of insect fertilisation among flowers, that I came at last to think that there must be some error in the commonly received opinion, and it is in the hope of throwing a little more light on the subject that I now pen these few remarks.

By way of preface, I will quote a couple of passages from Mr A. R. Wallace's work on the "Geographical Distribution of Animals," which may be taken as expressing the

latest and the current opinion on the subject. He says (vol. i. p. 462): "It is a striking confirmation on a large scale, of Mr Darwin's beautiful theory—that the gay colours of flowers have mostly, or perhaps, wholly been produced, in order to attract insects which aid in their fertilisation—that in New Zealand, where insects are so strikingly deficient in variety, the flora should be almost as strikingly deficient in gaily-coloured blossoms. Of course there are some exceptions, but as a whole, green, inconspicuous, and imperfect flowers prevail, to an extent not to be equalled in any other part of the globe; and affording a marvellous contrast to the general brilliancy of Australian flowers, combined with the abundance and variety of its insect-life. We must remember, too, that the few gay or conspicuous flowering-plants possessed by New Zealand, are almost all of Australian, South American, or European *genera*; the peculiar New Zealand or Antarctic *genera* being almost wholly without conspicuous flowers." A little further on in the same work he adds: "After the preceding paragraphs were written, it occurred to me, that if this reasoning were correct, New Zealand plants ought to be also deficient in scented flowers; because it is a part of the same theory, that the odours of flowers have, like their colours, been developed to attract the insects required to aid in their fertilisation. I therefore at once applied to my friend Dr Hooker, as the highest authority on New Zealand botany; simply asking whether there was any such observed deficiency. His reply was: 'New Zealand plants are remarkably scentless, both in regard to the rarity of scented flowers, of leaves with immersed glands containing essential oils, and of glandular hairs.' There are a few exceptional cases, but these seem even more rare than might be expected, so that the confirmation of theory is very complete."

I have quoted these paragraphs in full, because Mr Wallace, in drawing up his remarks, may be considered to have acquired the fullest and latest information on the subject. While agreeing with the general correctness of his remarks, I think I can point out one or two remarkable features in regard to our Flora and Insect Fauna which have not been noticed before. It is necessary to bear in

mind that Mr Wallace's data, though in the main correct, are necessarily imperfect, for our knowledge of the insect fauna is still very incomplete, and requires a great amount of working up. A comparison of the numbers of insects as given in Mr Wallace's work, and as known now, may prove to be of interest, particularly as showing what orders are collected by visiting naturalists, and have consequently been fairly well worked up.

Mr Wallace gives the number of indigenous species of butterflies as 11, Mr Butler of the British Museum as 15, while Mr Fereday of Christchurch, a local entomologist who is intimately acquainted with the Lepidoptera, enumerates 18 species. Mr Wallace mentions the occurrence of our two hawk-moths *Sphinx Convolvuli* and *Aegeria tipuliformis*, the latter supposed to have been introduced with the currant, but he makes no mention of any other moths. Mr Fereday, however, informs me that many hundred species of these exist, some of which are described in numerous publications, while a still greater number are undescribed. Besides being represented by numerous species, this division of the Lepidoptera is extremely rich in individuals. Their habits, food of caterpillars, &c., are very little known, but there is no mistake about their numbers. They rise from the grass in summer evenings in myriads, and are common at all elevations from sea-level to 6000 feet. Many of our flowers are exclusively fertilised by them, and probably all of them visit flowers for their nectar. It would throw some light on this subject if we could obtain information as to whether these insects are mostly attracted by sight or smell; and also as to the relative lengths of their probosces. As compared with the other orders of insects in New Zealand, Mr Fereday considers the moths to be well represented.

Mr Wallace states the Coleoptera at 300 species, belonging to about 150 genera. But Captain Broun, who has worked up this branch of the New Zealand Fauna with great care and success, informs me that there are about 1300 species described. Omitting altogether such families as the *Carabidæ*, which are almost all predaceous ground-beetles, the littoral *Dynastidæ*, &c., we find that beetles play a very important part in this country in flower-fertilisa-

tion. I cannot do better than quote here the following extracts from a communication on the subject, which Captain Broun has been good enough to make me. Of "the family *Palpicornes*, two genera, *Hydrobius* and *Philhydrus* consist of water-loving species, as is usual in other countries, but one peculiar New Zealand genus of 6 species (*Rygmobus*) is of quite abnormal habits: one, *R. modestus*, is commonly found on the inflorescence of *Brachyglottis repanda*, *Cordyline Banksii*, &c. It has finely spinous legs, and though somewhat metallic above, is hairy underneath; it undoubtedly plays an important part in the fertilisation of flowers, a remarkable trait in the case of an insect belonging to that family, I think the only instance known to science. Most of the others are rare, and though described by me, were found by other collectors, so that I cannot speak authoritatively as to their habits; I suspect, however, that all frequent plants." "Some two or three species, temporarily located in the genus *Cryptophagus*, frequent *Areca sapida*, but do not, I imagine, affect its seeding." "Of the *Melolonthidæ*, the pretty *Pyronota festiva*, metallic above, hairy below, is found in profusion on the inflorescence of *Leptospermums*. The *Buprestidæ* and *Elateridæ*, about 80 species, are wood-feeders in the larval state, but when perfect insects, occasionally visit flowers. Some of the *Dascillidæ* do so too, in fact nearly all, and must, being hairy, render important services." "All the *Melandryadæ* and *Mordellidæ* frequent flowering shrubs; one insect—*Selenopalpus cyaneus*—is never found away from them, chiefly ti-tree (*Cordyline australis*), but I once noticed numbers of that species on grass in bloom. The *Cureulionidæ*, an extensive family, in most cases having scaly or hairy clothing, aid to a great extent the seeding of flowers. The species of *Eugnomus* are very partial to the 'Lawyers' (*Rubus australis*) when in bloom, in fact about 40 species of the group *Eriirhinidæ* may be found on most of the indigenous flowering shrubs. *Apion metrosideros* confines itself almost exclusively to the Pohutukawa (*Metrosideros tomentosa*). *Oropterus coniger* lives entirely on the native *Fuchsia coccinifera*. The *Longicornia* are wood-feeders, but often visit flowers. *Zorion minutum* confines itself almost exclusively to flowers. Some,

