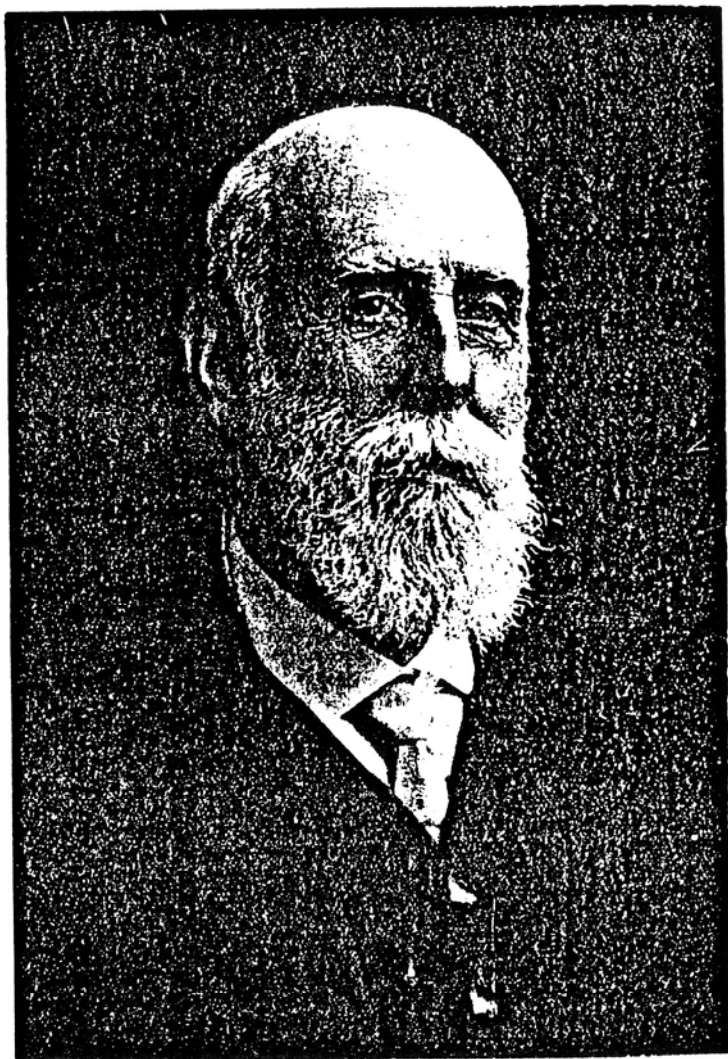


CHEESEMAN  
ON  
ORCHIDS

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ORCHIDS

compiled by Ian St George

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*J. F. Cheeseman*

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**Introduction**

**Thomas Frederic Cheeseman 1846-1923**

Leonard Cockayne wrote Cheeseman's obituary for the New Zealand Institute (*Transactions* 1923. 54: xvii-xix). I can do no better than reproduce it in full here.

By the death of Thomas Frederic Cheeseman on the 15th October, 1923, the New Zealand Institute has lost a highly distinguished Fellow whose name must be added to that select band—Colenso, Kirk, Haast, Hector, and Hutton—who, with himself, working in this country, have laid a lasting foundation on which is being erected the splendid edifice of New Zealand natural history.

Cheeseman, though nominally an Englishman through being born at Hull, in Yorkshire, in 1846, was in reality a New-Zealander, since he came to the colony with his parents when only eight years of age, and was educated first at the Parnell Grammar School and later at St. John's College, Auckland. His father, the Rev. Thomas Cheeseman, was at one time a member of the old Auckland Provincial Council, and took a prominent part in the public life of the day.

It is not easy to say what led Cheeseman to commence a serious study of our flora, but probably the stimulus to a natural bent was Hooker's *Handbook*, together with the founding of the New Zealand Institute. At any rate, by 1872—fifty-one years ago—he had acquired, unaided in any way, so sound a knowledge of the plants of his neighbourhood that he was able to publish an accurate and comprehensive account of the plant-life of the Waitakerei Hills. This paper is far from being obsolete, for it is the sole record of a vegetation which is now profoundly modified.

In 1874 Cheeseman was appointed Secretary of the Auckland Institute and Curator of the Museum, then in its early infancy. How far-reaching for the scientific advancement of New Zealand, and indeed for the general benefit of the country, this apparently unimportant appointment was, no one could possibly foresee; yet it has led to the gathering together of the invaluable collections of the Auckland Museum, and to botanical studies, not academic only, but of high significance for agriculture, horticulture, and forestry. These studies were carried on diligently up to his death, hardly a year having passed without some communication appearing from his pen. Primarily a botanist, he belonged nevertheless to that class of naturalists, common enough before these days of specialization, who took an interest in all branches of natural history. Thus, of his 101 papers and books, twenty-two deal with zoological or ethnological subjects; indeed, it was this wide knowledge which fitted him so eminently for his museum activities.

But it was as a botanist that Cheeseman stood pre-eminent, and it is his work in floristic botany which has made his name widely known in all lands. At the time his researches commenced, the greater part of New Zealand was almost unknown botanically, so that a keen search for plants in all directions was demanded; fresh material was also essential for the accurate study of many species admitted by Hooker. During his vacations, therefore, Cheeseman assiduously sought to remedy this state of affairs, and many were his excursions. The most important communications from his pen on this head concern the Nelson Provincial District, the Kermadec and Three Kings Islands, and the area from Mangonui to the far north; but these by no means reflect all his activities in the field, nor give any idea of the number of species he discovered or specially investigated. All this is better reflected in his *Manual*, wherein are indicated the many localities he visited and the species he described. In some of his excursions he was accompanied by his friend the late Mr. J. Adams, of the Thames High School, and the names *Senecio Adamsii* and *Elytranthe Adamsii*, bestowed by Cheeseman, are a fitting memento of their comradeship.

Cheeseman's explorations were not confined to the New Zealand Botanical Region; he also visited Polynesia, and published in the *Transactions of the Linnean Society* a comprehensive account of the flora of Rarotonga, the chief island of the Cook Group. His general botanical knowledge was wide, especially of systematic botany; he also had the greatest sympathy for other branches of the science, and perceived plainly the present-day trend—for had he not closely watched the botanical development of fifty years' unparalleled activity? Thus, in his own domain, although during the greater part of his career he based his work on the Linnean conception of species, in recent years his opinion changed in no small degree in this regard, and he accepted, or defined, groups of individuals as species which he would previously have merged. In other words, he possessed the true scientific spirit, in that he was open to conviction, and would deliberately follow a new path, even if so doing clashed with his former opinions.

Cheeseman's botanical publications fall into several classes; many, along with the work of others, paved the way for a complete flora of New Zealand. Then there was the actual flora he produced in 1906, entitled *The Manual of the New Zealand Flora*, to which must be added his and Hemsley's *Illustrations of the New Zealand Flora* (1914). Then come his writings of a philosophical character which deal with the origin of the New Zealand subantarctic flora, and an early paper treating of the naturalized plants of the Auckland Provincial District. Finally, amongst his earlier writings also are several papers dealing with the pollination of certain species—a matter then receiving great attention through the influence of Darwin.

There is not space available for a full account of the scope of the above writings; all, even the shortest, were distinguished by those characteristics which their gifted author possessed to an extreme degree—sound judgment, clarity of expression, and accuracy. Above all, he had the supreme gift of infinite patience: all views expressed were the result of much cautious deliberation; the hurried methods of the present day were not

for him. And in this spirit he approached his classic work, *The Manual of the New Zealand Flora*, with the result that it can be used with all confidence in the certain knowledge that it contains the well-considered conclusions of a master mind. As for this flora, it stands out the equal of any of that brilliant series of floras dealing with various parts of the British Empire which were conceived, and in part executed, by Bentham and Hooker.

Hand in hand with his botanical research went on the development of the Auckland Museum, which, during the fifty years of his direction, developed into an institution of high rank, especially distinguished—such was his many-sided knowledge—by what is probably the most extensive collection extant illustrating Maori ethnology. A peculiarly important addition will be Cheeseman's almost complete herbarium of the flowering-plants and vascular cryptogams of the Dominion, which some short time ago he presented to the Auckland Institute—a splendid gift, invaluable for all students of the flora.