but not all the *Phytophaga*, are found on flowering plants. *Arnomus Brouni*, though very rare, is generally found on *Leptospermum*. Eleven species of the genus *Colaspis*, usually found in abundance, frequent the inflorescence of many shrubs." In addition to this valuable information, I am informed by Professor Hutton that "*Lyperobius huttoni* and *Inophlæus inuus*, two large weevils, are only found on spear-grass (*Aciphylla*); and *Cyttalia griseipila* is much more abundant on them than anywhere else. However, I think that *Lyperobius huttoni* lives on the juices of the leaves."

From the foregoing remarks it will be seen that a further acquaintance with the Coleoptera of the colony hardly justifies the statement that they are "strikingly deficient in variety."

In regard to the Hymenoptera, we are still in great ignorance; Mr Wallace states that there are only "a score of species." They certainly are very poorly represented, but as soon as an attempt is made to catalogue them, they will be found to be much more numerous than is supposed. Professor Hutton informs me that there are 10 species of bees, all of which are flower-visitants, and some of them are very abundant in individuals. But there are many other families fairly-well represented, some of which are flower-visitants. He has taken many small species of brightly-coloured *Chalcididae* on flowers, but is of opinion that they visit flowers in search of *Aphis* and other insects in which to lay their eggs.

The Neuroptera, Orthoptera, and Homoptera do not, as far as I am aware, furnish any flower-visitants, and therefore do not need to be considered by me.

The Heteroptera have not been catalogued, and are very scarce according to Mr Wallace; but even of these Professor Hutton assures me that there are many flower-visiting species, among which *Anubis vittatus*, *Rhopalimorpha obscura*, *Nysius Zealandicus*, and *N. huttoni* are very abundant.

Even perhaps if the orders of insects already mentioned were all that were represented in New Zealand, which affected the fertilisation of our flowering plants, we should be compelled to admit that they exercised a considerable

influence. But one of the largest (if not the largest) orders has been omitted, viz., the *Diptera*. This great order has not been mentioned by Mr Wallace, probably because there were not sufficient data to go upon. But, except perhaps the *Coleoptera*, they are apparently better represented here than any other order. This has all along been my own opinion, but in order to satisfy myself on the point, I put a few queries to Professor Hutton, who has given me the following, among other, information on the subject:—"With regard to the *Diptera*, 94 species have been described from New Zealand, and I have added I think 12 more, making 106. But this would have to be reduced to 90 or 95 after allowance is made for synonyms and errors in locality. I think that *Diptera* are very well represented here; I suppose that not more than one-tenth are yet described. I think that they are better represented than any other order." In reply to a second query as to what was known of the flower-frequenting species, he says: "The *Stratiomydæ* and the *Syrphidæ*, both found almost exclusively on flowers, are very abundant in individuals, and well represented in species. So also are some of the flower-frequenting *Acalyptrotæ*."

If now we turn to consider our Flora, we shall learn some interesting facts, many of which, though not absolutely new, I am enabled to state in some detail.

I will not here deal with the whole flora of New Zealand, but confine my remarks to my own observations. These have been made on the flowering plants which I have been able to examine carefully during the last two or three years, but do not include the lower forms of *Monocotyledons*. They are almost all *Otago* plants, and include 232 species, belonging to 132 genera. For reference sake I append a list of these plants, showing the orders to which they belong, and giving, by symbols, a few facts about each. In drawing up such a list, of course degrees of difference cannot well be pointed out, and it must therefore be taken as only approximately correct. Thus, for instance, among *proterandrous* and *proterogynous* flowers, some may have the *dichogamy* only partially developed, as in *Geranium*, while in other genera, such as *Coriaria*, *Nertera*, and *Forstera*, one or other form is so decided, as to

make the plant practically monœcious. Again, in some polygamo-diœcious plants as *Fuchsia*, *Aristolochia*, *Leptospermum*, &c., truly hermaphrodite forms occur; while in others as *Clematis*, *Pimelea*, &c., the flowers are structurally hermaphrodite, but owing to imperfection of one of the sexual whorls, functionally diœcious. With regard to the *Compositæ*, which I have included under the head polygamo-diœcious, most of the flower-heads, as is usual in the order, include both hermaphrodite and pistillate flowers, but in the majority of cases, the former are so distinctly proterandrous, as to be unisexual in function. The following is a summary of my observations:—Of the 262 species referred to, 129 were invariably hermaphrodite, but of these 37 species were so strictly proterandrous, and 10 species so strictly proterogynous, as to be functionally diœcious; 22 species were invariably diœcious (including 14 species of *Coprosma*), and no less than 79 species polygamo-diœcious (including 31 species of *Compositæ*). If then, from the total number observed, we subtract all which are more or less unisexual either structurally or functionally, we shall find that only 82, or a little over 31 per cent., have any chance of being self-fertilised. But even of those, many are so specially contrived, such as the majority of the *Orchideæ*, that even they must be excluded from the list.

Again, out of this total of 262 species, 139 have conspicuous flowers, 83 being conspicuous alone, and 56 by association. These are roughly subdivided as follows:—white, 72 species; yellow, 27 species; greenish, 18 species; red or pink, 11 species; purple or lilac, 9 species; and blue, 2 species. The remaining 123 species are more or less inconspicuous, but even among them are to be found many which are absolutely entomophilous, and depend (as in *Tupeia*) on their fragrance and honey to attract insects.

The total number of species observed to secrete honey was 99, but it is to be remembered that flowers do not contain the nectar at all periods of their development, but that it is produced only at such times as the visits of insects would be of service. I have frequently noticed and recorded that certain flowers produce no honey, and then have come upon these same flowers on a warm, bright day,

and found abundance of nectar. Again, after fertilisation, the secretions of flowers seem to dry up very rapidly, even before the petals begin perceptibly to wither. The number given therefore as meliferous, amounting as it does to nearly 38 per cent., is probably somewhat under the mark.

In regard to scent, the same remarks apply; some flowers which are scentless or nearly so on dull days, becoming perceptibly fragrant when the weather is bright, while others again only emit their fragrance at certain times of the day. I have only recorded 64 species of fragrant flowers, or less than 25 per cent. Here again we may note that the largest and most prominent flowers are destitute of scent, whereas many extremely inconspicuous flowers are over-poweringly fragrant. As far as I can make out, these latter flowers are mostly visited by Diptera, and an interesting question has often occurred to me, to which, however, I cannot obtain trustworthy answers—Is it not the case that the most of the Diptera are attracted by smell and not by sight, but the majority of the flower-loving Coleoptera, Lepidoptera, and Hymenoptera more by sight than by smell?

Of the total number of 262 species, I am certain that 110 are absolutely incapable of self-fertilisation. Of these, 63 are entomophilous, and 47 anemophilous; but of the remaining 152 species, I believe 96 are more or less dependent on insects. Eight species, viz., *Fuchsia excorticata* and *F. procumbens*, *Metrosideros lucida*, *Loranthus Colensoi* and *L. flavidus*, *Clianthus puniceus*, *Sophora tetraptera*, and *Phormium tenax*, are mostly fertilised by birds of the family *Meliphagidæ*, such as the Tui (*Prothemadera*), and Bell-bird (*Anthornis*). These flowers are mostly large and conspicuous, are quite scentless, but produce abundance of honey.

As I have already stated, these plants were all carefully examined by me, and represent only a fraction of all the flowering plants of the colony; but I believe the proportions stated would apply fairly well to the whole flora (if we exclude the *Glumiferæ* among *Monocotyledons*). I have not sufficient knowledge personally of the British flora to draw up any comparisons, nor can I obtain sufficient data from other works—even such as Sir John Lubbock's

“British Wild Flowers in relation to Insects.” Such a comparison would not only be interesting, but would enable us to form a more correct estimate of the relative poverty of our flora and insect fauna, as compared with those of other countries.

Taken as a whole, I think the figures I have given will show that flower-frequenting insects are much more abundant here than is commonly supposed, and that our flowering plants are very largely dependent on their aid for propagation.

The most remarkable feature to my mind is the fact that the Diptera appear to take the place of and carry out the functions performed by the Hymenoptera in other parts of the world. I cannot find that they are anywhere mentioned as aiding in the pollination of plants, but here many flowers are exclusively dependent on them. *Tupcia antarctica*, a mistletoe with small, pale green, very fragrant flowers; *Corysanthes* (3 species), with small purple scentless flowers, always hidden among foliage, and close to the ground; and *Pterostylis* (3 species), with large solitary scentless green flowers, belong to this category, which also includes, I believe, the fragrant, dark green, diœcious flowers of *Astelia nervosa*. It was the attempt to unravel the mode of fertilisation of *Tupcia* which first induced me to examine into this subject. The plant is a good sized parasite, usually growing in the shelter of the bush (forest), removed from the influence of the wind, and with strictly diœcious flowers, which contain a lot of honey. It is frequented by numbers of very small Diptera, which must be attracted by smell, as the flowers are inconspicuous at the distance of a few yards.

The systematic examination of the questions touched on by me has only been commenced in New Zealand, and this contribution of mine is only intended as a preliminary one. In a paper read before the local Institute—but not published yet—I have gone more into detail on this subject.

The occurrence of Heteromorphism among our flowers has hardly been noticed yet. The two species of *Viola* occurring commonly here, viz., *V. filicaulis* and *V. Cunninghamii*, both produce cleistogamic flowers in abundance,

and *Hypericum japonicum* shows a tendency in the same direction. Distinct heterostylism has not yet been pointed out. A form of it occurs in various species of *Pimelea* (and apparently in one or two other plants); but in this case appears to me to be a step towards diœcism (to coin a new word).

In conclusion, I would point out that it is remarkable to what a degree the separation of the sexual functions in the New Zealand Phanerogams is carried out. A reference to the appended table will show this as occurring in *Clematis* (among Ranunculaceæ), *Plagianthus* (Malvaceæ), *Fuchsia* (Onagraceæ), and *Leptospermum* (Myrtaceæ), all orders characterised as a rule by hermaphrodite flowers. In some genera as *Fuchsia* and *Pimelea*, &c., I believe we can see the changes towards absolute separation now going on.