To a scientific worker in a far-away corner of the earth honours come slowly. Nevertheless it would have been astonishing had Cheeseman's many claims for recognition been overlooked. For many years New Zealand itself had nothing to offer. Even the University does not honour itself, as do other universities, by conferring degrees upon distinguished men. But Cheeseman was early elected a Fellow of the Linnean Society of London, and, a little later, of the Zoological Society also. But honours far more distinguished came to him—first of all, a Corresponding Membership of the Botanical Society of Edinburgh, and this year one of the highest science can offer, the Gold Linnean Medal of the Linnean Society, a distinction open to zoologists and botanists throughout the world; further, had he lived, he would almost certainly have been elected a Fellow of the Royal Society. Then the New Zealand Institute made him its President in 1911, which is the highest honour a scientific man can attain in the Dominion, and in 1918 he was awarded the Hector Memorial Medal and Prize for his botanical researches, and the succeeding year he was made an original Fellow of the New Zealand Institute.

After all, the gaining of honours is far from being the crown of the gifted man of science: rather is it the admiration of those who best know his work, and, above all, the knowledge that such work is influencing his fellow-workers, old and young. It is indeed difficult to estimate how great has been the influence of Cheeseman upon botanical research in New Zealand. His works must perforce be in the hands of all pursuing studies concerned either with the flora or the vegetation, and must be consulted daily. Nor will this influence lessen with his lamented death; it will vastly increase. Happily, the great botanist lived to round off his life's work—the revised edition of his flora. How greatly do we botanists of this country, if I may speak for my friends and colleagues, rejoice that he had the satisfaction of finishing his task! How greatly do we deplore that he did not live to see his labours materialized, and to receive our acclamation!

He added *Townsonia* to the orchid genera, added a number of new species (*Corybas carsei*, *C.matthewsii*, *Earina aestivalis*, *Thelymitra decora*, *T.matthewsii*), and filed new New Zealand records for a number of other species (*Caleana minor*, *Calochilus robertsonii*, *Chiloglottis formicifera*, *Pterostylis plumosa*, *P.mutica (tristis)*, *P.nutans*, *Thelymitra pauciflora*). The second edition of Darwin's *Fertilisation of Orchids* (pp88 and 90), quotes Cheeseman's observations on *Pterostylis alobula* and *Acianthus sinclairii*.

The illustration of *Pterostylis alobula* in his paper on the fertilisation of *Pterostylis* is a lithographic copy by John Buchanan of a watercolour by Cheeseman's sister, Emily (though Buchanan attributed it to Cheeseman himself). The original is part of a collection of her beautiful (and largely unsung, for women were not valued in scientific circles in those days) botanical paintings held in the Auckland Museum and Institute. The *Illustrations of the New Zealand Flora* are lithographs by John Nugent Fitch from pencil drawings by Matilda Smith; the original drawings are also in the Auckland collection.

A second, enlarged, rearranged but not greatly altered edition of the *Manual* was edited by W.R.B.Oliver and published posthumously in 1925.

Reprinted here are excerpts on the New Zealand orchids from his papers in the *Transactions of the New Zealand Institute*, 1871-1915, reproduced with permission from the Royal Society of New Zealand, the section and appendix on orchids from the 1906 *Manual*, the orchid plates and text from his *Illustrations*, and his list of illustrations of the New Zealand orchids published before 1914.

I am grateful to Dan Hatch for his help with the notes.

Ian St George,  
Dunedin. 2 March. 1989

## Cheeseman on orchids

From *On the Botany of the Titirangi District of the Province of Auckland. Transactions of the New Zealand Institute* 1871. 4: 275, 279.

*Corsysanthes Cheesemanii*, Hook. f. As yet I have only noted this in a single locality, but it is probably not uncommon, and overlooked from its small size. One of the earliest of our Orchids, generally seen in flower towards the close of May, and continuing in bloom until the commencement of August.

*Chiloglottis cornuta*, Hook. f. Local. This plant seems to differ from the *C. cornuta* of the "Handbook" in the more numerous glands on the lip, but is referred to that species by Dr. Hooker.

Earina	Microtis
mucronata, Lindl.	porrifolia, Spreng.
autumnalis, Hook. f.	Caladenia
Dendrobium	minor, Hook. f.
Cunninghamii, Lindl.	Pterostylis
Bolbophyllum	Banksii, Br.
pygmæum, Lindl.	graminea, Hook. f.
Sarcochilus	trullifolia, Hook. f.
adversus, Hook. f.	puberula, Hook. f.
Acianthus	Chiloglottis
Sinclairii, Hook. f.	cornuta, Hook. f.
Cyrtostylis	Thelymitra
oblonga, Hook. f.	longifolia, Forst.
rotundifolia, Hook. f.	pulchella, Hook. f.
Corsysanthes	imberbis, Hook. f.
triloba, Hook. f.	Prasopphyllum
oblonga, Hook. f.	pumilum, Hook. f.
rotundifolia? Hook. f.	Orthoceras
rivularis, Hook. f.	Solandri, Lindl.
macrantha, Hook. f.	
Cheesemanii, Hook. f.	

On the Fertilization of the New Zealand forms of  
*Pterostylis*. *Transactions of the New Zealand  
Institute* 1872. 5: 352-7.

PERHAPS the most interesting study connected with the structural peculiarities of Orchids is that of the varying means by which, in the majority of the species, fertilization by insect agency is secured. The wonderful co-adaptation of all the parts of the flower to effect this end, the degree in which organs have become modified to uses widely different from their normal functions, and the general fertility of contrivance exhibited, can never fail to excite our admiration and surprise.

Although none of the New Zealand Orchideæ exhibit a mode of fertilization, founded on such complexity of structure and specialization of parts, as occurs in some of the tropical American and Asiatic genera; and although probably none equal in this respect the British species of *Orchis* and *Ophrys*, yet several kinds present interesting and noteworthy peculiarities. These are so strongly marked in *Pterostylis*, that I have ventured to draw up the following account of my observations on that genus. I have been the more induced to do this from the fact that Mr. Darwin's book "On the Fertilization of Orchids," which is deservedly considered to be the standard work on the subject, does not contain an account of a similar method of fertilization; nor is any species described, included in the sub-order Arethuseæ to which *Pterostylis* belongs.

The genus *Pterostylis* is represented in New Zealand by seven species. Of these, six (*P. banksii*, *P. graminea*, *P. micromega*, *P. foliata*, *P. trullifolia*, and *P. puberula*.) constitute a closely connected series of forms, and seem to present no differences of importance in their fertilization. The seventh species (*P. squamata*) belongs to another section of the genus, and (judging from descriptions) differs in several respects from the others. It is stated in the "Handbook" to have been discovered near Auckland by the late Dr. Sinclair, but I have not been fortunate enough to find it, nor has the plant been seen by any New Zealand botanist of late years. I shall now proceed to describe the mode of fertilization in *P. trullifolia*, the species on which my observations are the most complete. The accompanying illustration (Pl. XX.), containing magnified drawings of the most important parts of the flower, will perhaps cause my meaning to be more easily understood.

The upper sepal and petals connive and form a kind of hood, inclosing and arching over the column. The lateral sepals are placed in front of this

hood, and being united for fully half their length, partially close the entrance to it. The column (see figs. C. and D., and *c.* in fig. B.), is bent backwards at the base, so as to lie close to the upper sepal, with which for some distance it is united; it then becomes erect, and towards the summit is furnished with two broad membranous wings, each of which is extended downwards into a blunt lobe, and upwards into an erect horn-like appendage. The stigma (*s.* in Figs. C. and D.) is a bilobed prominence about the middle of the column. The anther (*a.*, Figs. C. and D.) is terminal, hinged on to the summit of the column, two-celled, the cells opening while the flower is still unexpanded. The pollinia (*p.*, Figs. D. and E.) are four in number, two in each cell, linear in shape. They lie loose in their cells, having no caudicles, and do not become attached to the rostellum. The rostellum (*r.*, in Fig. D.) is an erect, somewhat triangular projection, placed immediately below the anther. Its anterior surface is slightly concave, and consists of a thick mass of highly viscid matter, portions of which can easily be detached.

The lip, consisting of a linear, somewhat fleshy lamina, with a curious curved appendage at its base, is clawed on to the bottom of the lateral sepals by a delicate ribbon-like membrane. It is extremely sensitive, so that, although in its natural position it has its apex exerted between the free points of the lateral sepals (see *l.*, Fig. B.), yet the slightest touch is sufficient to cause it to move quickly up to the column, when it occupies the position shown in Fig. C. On this movement of the lip the fertilization of the plant depends.

If we take a flower, and gently touch the lip, so as to cause it to perform the motion just described, and then examine the position of the parts, we see that each side of the flower is narrowed inwards in a curved line parallel to the position now occupied by the margins of the lip, so that the posterior part of the flower forms a chamber, to which the lip, resting against the wing-like appendages of the column, is a tolerably close fitting door.