List of Plants mostly found near Dunedin, New Zealand, on which the observations and results recorded in this paper were made during the summers of 1877–80 inclusive.

Explanation.—Under the heading *Conspicuous Flowers*, 1 stands for very large blossoms 2 inches in diameter (or length), 2 for flowers about an inch, and 3 for flowers of $\frac{1}{2}$ inch or thereabouts. The same numbers are employed for those blossoms which are conspicuous by association, and sometimes a flower is marked as occurring in both columns, when the blossoms are individually large, and are also associated into prominent masses. Proterandrous hermaphrodite flowers = p.a — proterogynous = p.g.

	Always Hermaphrodite.	Always Diœcious.	Polygamo- Diœcious.	Conspicuous Alone.	Conspicuous by Association.	Inconspicuous Solitary.	Inconspicuous Clustered.	Absolutely Entomophilous.	Absolutely Anemophilous.	Colour.	Observed to have Honey.	Sweet-scented.	Incapable of Self-fertilisation.
<i>Ranunculaceæ.</i>													
<i>Clematis indivisa</i>, . . . . .	...	...	†	† 1	† 1	...	...	†	...	white	...	...	†
<i>hexasepala</i>, . . . . .	...	...	†	† 2	† 1	...	...	†	...	white	...	...	†
<i>fœtida</i>, . . . . .	...	...	†	† 3	† 1	...	...	†	...	yel.-gr.	...	†	†
<i>Ranunculus Sinclairii</i> ,	† p.a.	...	...	† 3	...	...	...	...	...	yellow	†	...	...
<i>plebeius</i> ,	† p.a.	...	...	† 3	...	...	...	...	...	yellow	†	...	...
<i>lappaceus</i> ,	† p.a.	...	...	† 3	...	...	...	...	...	yellow	†	...	...
<i>macropus</i> ,	† p.a.	...	...	† 3	...	...	...	...	...	yellow	†	...	...
<i>rivularis</i> ,	† p.a.	...	...	† 3	...	...	...	...	...	yellow	†	...	...
<i>acaulis</i> ,	† p.a.	...	...	† 3	...	...	...	...	...	yellow	†	...	...
<i>Magnoliaceæ.</i>													
<i>Drimys axillaris</i>, . . . . .	†	...	...	...	...	† 3	...	...	...	yel.-gr.	...	...	...
<i>Cruciferaæ.</i>													
<i>Nasturtium palustre</i>, . . . . .	†	...	...	...	...	†	...	...	...	yellow	...	...	...
<i>Sisymbrium Nov.-Zæl.</i>, . . . . .	†	...	...	...	...	†	...	...	...	white	...	...	...
<i>Cardamine hirsuta</i>, . . . . .	†	...	...	† 3?	...	†	...	...	...	white	...	...	...

	Always Hermaphrodite.	Always Dioecious.	Polygamio- Dioecious.	Conspicuous Alone.	Conspicuous by Association.	Inconspicuous Solitary.	Inconspicuous Clustered.	Absolutely Entomophilous.	Absolutely Anemophilous.	Colour.	Observed to have Honey.	Sweet-scented.	Incapable of Self-fertilisation.
<i>Myriophyllum varietifolium</i>.	...	...	†	...	...	†	...	...	†	green	...	...	†
<i>elatinooides</i>.	...	...	†	...	...	†	...	...	†	green	...	...	†
<i>Gunnera monoica</i>.	...	...	†	...	...	...	†	...	...	green	...	...	†
<i>densiflora</i>.	...	...	†	...	...	...	†	...	...	green	...	...	†
<i>Callitriche verna</i>.	...	...	†	...	...	†	...	...	...	...	...	...	†
<i>Myrtaceæ.</i>													
<i>Leptospermum scoparium</i>.	...	...	†	†2	†	...	...	†	...	white	†	†	†
<i>ericoides</i>.	†	...	...	†3	†	...	...	...	...	white	†	†	...
<i>Metrosideros lucida</i>.	†	...	...	†12	†	...	...	...	...	red	†	...	...
<i>hypericifolia</i>.	†	...	...	†3	†	...	...	...	...	red or w.	†	†	...
<i>Myrtus obcordata</i> .	† p.a.	...	...	†3	...	...	...	...	...	white	†	†	...
<i>pedunculata</i> .	† p.a.	...	...	†3	...	...	...	...	...	white	†	†	...
<i>Onagraricæ.</i>													
<i>Fuchsia exorticata</i>.	...	...	†	†2	...	...	...	birds	...	g. & pur.	†	...	†
<i>procumbens</i>.	...	...	†	†3	...	...	...	do.	...	g. & pur.	†	...	†
<i>Epilobium nummularifolium</i>.	†	...	...	...	...	†	...	...	...	white	...	...	...
<i>alsinoides</i>.	†	...	...	†3	...	...	...	...	...	white	...	...	...
<i>rotundifolium</i>.	†	...	...	†3	...	...	...	...	...	white	...	...	...
<i>juncum</i>.	†	...	...	†3	...	...	...	...	...	purple	...	...	...
<i>pubens</i>.	†	...	...	†3	...	...	...	...	...	white	...	...	...
<i>pallidiflorum</i>.	†	...	...	†2	...	...	...	...	...	white	...	...	...
<i>Ficoideæ.</i>													
<i>Mesembryanthemum australe</i>.	...	...	†	†2	...	...	...	...	...	pink	...	...	...
<i>Tetragonia expansa</i> .	† p.g.	...	...	...	...	†	...	...	...	yellow	†	...	...
<i>Umbellifera.</i>													
<i>Hydrocotyle elongata</i>.	†	...	...	...	...	...	†	...	...	green	...	...	...
<i>americana</i>.	†	...	...	...	...	...	†	...	...	green	...	...	...
<i>asiatica</i>.	†	...	...	...	...	...	†	...	...	green	...	...	...
<i>moschata</i>.	†	...	...	...	...	...	†	...	...	green	...	...	...
<i>mucosa</i>.	†	...	...	...	...	...	†	...	...	green	...	...	...
<i>Violaricæ.</i>													
<i>Viola filicaulis</i>.	†	...	...	†3	...	...	...	[†	...	white	†	...	†
<i>Cunninghamii</i>.	†	...	...	†3	...	...	...	†	...	white	†	...	†
<i>Melicytus ramiflorus</i>.	...	...	†	...	†	...	...	†	...	yellow	†	†	†
<i>lanceolatus</i>.	...	...	†	...	†	...	...	†	...	y. & pur.	†	†	†
<i>Pittosporæ.</i>													
<i>Pittosporum tenuifolium</i> .	† p.g.	...	...	†3	...	...	...	...	...	purple	†	...	...
<i>eugenioides</i>.	...	...	†	...	†	...	...	...	...	yellow	†	...	...
<i>Caryophyllæ.</i>													
<i>Stellaria parviflora</i>.	†	...	...	...	...	†	...	...	...	white	...	...	...
<i>Colobanthus subulatus</i>.	†	...	...	...	...	†	...	...	...	green	...	...	...
<i>Portulacæ.</i>													
<i>Claytonia australasica</i> .	† p.a.	...	...	†3	...	...	...	...	...	white	†	...	...
<i>Montia fontana</i>.	†	...	...	...	...	†	...	...	...	white	†	...	...
<i>Hypericicæ.</i>													
<i>Hypericum gramineum</i> .	† p.a.	...	...	†3	...	...	...	...	...	yellow	...	...	...
<i>japonicum</i>.	†	...	...	†3	...	...	...	...	...	yellow	...	...	...
<i>Malvacæ.</i>													
<i>Plagianthus divaricatus</i>	†	†	...	†	...	white	†	†	†
<i>betulinus</i>	†	†	...	†	...	yel.-gr.	†	†	†
<i>Hoheria populnea</i> .	†	†3	white

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<i>Tiliaceæ.</i>													
Aristotelia racemosa,	†	...	†	pink
fruticosa,	†	†	pink
Elæocarpus Hookerianus, . . .	† p.a.	†	gr.-w.	†
<i>Linææ.</i>													
Linum monogynum, . . . . .	†	...	...	† 2	...	...	...	†	...	white	...	...	†
<i>Geraniaceæ.</i>													
Geranium microphyllum, . . .	† p.a.	...	...	† 3	...	...	...	...	...	white	...	...	...
molle,	† p.a.	...	...	† 3	...	...	...	...	...	w. or red	...	...	...
Oxalis magellanica, . . . . .	†	...	...	† 3	...	...	...	†	...	white	...	...	†
corniculata, . . . . .	†	...	...	† 3	...	...	...	†	...	yellow	†	...	†
<i>Rutaceæ.</i>													
Melicope simplex, . . . . .	...	...	†	...	...	†	...	†	...	yel.-gr.	...	†	†
<i>Olacineæ.</i>													
Pennantia corymbosa, . . . . .	...	...	†	...	†	...	...	†	...	white	...	†	†
<i>Rhamnææ.</i>													
Discaria Toumatou, . . . . .	†	...	...	...	...	†	...	†	...	green	†	†	†
<i>Coriariææ.</i>													
Coriaria ruscifolia,	† p.g.	...	...	...	...	†	...	†	...	green	...	...	†
thymifolia, . . . . .	...	...	†	...	...	†	...	†	...	green	...	...	†
angustissima, . . . . .	...	...	†	...	...	†	...	†	...	green	...	...	†
<i>Leguminosæ.</i>													
Carmichaelia flagelliformis, . .	† p.a.	...	...	...	...	†	...	...	...	w. & pur.	†	†	...
Clianthus puniceus,	† p.a.	...	...	† 1	†	...	...	...	...	red	†	...	...
Sophora tetraptera, . . . . .	†	...	...	† 2	†	...	...	...	...	yellow	†	...	...
<i>Rosaceæ.</i>													
Rubus australis, . . . . .	...	...	†	† 2	†	...	...	†	...	white	†	†	†
Potentilla anserina, . . . . .	†	...	...	† 2	...	...	...	...	...	yellow	†	†	...
Acæna Sanguisorbæ,	† p.g.	...	...	...	...	†	...	†	...	green	...	...	†
<i>Saxifrageæ.</i>													
Donatia Novæ-Zælandiæ, . . .	†	...	...	† 3	†	...	...	...	...	white	...	...	...
Carpodetus serratus,	† p.a.	...	...	† 3	†	...	...	†	...	white	†	†	†
Weinmannia racemosa, . . . . .	†	...	...	...	†	...	...	...	...	lilac	†	†	...
<i>Crassulaceæ.</i>													
Tillæa moschata,	† p.a.	...	...	...	...	†	...	...	...	white	†	†	...
<i>Halorageæ.</i>													
Haloragis depressa, . . . . .	...	...	†	...	...	†	...	...	†	green	...	...	†
micrantha, . . . . .	...	...	†	...	...	†	...	...	†	green	...	...	†
Pozoa trifoliolata, . . . . .	†	...	...	...	...	†	...	...	...	green	...	...	...
Crantzia lineata, . . . . .	†	...	...	...	...	†	...	...	...	green	...	...	...
Apium australe, . . . . .	†	...	...	...	...	†	...	...	...	white	†	†	...
filiforme, . . . . .	†	...	...	...	...	†	...	...	...	white	†	†	...
Oreomyrrhis ramosa, . . . . .	†	...	...	...	...	†	...	...	...	green	...	...	...
Aciphylla squarrosa, . . . . .	...	†	...	...	...	...	...	†	...	yellow	†	†	†
Colensoi, . . . . .	...	†	...	...	...	...	...	†	...	yellow	†	†	†
Ligusticum intermedium, . . .	...	†	...	...	...	...	...	†	...	yellow	†	†	†
aromaticum, . . . . .	...	†	...	...	...	...	...	†	...	wh. gr.	†	†	...
Angelica Gingidium, . . . . .	...	†	...	...	...	...	...	†	...	white	†	†	†
Geniculata, . . . . .	...	†	...	...	...	...	...	†	...	white	†	†	†
Daucus brachiatus, . . . . .	†	...	...	...	...	†	...	...	...	red	...	...	...