Now let us suppose that an insect were to enter a freshly opened flower. The only entrance is between the tips of the lateral sepals, and here the apex of the lip is placed exactly where our visitor would probably alight. At first the weight of the insect would most likely counteract the natural tendency of the lip to move inwards, but as the insect crawls further into the flower, this would have less effect, until at length the irritability of the lip would enable it to overcome the resistance offered, and to spring back to the column. If no capture is made the lip soon regains its former position, but if the insect is imprisoned it remains firmly appressed to the column while its prey continues

to move about. For the prisoner there is now only one mode of escape. This is by crawling up the column, passing over the stigma and viscid rostellum, and finally emerging from between the appendages of the column, directly in front of the anther. This passage, however, is so narrow and confined that it would not be possible for an insect to pass through without brushing against the rostellum, and detaching portions of its viscid surface. If the insect were now to touch the anther, and it is difficult to see how it can escape without doing so, one or more of the pollen-masses, lying loose in their cells, would become glued to the viscid matter on the insect's back, and consequently be withdrawn from the flower. To understand the mode of fertilization we have now only to suppose that the insect, with the pollinia attached to it, visits another flower, and is again imprisoned, when it is evident that in its efforts to escape it would pass over and in front of the stigma, which is sufficiently adhesive, when touched, to draw off a portion of a pollen-mass, or even a whole one, from the back of the insect.

After careful and repeated examinations of living plants, I adopted this view of the fertilization of *P. trullifolia* as the only one explaining the various facts I had collected; but, in order to satisfy myself that the lip really plays the important part I had supposed, I selected twelve flowers which were just expanding, and removed that organ from the whole of them. After a week or two, when they had closed and commenced to wither, I gathered them and examined their stigmas and pollinia. Not one flower was fertilized, and not a single pollen-mass had been removed.

On several occasions I have artificially inclosed small insects in the flower. Most escaped by crawling up the column and passing between the appendages, and some, but not all, carried pollen-masses away with them. It can hardly be expected, however, that insects selected at random would remove the pollinia with the same ease and certainty as the species to whose requirements the flower has no doubt been profoundly modified by natural selection, acting during long periods of time.

Although I have often watched the flowers I have never seen insects directly enter them. It occurred to me, however, that I should be more successful if I were to examine every plant noticed with the lip drawn back against the column. Acting on this idea I soon found three, each inclosing a small dipterous insect. Two of these had no traces of pollen on them, and the flowers were not fertilized. The third was dead, apparently not having been able to find the passage out of its prison. It had the remains of two pollinia attached to its back. The stigma of the flower was also plentifully

covered with pollen, which had evidently been conveyed from another plant, for all four pollen-masses were intact and undisturbed in their cells.

The fact of this insect being unable to effect its escape led me to examine a considerable number of flowers which had commenced to wither, and in which the sepals and petals had closed together, with the view of ascertaining if this circumstance was of frequent occurrence. The results were important. Out of 110 specimens examined seventeen contained dead insects, and nine of these insects bore traces of having had pollen attached to them. Some had followed the passage between the wings of the column until they had reached the anther, and then becoming glued to the pollen-masses had not been able to drag them out of their cells, thus perishing on the threshold of their prison. Many of the flowers which did not inclose insects exhibited signs, besides the removal of the pollinia, of having been visited by them, from the presence of hairs, etc., adhering to the stigma and rostellum; and in one instance the antenna of some insect was found glued to the rostellum, proving that its owner had escaped by crawling through the passage in front of that organ.

All the insects proved to be Diptera, and all are probably referable to one species. I am not, however, entomologist enough to be able to indicate its name. What inducement there is to visit the plants I cannot conjecture, for even with the most careful examination I have not been able to detect the presence of any nectar, or nectar-secreting organs.

The comparatively large number of insects retained in the flowers examined appears at first sight to show a serious imperfection in the contrivances for insuring fertilization, as it is evident that it is a loss to the plant when its visitor cannot escape and carry away the pollinia. On a closer examination, however, it probably only proves how carefully the passage for the exit of the insect has been modified to suit the relative size of the species by which the plant is fertilized, for if the passage had been of a size sufficient to allow the largest individuals to escape with ease the smaller ones would perhaps have been able to pass through without touching the rostellum, and consequently would not remove the pollinia.

It seldom happens that all the pollinia are removed. Out of 110 withered flowers twenty-eight had all the pollinia remaining in their anther cells, twenty-nine had lost one, thirty-four two, thirteen had three withdrawn, while only six had all four removed. Seventy-one of the flowers were fertilized, but it must not be forgotten that a large number of the unfertilized ones drop off before commencing to wither, so that the proportion fertilized is really much less than this. Probably not one quarter of the flowers ever produce

capsules.

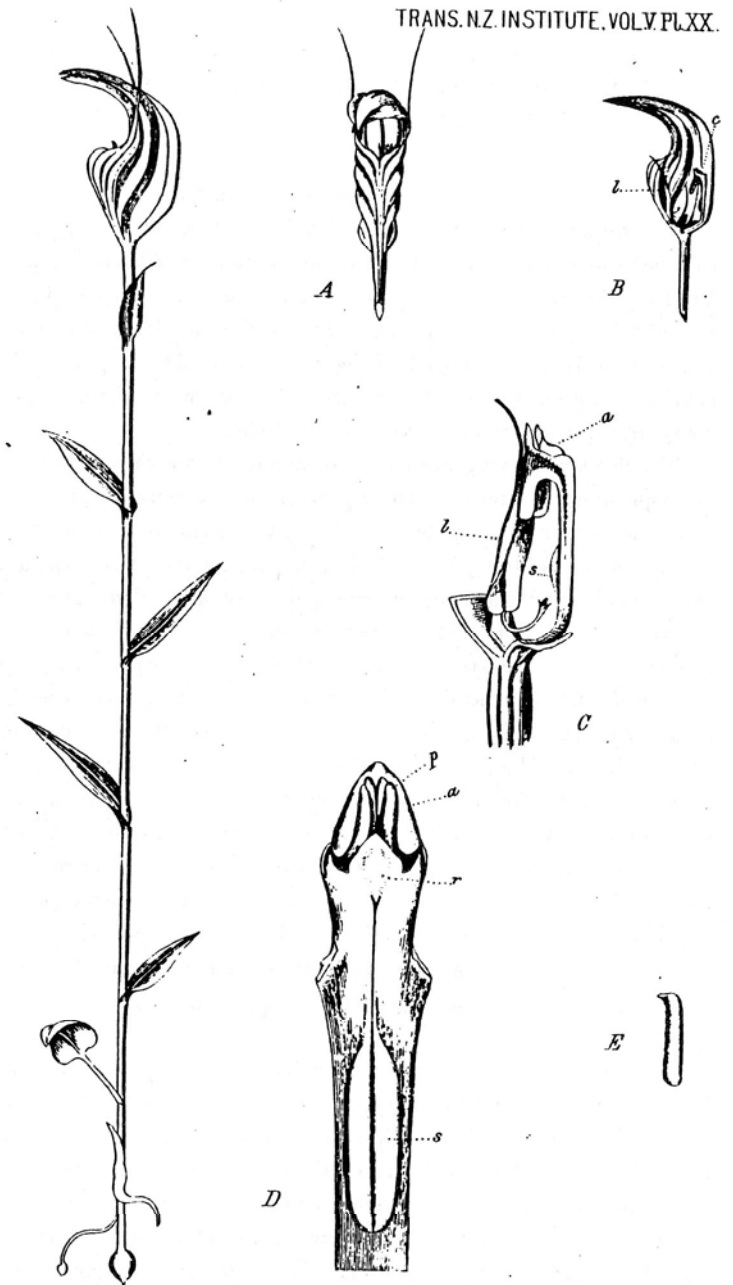
Of the other species of *Pterostylis*, *P. banksii*, *P. graminea*, and *P. puberula* are fertilized in exactly the same manner. There are, of course, slight differences in the size and arrangement of the parts of the flower, but it is hardly worth while describing these in detail here. In *P. puberula* nectar appears to be often present on the outside of the lateral sepals, near the point of their coalescence, serving, no doubt, to attract insects to the flower. *P. banksii* also has two minute papillæ at the base of the column, which may secrete nectar, but I have never observed any. The insect which fertilizes this species is nearly twice the size of that which performs the same office for *P. trullifolia*. I have seen an insect enter the flower of *P. graminea* and become entrapped by the lip. With *P. micromega* I am imperfectly acquainted, but believe the fertilization to be on the same plan. Of *P. foliata* I have only seen dried specimens, but as the structure of the flower is in the main the same as in *P. trullifolia* I have no doubt that it will prove to be fertilized in a similar way.