	Always Hermaphroditic.	Always Dioecious.	Polygamo- Dioecious.	Conspicuous Alone.	Conspicuous by Association.	Inconspicuous Solitary.	Inconspicuous Clust'ered.	Absolutely Entomophilous.	Absolutely Anemophilous.	Colour.	Observed to have Honey.	Sweet-scented.	Incapable of Self-fertilisation.
<i>Araliaceæ.</i>													
<i>Stilbocarpa polaris</i> ,	†	...	†	†	...	yel.-gr.	...	...	†
<i>Panax simplex</i> ,	†	...	†	†	...	green	†	†	†
<i>Edgerleyi</i> ,	†	...	†	†	...	green	†	†	†
<i>crassifolium</i> ,	†	...	†	†	...	green	†	†	†
<i>Colensoi</i> ,	†	...	†	†	...	green	†	†	†
<i>Schefflera digitata</i> ,	†	...	†	†	...	green	†	†	†
<i>Corneæ.</i>													
<i>Griselinia littoralis</i> ,	†	†	...	†	green	†	†	†
<i>Corokia Cotoneaster</i> ,	†	† 3	...	...	...	...	...	yellow	†	†	...
<i>Loranthaceæ.</i>													
<i>Loranthus Colensoi</i> ,	†	† 1	†	...	...	...	...	red	...	...	...
<i>flavidus</i> ,	†	† 3	†	...	...	...	...	yellow	...	...	...
<i>micranthus</i> ,	†	†	green	...	†	...
<i>Tupeia antarctica</i> ,	†	†	green	...	†	†
<i>Viscum Lindsayi</i> ,	†	†	...	†	...	†	†	...
<i>salicornioides</i> ,	†	†	...	†
<i>Rubiaceæ.</i>													
<i>Coprosma lucida</i> ,	†	†	...	†	green	...	...	†
<i>robusta</i> ,	†	†	green	...	...	†
<i>Cunninghamii</i> ,	†	†	...	†	green	...	...	†
<i>rotundifolia</i> ,	†	†	...	†	green	...	...	†
<i>tenuicaulis</i> ,	†	†	green	...	...	†
<i>rhamnoides</i> ,	†	†	...	†	green	...	...	†
<i>divaricata</i> ,	†	†	green	...	...	†
<i>parviflora</i> ,	†	†	...	†	green	...	...	†
<i>virescens</i> ,	†	†	...	†	green	...	...	†
<i>propinqua</i> ,	†	†	green	...	...	†
<i>fetidissima</i> ,	†	†	...	†	green	...	...	†
<i>acerosa</i> ,	†	†	...	†	green	...	...	†
<i>linariifolia</i> ,	†	†	green	...	...	†
<i>repens</i> ,	†	†	green	...	...	†
<i>Nertera depressa</i> ,	† p.g.	...	...	...	...	...	†	...	†	green	...	...	†
<i>dichondræfolia</i> ,	† p.g.	...	...	...	...	...	...	...	†	green	...	...	†
<i>setulosa</i> ,	† p.g.	...	...	...	...	...	...	...	†	green	...	...	†
<i>Galium umbrosum</i> ,	†	white	†	...	...
<i>Asperula perpusilla</i> ,	†	white	†	...	...
<i>Compositæ.</i>													
<i>Olearia nitida</i> ,	†	...	† 1	...	...	...	...	white	...	†	...
<i>dentata</i> ,	†	...	† 2	...	...	...	...	white	...	†	...
<i>ilicifolia</i> ,	†	...	† 3	...	...	...	...	white	...	†	...
<i>virgata</i> ,	†	...	† 2	...	...	...	...	white	...	†	...
<i>Hectori</i> ,	†	...	† 3	...	...	...	...	yel.-wh.	...	†	...
<i>Celmisia coriacea</i> ,	†	...	† 1	...	...	...	...	white	†	...	...
<i>longifolia</i> ,	†	...	† 2	...	...	...	...	white	†	†	...
<i>Hectori</i> ,	†	...	† 1	...	...	...	...	white	†	...	...
<i>sessiliflora</i> ,	†	...	† 1	...	...	...	...	white	†	...	...
<i>Vittadinia australis</i> ,	†	...	† 3	...	...	...	...	white	...	†	...
<i>Lagenophora Forsteri</i> ,	†	...	† 3	...	...	...	...	white	...	...	...
<i>Cotula coronopifolia</i> ,	†	...	† 3	...	...	...	...	yellow	...	...	...
<i>dioica</i> ,	†	†	green	...	...	...
<i>Cassinia fulvida</i> ,	†	...	† 3	...	...	...	...	white	...	†	...
<i>Ozothamnus glomeratus</i> ,	†	...	† 3	...	...	...	...	white	...	†	...
<i>Gnaphalium trinerve</i> ,	†	...	† 3	...	...	...	...	white	...	†	...
<i>bellidioides</i> ,	†	...	† 3	...	...	...	...	white	...	†	...
<i>filicaule</i> ,	†	†
<i>luteo-album</i> ,	†	†
<i>involutum</i> ,	†	†
<i>Erechtites arguta</i> ,	†	green
<i>prenanthoides</i> ,	†	green
<i>scaberula</i> ,	†	†	green
<i>glabrescens</i> ,	†	†	green