It seems hardly necessary to draw attention to the fact that the elaborate structure displayed in this genus is solely used to insure the pollen of one flower being placed on the stigma of a different one. It is not too much to say that the pollinia can never reach the stigma of the same flower, except, perhaps, by a combination of circumstances extremely unlikely to happen. As all our New Zealand species have solitary flowers, the cross effected is not only between different flowers but between different plants.

#### DESCRIPTION OF PLATE XX.

*Pterostylis trullifolia*, Hook. f. Natural size.

- A. Front view of flower.  
 B. Lateral view of flower. The sepals and petals on one side removed to show the position of the column and lip.  
 C. View of column and lip, showing the position taken by the lip when touched.  
 D. Front view of the upper part of the column, with the appendages cut off, so as to show the rostellum, and pollinia loose in their anther-cells.  
 E. Single pollinium removed from the anther.
- a., anther; c., column; l., lip; p., pollinia; r., rostellum; s., stigma.  
 A. and B. natural size; C. D. and E. magnified.



FERTILIZATION of N.Z. sp. of PTEROSTYLES.



On the Fertilization of *Acianthus* and *Cyrtostylis*.  
*Transactions of the New Zealand Institute*  
 1874. 7: 349-52.

1. *Acianthus sinclairii*.

In examining the fertilisation of this plant, we do not find contrivances so remarkable and unique as those that obtain in *Pterostylis*, or in other of the New Zealand Orchids; on the contrary, the mode employed is simple, and presents few features of interest. Yet, if the completeness of any method of fertilisation is to be judged of by the results obtained, as undoubtedly it should be, we must regard that of *Acianthus* as one of the most perfect of the many different modes in use among our Orchids.

The flowers, varying in number from one to twelve, are minute, and of an inconspicuous appearance. The lip, which is horizontally spread out in front of the flower, or slightly deflexed, is ovate-lanceolate in outline, and greatly concave, so as to form a kind of bucket. At its base it is furnished with two large glands, and the margins and point are also plentifully studded with minute fleshy papillæ. The column is somewhat curiously shaped. At first it is erect, but towards the summit suddenly arches over the lip, and is much thickened and expanded. The anther is terminal, two-celled, each cell possessing two pollinia, which are deeply bilobed, so as to resemble a horse shoe in shape. The stigma is a deep circular hollow situated just below the anther; and, by the arching of the upper part of the column, hangs directly over the lip. The rostellum is placed on its upper margin. It consists of two triangular projections, which at first are cellular, but ultimately resolve into masses of viscid matter, covered with an extremely delicate membrane. As the flower expands, the connection of these projections with the rest of the column becomes very slender, so that at last they can be detached by a comparatively slight touch, leaving the upper margin of the stigmatic chamber quite plane.

Long before the flower opens, each lobe of the anther splits gradually from base to apex, allowing the included pollinia almost to touch the upper part of the rostellate points. The pollinia then emit a number of excessively delicate thread-like projections, which reach the rostellum, and become firmly attached to it. So that, in a fully expanded flower, each set of pollen-masses is quite free from its anther cells, but they are firmly attached by their bases to their respective rostella, neither of which can be removed without bringing away the pollinia.

The glands at the base of the lip secrete nectar, which is stored up in the cavity just in front of them. From this circumstance alone we might surmise that the flowers would be frequently visited by insects, and a little observation soon shows this to be a fact. On a warm sunny day it is almost impossible to watch a bed of this Orchid for any length of time without seeing numerous Diptera flitting from flower to flower, busily engaged in robbing them of their sweets.

If we now call to mind the manner in which the column arches over the lip, we can easily see that an insect crawling into the flower to get at the supply of nectar can hardly avoid touching one of the points of the rostellum, ranging almost directly over it; if it did so, the delicate exterior membrane would be at once ruptured, and the viscid mass firmly glued to the insect's back. Thus, on withdrawing from the flower, the visitor would carry away with it not only the portion of the rostellum which it had touched, but also the attached pair of pollinia. These (from each pollinium being nearly subdivided into two) would form four little projections standing rigidly erect on the back of the insect; and consequently, when conveyed to another flower, can hardly fail to strike the overhanging stigmatic chamber, which is sufficiently viscid to detach a portion, at least, of the pollinia from the body of the insect, thus ensuring the fertilisation of the flower.

As I have several times seen insects remove the pollinia, and on one occasion also seen a pollen-mass left on the stigma, there can be little doubt that fertilisation is conducted on this plan. That insect aid is absolutely required is proved by the fact that the pollinia remain in their cells, and never reach the stigma, when the plant is covered up or allowed to expand its flowers in a room. But, under natural conditions, the flowers are so frequently visited that the pollinia are generally removed directly after the opening of the blossoms; while the large proportion of capsules produced is good evidence of the completeness with which the visitors perform their duties. Out of eighty-seven flowers, borne on fourteen plants, no less than seventy-one matured capsules, and of those that had failed to do so, many were imperfect ones situated at the summit of the panicle, and probably incapable of producing seed. Another set, from a different locality, had borne forty-seven flowers, of which no less than forty-four had ripened capsules.

The fact that almost every perfect flower produces a capsule, is in remarkable contrast to what occurs in several other genera of our Orchids. For instance, *Pterostylis* is fertilised on a plan much more complex, and the co-adaptation of the various parts of the flower is so complete that almost

every insect that fairly enters the flower must remove the pollinia, which is not the case in *Acianthus*. Yet, from some reason, probably from the want of sufficient attraction, the flowers are comparatively seldom visited, and consequently few capsules produced. In my account of the fertilisation of this genus, (*Transactions of the N. Z. Institute*, Vol. V, p. 356.) I have estimated that about one quarter of the flowers produce capsules; but from subsequent observations I am now convinced that the number is much less. *Corysanthes* offers a case of imperfect fertilisation even more singular. In all the species the proportion of capsules produced is very small, and large patches can often be found that have failed to mature a single one. As an illustration, a bed of *Corysanthes triloba*, in a favourable situation for the visits of insects, expanded, during the last season, over two hundred flowers: yet of this large number only five succeeded in ripening capsules. We must be cautious, though, in assuming that the imperfect fertilisation of these plants is of much real disadvantage to them. In many districts *Pterostylis trullifolia* is quite as abundant as *Acianthus*; while the less general distribution of the species of *Corysanthes* is probably due to their organization not being so well adapted to a variety of conditions and habitats, rather than to the scarcity of seed produced. In their special localities they are often abundant.

## 2. *Cyrtostylis oblonga*.

The great resemblance that this plant bears to *Acianthus*, induced me to suppose that its fertilisation would be conducted on the same plan, and this appears to be the case. We find in *Cyrtostylis*, as in *Acianthus*, the lip horizontally spread out, secreting abundance of nectar; the column arching over it; the points of the rostellum hanging downwards, with the pollinia firmly fastened to their upper margins; together with other contrivances, all apparently co-ordinated, so that an insect, having once entered the flower, can hardly avoid attaching itself to the pollen-masses, and removing them on its departure.

On comparing the flowers of the two plants, we at once find a difference in the structure of the lip. In *Acianthus* this organ is concave, for the purpose of storing up nectar to serve as an attraction for insects: in *Cyrtostylis* it is narrow, and quite plain; but the same end is attained by allowing the nectar slowly to trickle down each side of the midrib. The secreting glands at the base of the lip are much smaller than in the former species, while the papillæ on the margins and points are totally wanting. The column agrees with that of *Acianthus* in most features, but is broadly winged on each side.

This may be of use as a protection to the stigma, or perhaps the projections serve as guides for the proper withdrawal and insertion of the pollen-masses. No difference worth mention is found in the stigma, or rostellum; and the mode of attachment of the pollinia to the latter organ appears to be precisely the same in both plants. In the shape of the pollen-masses themselves, however, we find a marked divergence, for instead of being nearly subdivided, as in *Acianthus*, they are simply falcate in shape. They are laterally much compressed, and extremely friable.

Notwithstanding the minuteness of the flowers, they are frequently visited by insects, chiefly minute species of Diptera. The pollinia, however, are not removed with the same regularity and precision as in *Acianthus*, nor is such a large proportion of capsules produced. I find, though, that specimens from some localities give very discordant results in this respect, although as a rule there can be no doubt that the proportionate number of capsules matured is much less than in *Acianthus*.

I have made no observations on the fertilisation of the only other species of *Cyrtostylis* (*C. rotundifolia*) native to New Zealand. The difference between the two plants is so slight (if indeed it is sufficient to allow a specific distinction being maintained) that I can entertain no doubt but that, on investigation, the mode of fertilisation will be found to be the same for both species.

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## On *Pterostylis squamata* in New Zealand. *Transactions of the New Zealand Institute* 1874. 7: 352-3.

FOR the discovery of this singular plant in New Zealand, we are indebted to the late Dr. Sinclair, so well known for his successful researches into the natural history of this country. Specimens collected by him in some locality near Auckland were forwarded to Sir W. Hooker at Kew, about twenty-four years ago; and accordingly we find the plant described in the first volume of the *Flora Novæ-Zelandiæ*. Nearly the same description is reproduced in the more recently issued Handbook, but with no additional habitats attached. Unfortunately, no precise record appears to have been preserved of the station in which it was found; and consequently, on Dr. Sinclair's decease, the species became entirely lost to New Zealand botanists. Since then, although the vicinity of Auckland has been repeatedly searched, no traces of its presence

have been observed, nor, until a few months ago, had it been found elsewhere in the colony. As the plant must undoubtedly be considered one of the rarest members of the New Zealand flora, and as it is structurally one of the most interesting, it seems not out of place to put the fact of its rediscovery on record.

During a recent visit to the Thames, while examining the low clay hills which skirt the river immediately behind the native settlement of Kapu, I observed a solitary *Pterostylis*, that on inspection proved to be the long-lost *P. squamata*. On a further search two more specimens were found, but both of these were barren. Unfortunately the time at my disposal was not sufficient to enable me to make a complete examination of the district, and to ascertain definitely if the plant is abundant or rare in this, the only locality in New Zealand of which we have now any certain knowledge of its occurrence. It seems most probable, though, that it will prove to be far from common although isolated specimens will doubtless be met with.

*Pterostylis squamata* can be distinguished from its congeners in New Zealand by the very obvious character of the lateral sepals being turned downwards, instead of being erect. This distinction has been made use of to divide the genus into two sections; the first, *Antennæa*, to which the majority of the Australian and New Zealand species belong, having the sepals erect; the second, *Latochilus*, which includes our plant, having them deflexed. Another excellent character is afforded by the labellum, which is filiform and hangs out of the mouth of the flower. It is also clothed throughout its whole length with copious golden-yellow hairs, except at the apex, where it bears a curious large purple gland, which has been aptly compared to the head of a nail.

Although *Pterostylis squamata* is rare and local in New Zealand, it is comparatively common in Tasmania, and is also found in Victoria and South-Western Australia. In this respect it agrees with *Epacris purpurascens* and *Leucopogon richiei*, both of which are abundant Australian plants, and both of which are confined to limited areas in New Zealand.

It is worth remarking that the affinity existing between the temperate Australian and New Zealand floras, easily recognised except in a few anomalous instances, is perhaps more clearly shown in the Orchideæ of the two countries, than in any other order of equal extent. Thus, in examining the distribution of the eighteen genera found in New Zealand, we find that no less than sixteen also occur in Australia, while the two remaining ones, although peculiar to New Zealand, are yet closely related to Australian forms. This result, striking in itself, becomes more so if we look closely into it, when it

appears that out of the sixteen, six are absolutely peculiar to the two countries, and six others, although possessing outlying species in the Indian Archipelago or Pacific Islands, yet plainly have their head-quarters in Australia and New Zealand. *Pterostylis* is a good instance of this. It has twenty-four species in Australia, and seven in New Zealand. One of the Australian species extends into New Caledonia, but beyond this the genus is endemic in the two countries.

In the sixth volume of the *Flora Australiensis*, recently issued, I observe that Mr. Bentham considers the true *P. squamata* of R. Brown to be a form only of the *P. rufa* of the same author; and the plant to which the specific name of *squamata* has been, in many instances, applied by later botanists, is referable to a species long ago described by Dr. Lindley. If this view should meet with the general acceptance of botanists, as seems likely, our plant will in future bear the name of *Pterostylis barbata*, Lindley.

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This plant is now recognised as *Pterostylis plumosa*. Hooker was in error in referring it to *P. squamata* R.Br. Cheeseman followed Australian usage in referring it here and in his *Manual* to *P. barbata* Lindl. Hatch agreed, and listed it in 1946 as one of those species common to Australia and New Zealand.<sup>1</sup> Moore followed suit, but noted, "Eastern Australian plants resemble those in N.Z. in having yellow labellum-hairs and shortly pointed sepals and they may, if considered specifically distinct from *P. barbata sens. strict.*, be referred to *P. plumosa* Cady in *Australian plants* 5, 1969, 38".<sup>2</sup> A.S. George looked up the type of *P. barbata* and found that it matched the Western Australian species known (wrongly) as *P. turfosa*, which left the eastern Australian and N.Z. plant without a name. This was remedied by Cady describing *P. plumosa*. *P. barbata* is now regarded as a distinct Australian species with fewer and coarser labellum hairs than *P. plumosa* which is common to both countries.<sup>3</sup>

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THAT cross-fertilization is the almost universal rule in the great family of Orchids is a generalization first propounded and sustained by reliable evidence by Mr. Darwin, in his "Fertilization of Orchids." Many memoirs and short papers on the subject have appeared since the publication of the first edition of this work in 1862, but, taking them collectively, they only give additional confirmation to Mr. Darwin's views. It is true that, to the two or three cases of self-fertilization given by Mr. Darwin himself, several other instances have since been added, but even then the total number is small, and bears no sensible proportion to the overwhelming majority depending on cross-fertilization for the production of seed.

Some of the most interesting exceptions to the rule yet recorded occur in the Australian and New Zealand genus *Thelymitra*. The Australian species have been ably investigated by Mr. Fitzgerald, who finds in the genus almost all the links between forms that are utterly sterile and barren without insect aid, and others that are regularly self-fertilized from one generation to another, and in which the flowers have almost become cleistogone. As nothing has been published about the New Zealand species, I propose to give a sketch of the fertilization of one of them—*T. longifolia*, pointing out some apparent differences between the method employed here and that which according to Mr. Fitzgerald is in use in Australia.

*Thelymitra longifolia* is probably the most abundant Orchid in the North Island. Its favourite station is on clay hills, but it can also be found in dry rocky places, on sand-hills, and even in wet swamps; in short, in all soils and situations, with the exception that it is rarely (if ever) seen in the dense forest, although often luxuriating in the shade of the "tea-tree scrub." As might be predicted of a plant having such a wide range of habitats, it is extremely variable. Small specimens are often seen barely two inches in height, with a narrow leaf and single small flower. Every intermediate can be traced between this and the large stout form eighteen inches, or even two feet, high, with a broad leaf, and a spike of from ten to twenty large flowers. The colour of the flowers is usually white, but pink and blue flowered varieties are common.

The perianth differs from that of most Orchids in being composed of six nearly equal leaflets, which spread on all sides when expanded; so that the flower has little of the irregular and often fantastic appearance of many of

its allies, but rather resembles an *Ixia* or *Sisyrinchium*.

The column may be roughly described as hood-shaped, the upper part being produced over and above the anther into a broad three-lobed projection, the middle lobe (which is much the largest) being blunt and smooth, but the lateral ones densely fringed with cilia at their extremities. The anther is placed about half way up the face of the column. It is two-celled, each cell containing two granular plate-like pollen-masses. From each side of the base of the column a low wing-like expansion curves round towards the front of the flower, meeting opposite to the labellum. A small recess is thus enclosed, within which the stigma and rostellum are placed; both organs being detached from the column proper. The stigma is a broad shield-like body situated in front of and slightly below the anther. At its base it is thick and fleshy, but it becomes thin and membranous towards the sides and two-lobed summit. The rostellum is lodged between the terminal forks of the stigma, in front of which it projects as a rounded boss. When mature, it consists entirely of viscid matter, covered with an extremely delicate membrane. At this stage its connection with the stigma is easily ruptured, so that it can be readily removed by a slight touch.

The anther attains its full size and development while the flower is yet in the bud, and long before expansion each cell splits down its outer face, exposing the pollinia. As these rest immediately behind the rostellum, and in contact, or nearly so, with its viscid posterior surface, they invariably become firmly attached to it. After this takes place, the column lengthens considerably, thus causing the anther to occupy a higher position relatively to the stigma and rostellum than before. As the pollinia have become affixed to the rostellum, they cannot accompany the anther in this movement, and the anther-case being dragged from them they remain hanging to the back of the rostellum in the narrow passage existing between the stigma and column; the upper part of the pollinia slightly overtopping the stigma. This is the state of things just before the expansion of the flower.