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<i>Senecio bellidioides</i> ,	†	...	† 2	yellow
<i>lautus</i> ,	†	...	† 2	yellow
<i>Lyallii</i> ,	†	...	† 2	yellow
<i>rotundifolius</i> ,	†	...	† 1	gr.-yel.	†	†	...
<i>Microseris Forsteri</i>, . . .	...	...	†	...	† 3	...	...	...	...	yellow	...	...	...
<i>Taraxacum deus-leonis</i>, . . .	...	...	†	...	† 3	...	...	...	...	yellow	†	...	...
<i>Sonchus oleraceus</i>, . . .	...	...	†	...	...	...	†	...	...	yel.-gr.	...	...	...
<i>Stylidiæ.</i>													
<i>Forstera sedifolia</i> , . . .	† p.a.	ov.	†	† 3	...	...	...	†	...	white	†	...	†
<i>Helophyllum clavigerum</i> , . . .	† p.a.	...	...	† 3	†	...	...	†	...	white	†	...	†
<i>Stylidium graminifolium</i> , . . .	† p.a.	...	...	† 3	...	...	...	†	...	white	...	...	†
<i>Campanulacæ.</i>													
<i>Wahlenbergia gracilis</i> , . . .	† p.a.	...	...	† 3	...	...	...	†	...	white	†	...	†
<i>saxicola</i> , . . .	† p.a.	...	...	† 3	...	...	...	†	...	white	†	...	†
<i>Pratia angulata</i> , . . .	† p.a.	...	...	† 3	...	...	...	†	...	white	†	...	†
<i>Selliera radicans</i> , . . .	† p.a.	...	...	† 3	...	...	...	†	...	white	†	...	†
<i>Ericæ.</i>													
<i>Gaultheria antipoda</i>, . . .	...	...	†	† 3	...	...	...	†	...	white	†	...	†
<i>rupestris</i>, . . .	...	...	†	† 3	†	...	...	†	...	white	†	...	†
<i>Epacridæ.</i>													
<i>Cyathodes acerosa</i> , . . .	† p.a.	...	...	...	...	†	...	...	...	white	†	...	...
<i>empetrifolia</i> , . . .	† p.a.	...	...	...	...	†	...	...	...	white	†	...	...
<i>Leucopogon Frazeri</i>, . . .	†	...	...	† 3	...	...	...	†	...	white	†	†	†
<i>Pentachondra pumila</i>, . . .	†	...	...	...	...	†	...	†	...	white	†	...	†
<i>Dracophyllum longifolium</i>, . . .	†	...	...	† 3	†	...	...	...	...	white	†	†	...
<i>rosmarinifolium</i>, . . .	†	...	...	† 3	...	...	...	...	...	white	†	†	...
<i>muscoides</i>, . . .	†	...	...	† 3	...	...	...	...	...	white	†	†	...
<i>Myrsinæ.</i>													
<i>Myrsine Urvillei</i>, . . .	...	...	†	...	...	†	...	...	†	...	...	...	†
<i>Apocynæ.</i>													
<i>Parsonsia albiflora</i>, . . .	†	...	...	...	†	...	...	...	...	white	†	†	...
<i>Gentianæ.</i>													
<i>Gentiana montana</i> , . . .	† p.a.	...	...	† 3	...	...	...	†	...	white	...	...	†
<i>Convolvulacæ.</i>													
<i>Convolvulus Tuguriorum</i>, . . .	†	...	...	† 1	...	...	...	...	...	white	...	...	...
<i>Soldanella</i>, . . .	†	...	...	† 1	...	...	...	...	...	pink	...	...	...
<i>Dichondra repens</i>, . . .	†	...	...	...	...	†	...	...	...	wh.-gr.	...	...	†
<i>Scrophularinæ.</i>													
<i>Veronica salicifolia</i> , . . .	† p.a.	...	...	...	†	...	...	†	...	white	†	†	†
<i>Traversii</i> , . . .	† p.a.	...	...	...	†	...	...	†	...	white	†	...	†
<i>elliptica</i> , . . .	† p.a.	...	...	...	†	...	...	†	...	white	†	†	†
<i>buxifolia</i> , . . .	† p.a.	...	...	...	†	...	...	†	...	white	†	...	†
<i>cataractæ</i> , . . .	† p.a.	...	...	...	†	...	...	†	...	lilac	†	...	†
<i>Lyallii</i> , . . .	† p.a.	...	...	...	†	...	...	†	...	white	†	...	†
<i>Lentibulariæ.</i>													
<i>Utricularia monanthos</i>, . . .	†	...	...	† 3	...	...	...	†	...	purple	...	...	†
<i>Verbenacæ.</i>													
<i>Myoporum lætum</i> , . . .	†	† 3	white	†
<i>Labiata.</i>													
<i>Mentha Cunninghamii</i> , . . .	† p.a.	† 3	white	†	†	...

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<i>Plantagineæ.</i>													
Plantago Raoulii,	† p.g.	†	...	†	green	†
<i>Chenopodiaceæ.</i>													
Chenopodium triandrum,	†	†	...	†	green	†
<i>Polygoneæ.</i>													
Polygonum aviculare, . . . .	†	...	...	...	...	†	...	...	...	pink	...	...	...
Muhlenbeckia adpressa, . . .	...	...	†	...	...	...	†	...	†	green	...	...	†
complexa, . . . .	...	...	†	...	...	...	†	...	†	green	...	...	†
axillaris, . . . .	...	...	†	...	...	...	†	...	†	green	...	...	†
Rumex flexuosus,	† p.a.	...	...	...	...	...	†	...	†	green	...	...	...
neglectus,	† p.a.	...	...	...	...	...	†	...	†	green	...	...	...
<i>Thymeleeæ.</i>													
Pimelea prostrata, . . . .	...	...	†	...	†	...	...	†	...	white	†	†	†
Drapetes Dieffenbachii, . . .	†	...	...	...	...	†	...	...	...	white	...	...	...
<i>Euphorbiaceæ.</i>													
Euphorbia glauca, . . . .	...	...	†	...	...	...	†	...	...	...	†	...	...
<i>Cupuliferæ.</i>													
Fagus Menziesii, . . . .	...	...	†	...	...	...	†	...	†	...	...	...	†
<i>Urticaceæ.</i>													
Urtica incisa, . . . .	...	†	...	...	...	...	†	...	†	...	...	...	†
ferox, . . . .	...	†	...	...	...	...	†	...	†	...	...	...	†
Epicarпус microphyllus, . . .	...	†	...	...	...	...	†	...	†	...	...	...	†
Parietaria debilis, . . . .	...	...	†	...	...	...	†	...	†	...	...	...	†
Australina pusilla, . . . .	...	...	†	...	...	...	†	...	†	...	...	...	†
<i>Orchideæ.</i>													
Earina mucronata, . . . .	†	...	...	...	†	...	...	†	...	yellow	†	†	†
autumnalis, . . . .	†	...	...	...	†	...	...	†	...	white	†	†	†
Dendrobium Cunninghamii, . .	†	...	...	† 2	...	...	...	†	...	white	†	†	†
Sarcochilus adversus, . . . .	†	...	...	...	...	...	†	†	...	green	†	†	†
Corysanthes triloba, . . . .	†	...	...	† 3	...	...	...	†	...	purple	...	...	†
rivularis, . . . .	†	...	...	† 3	...	...	...	†	...	purple	...	...	†
macrantha, . . . .	†	...	...	† 3	...	...	...	†	...	purple	...	...	†
Microtis porrifolia, . . . .	†	...	...	...	...	...	†	...	...	green	...	...	...
Caladenia Lyalli, . . . .	†	...	...	† 3	...	...	...	†	...	pink	†	...	†
minor, . . . .	†	...	...	† 3	...	...	...	†	...	pink	†	...	†
bifolia, . . . .	†	...	...	† 3	...	...	...	†	...	white	†	...	†
Pterostylis Banksii, . . . .	†	...	...	† 2	...	...	...	†	...	green	...	...	†
graminea, . . . .	†	...	...	† 3	...	...	...	†	...	green	...	...	†
foliata, . . . .	†	...	...	† 3	...	...	...	†	...	green	...	...	†
Chiloglottis cornuta, . . . .	†	...	...	† 3	...	...	...	...	...	g. & pur.	...	...	...
Lyperanthus antarcticus, . . .	†	...	...	† 3	...	...	...	...	...	g. & pur.	...	...	...
Thelymitra longifolia, . . . .	†	...	...	† 3	...	...	...	...	...	blue	...	...	...
uniflora, . . . .	†	...	...	† 2	...	...	...	†	...	blue	†	...	...
Prasophyllum Colensoi, . . . .	†	...	...	...	†	...	...	...	...	green	...	†	...
<i>Irideæ.</i>													
Libertia ixioides, . . . .	†	...	...	† 3	...	...	...	...	...	white	†	...	...
micrantha, . . . .	†	...	...	† 3	...	...	...	...	...	white	...	...	...
<i>Naiadeæ.</i>													
Potamogeton natans,	† p.g.	...	...	...	...	...	†	...	†	green	...	...	...
Triglochin triandrum,	† D-g.	...	...	...	...	...	†	...	†	green	...	...	...
<i>Liliaceæ.</i>													
Callixene parviflora, . . . .	†	...	...	† 3	...	...	...	...	...	white	...	...	...
Cordyline australis, . . . .	†	...	...	...	†	...	...	...	...	white	†	†	...
Astelia nervosa, . . . .	...	†	...	...	†	...	...	†	...	green	†	†	†
Anthericum Hookeri, . . . .	†	...	...	† 3	...	...	...	...	...	green	...	...	...
Phormium tenax,	† p.a.	...	...	† 1	†	...	...	...	...	red	†	...	...