In fine sunshiny weather the flowers usually open about nine o'clock in the morning, neatly reclosing about four or five in the afternoon. There is, however, considerable irregularity as to this, some varieties only opening for a short time in the middle of the day, others remaining expanded for a much longer period. In cloudy or showery weather the flowers never expand so fully as on a clear day. In stormy or very wet weather they generally do not open at all. I have observed that when rain has obtained

access into the flower the pollinia are frequently washed into a pulpy mass at the bottom of the recess behind the stigma; so that there can be no doubt that the closing of the flower acts primarily as a protection for the pollen against rain or dew; although in some of the varieties it certainly seems to be carried further than is required for this purpose. The flowers are quite scentless, and I have never observed that any nectar is secreted.

If a newly-expanded flower is taken and a blunt needle inserted in such a manner that the front of the rostellum is touched, the viscid matter composing this organ at once adheres to the needle, and if it is withdrawn, taking care to move the point in an upward and forward direction, the rostellum, with its attached pollinia, cannot fail to be brought away with it. This experiment should only be tried with flowers that have recently expanded, for, from reasons that will become apparent further on, the pollinia can only be removed with certainty immediately after the flower first opens.

So far, the whole structure of the flower seems designed to favour cross-fertilization through the agency of insects; and there can be no doubt that if the flowers were regularly visited by suitable species this would inevitably take place. But, from some reason—probably from the want of sufficient attraction—insects seldom visit the flowers. For the last seven years, I have made it a practice to watch beds of this Orchid, and save on two occasions I have never seen winged insects enter the flowers; and in both these cases the pollinia were not removed. It should, however, be mentioned that a minute thrip-like insect is sometimes abundant on the pollen, on which it probably feeds; but it is much too small to be of any service in removing the pollen from flower to flower, although it may be useful in another way. But although insects have not been actually observed in the act of removing the pollen, I have yet been able to collect evidence proving that they occasionally, though very rarely, do this. Thus, in November, 1876, seventy-five flowers were examined, and two had lost their pollinia—evidently removed by some insect. In November, 1878, 103 flowers were examined, and two of these had their pollinia removed. Lastly, in November, 1879, out of forty flowers three had the pollen-masses missing. In three instances I have also found pollen scattered over the stigma, the pollinia being still intact in their places at the back of the rostellum. These facts are quite sufficient to show that cross-fertilization does occasionally, though very rarely, take place.

Few of our indigenous species mature seed so abundantly as *Thelymitra longifolia*, almost every flower producing a ripe capsule. Taking this in connection with the facts mentioned above, it is obvious that we have to do

with a case of self-fertilization. The mode in which this is effected appears to be as follows:—The upper part of the stigma is thin and membranous, and has its margin slightly revolute, even when in the bud. After expansion this rolling back is carried to a greater extent, so that the edge of the stigma, and even a small portion of its anterior surface, comes into contact with the pollen-masses hanging directly behind it. Pollen-tubes are at once emitted into the substance of the stigma, usually so rapidly that before a flower has been expanded more than a single day the pollinia are glued so firmly to the margin of the stigma that they could not be removed by insects, even if they visited the flowers. Pollen-tubes are also frequently emitted into the upper part of the posterior surface of the stigma. Besides this, it often happens that the tops of the pollen-masses (which, as we have seen, slightly overtop the stigma) are broken down by some means, either by the shaking of the flowers by wind or by the minute thrip-like insect already mentioned, and the pollen scattered over the front of the stigma. By one of these methods, or by both combined, I believe that the flowers are regularly self-fertilized, and the perpetuation of the species secured.

Mr. Fitzgerald, in the introduction to his magnificent work on Australian Orchids, states that *T. longifolia* is fertilized in the bud in Australia. This, however, is certainly not the case in New Zealand, save when a long succession of wet weather has prevented the flowers from opening at their proper time. In ordinarily fine seasons I always find that the pollinia are intact and free from the stigma on the expansion of the flower, and come away with the rostellum on its removal. He also states that the flowers open for one hour only in the middle of the day. In New Zealand nearly all the varieties open for a much longer period than this, the chief exception being a blue-flowered form with very long and slender staminodia, apparently an intermediate between *T. longifolia* and *T. pulchella*. I cannot agree with Mr. Fitzgerald in considering the opening of the flowers "useless," for even admitting that the stigma had been penetrated by pollen-tubes prior to the expansion of the flower, yet if pollen should be brought from a different plant and placed on the stigma, it would probably have a prepotent influence, and destroy any effect produced by the plant's own pollen. To me it appears that the opening of the flowers is highly important, even if it takes place for only an hour, for it gives a chance of cross-fertilization being effected, and the great value of this is now well established. It is curious that Mr. Fitzgerald's researches should appear to go towards proving that *T. longifolia* is more exclusively self-fertilized,

and the flowers more nearly cleistogone, in Australia than in New Zealand; for, considering the admitted paucity of insects in New Zealand, and the much damper and cooler climate, the exact converse of this might have been anticipated.

The whole case of *Thelymitra* is most interesting, and at the same time perplexing in the highest degree. On the one hand we find the flowers possessing a viscid rostellum, to which the pollen-masses become spontaneously attached, and with which they can be removed,—clearly an adaptation for cross-fertilization through insect agency. On the other hand we see that the form and position of the stigma is such that it early comes into contact with the pollen-masses, an end which is also encouraged by the margins of the stigma slightly bending back towards the pollinia; we also find that in some of the varieties the flowers remain closed for a large part of the day, thus absolutely preventing the access of insects. It is impossible to doubt that these circumstances favour self-fertilization. We are thus driven to the same conclusion that Mr. Darwin has arrived at in the case of the Bee Orchis:—that in the same flower there exist elaborate contrivances for directly opposed objects. To believers in the theory of evolution, the case is not without an explanation. If we could trace back the modifications through which the plant has passed, we should probably arrive at a remote ancestor bearing flowers regularly cross-fertilized by insects, as is the case with most Orchids at the present day. We should probably find that from some reason—it might be from the flowers becoming less attractive, or from the proper insects becoming less plentiful—the flowers were not so regularly visited as before. It would then be an advantage to the plant to be occasionally self-fertilized, in order that a sufficiency of seed should be obtained to perpetuate the species. Varieties having a tendency to self-fertilization would then be rigorously selected. The process of modification having once commenced, I see no difficulty in its being carried on to any extent, provided that the visits of insects continued to decrease, and that consequently the necessity for self-fertilization became more pressing. In this way the species would become more and more self-dependent, until we find it, as it is at present, almost uniformly self-fertilized. At the same time, any structures existing in the flower for purposes of cross-fertilization would hardly be modified if they did not prevent self-fertilization from taking place, but would be retained in their original shape, although perhaps but seldom, or even never, performing their proper functions.

Most writers on the subject maintain that it is a positive disadvantage

to a species to be self-fertilized for a long length of time. But here we have the case of a plant which is probably self-fertilized for many generations in succession, but which is yet a vigorous and predominant species, accommodating itself to a wide range of habitats, protecting itself against encroachment by other species, and highly successful in the battle of life.

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From Contributions to the Flora of the Nelson  
Provincial District. *Transactions of the New  
Zealand Institute* 1881. 14: 320-1.

ORCHIDÆÆ.

- Earina mucronata*, Lindl. Vicinity of Nelson; Maitai Valley.  
*Gastrodia cunninghamii*, Hook. f. Maitai Valley; Moutere Hills; Graham River; Wairau Valley; Buller Valley.  
*Cyrtostylis oblonga*, Hook. f. Buller Valley.  
*Adenochilus gracilis*, Hook. f. Buller Valley, between the Hope and Owen Rivers. Not previously recorded from the South Island.  
*Corysanthes triloba*, Hook. f. Near Nelson; Graham river; Wairau Valley.  
 „ *oblonga*, Hook. f. Near Nelson.  
 „ *rotundifolia*, Hook. f. "Nelson, Travers" (Handbook).  
 „ *macrantha*, Hook. f. Wairau Valley; Buller Valley.  
*Microtis porrifolia*, Spreng. Vicinity of Nelson; Moutere Hills; Foxhill; Motupiko; Wairau Valley.  
*Caladenia lyallii*, Hook. f. St. Arnaud Mountains, 4,000 feet; Mount Arthur, abundant between 4,500 and 5,500 feet.  
*Pterostylis banksii*, Brown. Not uncommon.  
*Chiloglottis cornuta*, Hook. f. Buller Valley.  
 „ *traversii*, F. Muell. Wairau Valley and the adjoining mountains, not uncommon; Mount Arthur plateau, abundant.  
*Thelymitra longifolia*, Forst. Abundant in lowland districts.  
 „ *pulchella*, Hook. f. Lake Rotoiti; Wairau Valley.  
 „ *uniflora*, Hook. f. Lake Rotoiti; Wairau Valley; Mount Arthur plateau.  
*Prasophyllum colensoi*, Hook. f. Not uncommon; ascends to 4,500 feet on the Mount Arthur plateau.

*Orthoceras solandri*, Lindl. Near Nelson; Foxhill; Spooner's Ridge. In the Handbook stated to ascend to an elevation of 4,000 feet in the Nelson District, on the authority of *Bidwill*. I have never seen it above 1,200 feet.

From On some recent Additions to the Flora of New Zealand. *Transactions of the New Zealand Institute* 1882. 15: 300.

4. *Pterostylis mutica*, R. Br.

(R. Br., Prodr. 328; Bentham, *Flora Australiensis*, vol. vi., p. 362.)

Leaves in a radical rosette at the base of the stem,  $\frac{1}{4}$ – $\frac{1}{2}$  inch long, ovate, shortly petiolate, reticulate, apparently withering at the time of flowering. Stem 2–5 inches high, with 2–4 empty sheathing bracts below the flowers. Flowers 2–5, arranged in a slightly spiral spike, greenish-brown. Galea broad, much incurved, obtuse or subacute at the tip, hardly three lines long. Lower lip broad, almost orbicular in outline, concave, reflexed, with two short broad lobes. Labellum placed on a short flat claw, short, broad, and obtuse; appendage nearly as broad, entire, rounded. Column erect; wings broad, lower lobe broad and obtuse.

*Hab.* Lee Stream, near Dunedin; Mr. Sydney Fulton.

I am indebted to Mr. G. M. Thomson, of Dunedin, for specimens in spirit of this curious little species. It was first found in New Zealand by Mr. Fulton some two years back, and was identified in the "New Zealand Journal of Science" with *P. aphylla*, Lindl., a local Tasmanian species. It clearly belongs, however, to the section of the genus having the lower lip reflexed, and agrees so closely with the well-known Australian *P. mutica*, Br., that I cannot doubt its being the same species. New Zealand specimens are much smaller than Australian, but that may be due to the nature of the locality in which they were found. The structure of the flower agrees very well with the details given in Mr. Fitzgerald's plate in his "Australian Orchids," and with dried specimens that I have examined; with the exception of a slight difference in the shape of the appendage to the labellum—always a variable organ in this genus.

*Pterostylis mutica* is an Australian plant, and it was not until 1985 that Brian Molloy recognised that the New Zealand plant was different.<sup>4</sup> Colenso had described the NZ plant as *P. tristis*, and this name now stands.<sup>5</sup> *P. aphylla* is an entirely different Australian species.

From On some hitherto unrecorded plant stations. *New Zealand Journal of Science*. 1882. p202–5.

*Pterostylis barbata*, Lindl. (*P. squamata*, Hook, f., "Handbook N.Z. Flora," now R. Br.)—Bare clay hills, near Mercer, on the Waikato River. The only other locality certainly known is Kopu (Thames district).

From On the Flora of the Kermadec Islands; with Notes on the Fauna. *Transactions of the New Zealand Institute* 1887. 20: 174.

62. *Acianthus sinclairii*, Hook. f.

Sunday Island; abundant. New Zealand.

63. *Microtis porrifolia*, Spr.

Shaded places in the crater of Sunday Island. Flowers not seen, and the identification is therefore not certain. New Zealand, Australia.

From On some Recent Additions to the New Zealand Flora. *Transactions of the New Zealand Institute* 1891. 24: 411–2.

*Caleana minor*, R. Br. (Bentham, "Flora Australiensis," vi., 366).

I am indebted to the Rev. F. H. Spencer for numerous fresh specimens of this singular little plant, collected by him in the vicinity of Rotorua township. The discovery is an interesting one, both on account of its adding a new genus to our flora, and from its affording another proof of the close connection between the Orchidæ of New Zealand and Australia. Mr. Spencer's specimens exactly match the plate of the species given in Fitzgerald's "Australian Orchids," and there can be no doubt of the identity of the New Zealand with the Australian plant. Probably it is not uncommon in the

Rotorua and Taupo districts, and has been overlooked until now from its small size and inconspicuous character, and from the short duration of its flowering-period. The following description has been drawn up from Mr. Spencer's specimens:—

Very delicate and glabrous, 6in.—5in. high, usually slightly tinged with red. Leaf solitary, radical, very narrow-linear, rather fleshy, channelled. Flowers 1–3, greenish tinged with red, small, barely  $\frac{1}{2}$ in. long (including the ovary); pedicels  $\frac{1}{2}$ in., with minute subtending bracts. Sepals narrow-linear, slightly dilated above the middle, nearly equal in size; the dorsal one attached just above the top of the ovary, the lateral affixed to the basal projection of the column. Petals rather smaller. Labellum uppermost, very remarkable in shape, the lower portion claw-like, and articulated on to the basal projection of the column; the upper part expanded into a broad lamina, which is peltately attached to the claw. This lamina is convex on its outer or upper side, concave towards the column or on its lower side, rounded at the base, narrowed towards the apex and bluntly 2-lobed. The concave side is smooth, the convex or outer side covered with close-set reddish tubercles, which are longest on the margins. Column horizontal, rather long, with a broad basal projection, broadly winged, concave, forming a horizontally-placed cup or pouch.

*Hab.* Shaded places among *Leptospermum*, vicinity of Rotorua. Flowers in December and January.

The flowers have a most singular and bizarre appearance, and are well worth careful study. Owing to the ovary being recurved, the column is the lowest part of the flower, and forms a shallow cup or pouch. Directly over it is the broad lamina of the labellum, hanging from a delicate claw or ribbon which curves upwards from the basal projection of the column. A very slight pressure on the lamina causes it to overbalance, and it then swings over and descends on to the column, which it closes as with a lid. After a period of rest, it again assumes its previous position. No doubt this remarkable movement is connected with the fertilisation of the plant. It seems probable that small Diptera or other minute insects alight on the labellum, which then capsizes, imprisoning the insects in the concavity of the column; that they then disturb the pollinia, and either fertilise the flower with its own pollen, or when escaping convey the pollinia to other flowers. The latter supposition appears to me the most likely; but Mr. Fitzgerald, who has had good opportunities of studying the fertilisation of the plant in Australia, considers that it is almost invariably self-fertilised.

It is perhaps worth mentioning here that some years ago Mr. W. T. Ball collected a single specimen of a species of *Calochilus* between Rotorua and Whakarewarewa, and Mr. Spencer has since found it in the same locality. Judging from dried specimens, the plant is either closely allied to or identical with the Australian *C. paludosus*, Br., which has been collected at Collingwood by Mr. H. H. Travers (Buchanan, Trans. N.Z. Inst., xv., 340).

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*Caleana minor* was rediscovered by Chris Ecroyd in Rotorua, as he wrote in 1982.<sup>6</sup>

Thomas Kirk wrote on the Rotorua *Calochilus* in 1892, the year after Cheeseman's comment — both Kirk and Cheeseman mistook the plant for *C. campestris*.<sup>8</sup> whereas it was in fact *C. robertsonii*. The error began, as Hatch noted,<sup>9</sup> with R.D. Fitzgerald who illustrated *C. robertsonii* and labelled it *C. campestris* in his *Australian orchids*.



From On the Flora of the North Cape District.  
Transactions of the New Zealand Institute  
1896. 29: 376-7.

## ORCHIDÆ.

- Earina mucronata*, Lindl. In several localities from Mangonui to Ahipara; Ohora.  
*Earina suaveolens*, Lindl. (*O. autumnalis*). Oruru Valley.  
*Dendrobium cunninghamii*, Lindl. From Mangonui to Ahipara.  
*Bulbophyllum pygmaeum*, Lindl. Oruru Valley.  
*Gastrodia cunninghamii*, Hook. f. Near Kaitaia, Mr. Matthews!  
*Acianthus sinclairii*, Hook. f. Vicinity of Mangonui.  
*Microtis porrifolia*, Br. Not uncommon throughout the district.  
*Pterostylis banksii*, R. Br. Vicinity of Mangonui.  
*Thelymitra longifolia*, Forst. Abundant through the whole of the district.  
*Thelymitra pulchella*, Hook. f. Vicinity of Mongonui, abundant.  
*Thelymitra imberbis*, Hook. f. Vicinity of Mangonui.  
*Spiranthes australis*, Lindl. Abundant in a swamp between Waihopu and Te Kao.  
*Prasophyllum colensoi*, Hook. f. Three specimens picked in a swamp near Mangonui.  
*Prasophyllum pumilum*, Hook. f. Between Parengarenga and Spirits Bay, T. Kirk.  
*Orthoceras solandri*, Lindl. Not uncommon throughout the district.

Description of a New Species of *Corysanthes*.  
Transactions of the New Zealand Institute  
1898. 31: 351-2.

***Corysanthes matthewsii*, n. sp.**

A very delicate little plant, barely more than 1 in. in height, including the flower. Leaf  $\frac{1}{2}$  in.-1 in. in length, solitary, membranous, broadly ovate-cordate or orbicular-cordate, sessile, subacute or obtuse, when dry showing one or two veins on each side of the midrib connected by transverse veinlets. Flower solitary, shortly peduncled, about  $\frac{1}{2}$  in. in length, drooping, purplish-green. Bract small, erect. Upper sepal very narrow at the base, widened towards the tip and arched forwards, so as to become hood-shaped, obtuse. Lateral sepals and petals very small, narrow linear-subulate, barely more than one-half the length of the lip. Lip large, involute, the lateral margins meeting behind the column and enclosing it, orbicular-cordate or slightly three-lobed when spread out, veined; apex truncate, produced downwards, entire or very slightly fringed. Column short, stout, curved. Fully ripe capsules not seen.

*Hab.* Vicinity of Kaitaia, Mongonui County: Mr. R. H. Matthews.

I have pleasure in dedicating this pretty little plant to its discoverer, to whom I am indebted for much interesting information respecting the botany of his district. It agrees with *Corysanthes cheesemani*, Hook. f., in the lateral sepals and petals being much reduced in size, but differs altogether in the shape of the lip, which is not recurved at the apex, nor produced at the base into the two curious spurs of *C. cheesemani*. The upper sepal is also much narrower. Except for the great difference in the size of the lateral sepals and petals the structure of the flower is much nearer that of *C. oblonga*. But the flowers are larger than in that species, the lip is not coarsely fringed at the apex, and the upper sepal is narrower at the base and much more hood-shaped at the tip.

Hatch thought the New Zealand plant *Corysanthes matthewsii* was identical to the Australian *C. unguiculatus*,<sup>10</sup> and Moore agreed.<sup>11</sup>

From Some Recent Additions to the New Zealand Flora. Transactions of the New Zealand Institute 1900. 33: 312-3.

*Chiloglottis formicifera*, Fitzgerald, Austral. Orchids, i., 3 (1877).

A small delicate herb, 2 in.-3 in. high. Leaves 2, at the base of the stem, sessile, 1½ in.-2 in. long, linear-oblong or oblong-lanceolate, obtuse, thin and membranous; margins often undulate when fresh. Scape 2 in.-3 in. high, robust, 1-flowered, with a single sheathing bract towards the top. Dorsal sepal erect, linear-spathulate; lateral sepals about the same length, narrow linear-spathulate, acuminate. Petals linear-lanceolate, deflexed by the side of the ovary, rather longer than the sepals. Lip horizontal or ascending, contracted at the base into a long and narrow claw, above suddenly expanded into a short and broad spoon-shaped or rhomboid lamina, the tip of which is usually reflexed. Numerous glands occupy the median portion of the lamina, the largest of which is placed at the base, and projects with a kind of double head towards the column. Rows of smaller glands reach the tip of the lamina, and at the sides of the larger ones are smaller stalked calli. Column rather shorter than the upper sepal, broadly winged.

North Island: Vicinity of Kaitaia, Mongonui County, R. H. Matthews!

This is a most interesting and unexpected addition to our flora. Mr. Matthews's specimens agree in all respects with the beautiful plate in Fitzgerald's "Australian Orchids."

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*Chiloglottis formicifera* has never been seen in the wild in N.Z. since Matthews's discoveries.

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From *Manual of the New Zealand Flora*. First edition. Wellington, Government Printer, 1906. pp660-698, 1151-2.

#### ORDER LXXIX. ORCHIDEÆ.

Herbs, either terrestrial and tuberous-rooted, with annual herbaceous stems; or epiphytes with creeping rhizomes emitting fibrous or fleshy roots and bearing simple or branched leafy stems often thickened into pseudobulbs. Flowers hermaphrodite, solitary or in spikes or racemes or panicles, often large and showy. Perianth superior, irregular, of 6 free or more or less combined segments, in 2 series; the 3 outer (sepals) all similar or the dorsal one larger and more concave than the 2 lateral which are always alike; the 3 inner (petals) always dissimilar (except in *Thelymitra*), the 2 lateral alike, but the third (called the lip, or *labellum*) usually exceedingly different, often spurred, lobed, fringed, or furnished with glands or other appendages. Stamens and style confluent into a fleshy variously shaped central body facing the lip, called the column; anther usually solitary (2 in *Cypripedium*), placed on the front, top, or back of the column, and either free or adnate to it, persistent or deciduous, usually 2-celled; pollen granular or waxy, usually cohering in each cell into 1, 2, or 4 pairs of pollen-masses (*pollinia*), which are either free or attached, directly or by a caudicle, to a gland on the apex of the stigma (*rostellum*). Ovary inferior, 1-celled; ovules numerous, on 3 parietal placentas; stigma a viscid depression towards the top or on the front of the column, below the anther, facing the lip, upper margin often produced into a beak or point called the rostellum. Fruit a 1-celled 3-valved capsule; seeds numerous, very minute; testa loose, reticulate; albumen wanting; embryo solid, fleshy.

A very extensive and distinct family, found in almost all parts of the world, but rare or absent in extreme northern or southern latitudes, and on the tops of high alpine mountains. Most of the species found in temperate countries are terrestrial; but in the tropics the greater number are epiphytes, growing upon the branches or trunks of trees or on rocks. The genera are estimated at 840, the species at 5000. Notwithstanding the great extent of the order, it is singularly deficient in useful plants. The only one possessing any commercial importance is vanilla, the scented pods of which are used for flavouring delicate dishes or liqueurs. The great beauty and singularity of the flowers of many of the tropical species have caused them to be extensively cultivated in hothouses, and probably over 2000 distinct species are now grown by European horticulturists.

The close affinity existing between the flora of New Zealand and that of Australia is nowhere better shown than in the *Orchideæ*. Out of 21 genera found in New Zealand, 19 occur in Australia as well, and 8 are absolutely confined to the two countries, while several others have a very limited additional range. The only genera with a wide distribution are *Dendrobium*, *Bulbophyllum*, and *Spiranthes*. *Earina*, which does not occur in Australia, is found in the Pacific islands, while *Townsonia* is endemic.

A. Epiphytes with creeping rhizomes, perennial stems, and evergreen leaves. *Pollinia* waxy, free or attached by caudicles to the rostellum.

\* *Pollinia* free.

The New Zealand species with slender much-branched stems, no pseudobulbs and axillary flowers. Lateral sepals and lip adnate to the base of the column .. 1. DENDROBIUM.

The New Zealand species forming small matted patches on the trunks of trees, furnished with pseudobulbs. Flowers on a scape rising from the base of the pseudobulb. Lip jointed on to the base of the column, mobile. Stems leafy, unbranched. Flowers in terminal panicles. Lateral sepals free. Lip 3-lobed .. .. .

2. BULBOPHYLLUM.

3. EARINA.

\*\* Pollinia attached to the rostellum by a caudicle.

Stems short, leaves few. Flowers small, in lateral racemes. Lip 3-lobed .. .. .

4. SARCOCHILUS.

B. Terrestrial, with tuberous roots and annual stems. Pollinia granular or powdery.

\* Leaves long, very narrow-linear, flat or terete.

a. Leaves more than one.

Flowers numerous, on a spirally twisted spike. Dorsal sepal and petals connivent into a hood. Lip undivided. Flowers several, spicate. Dorsal sepal broad, hooded; lateral linear or filiform, erect. Lip 3-lobed .. .. .

5. SPIRANTHES.

7. ORTHOCERAS.

b. Leaf solitary.

Sepals, petals, and lip all similar in shape, petaloid. Column very short, not attached to the lip at the base .. .. .

6. THELYMITRA.

Dorsal sepal concave. Petals much smaller. Surface of lip covered with long hairs. Column very short .. .. .

14. CALOCHILUS.

Dorsal sepal concave. Lip uppermost, undivided, usually with an adnate gland on the disc. Column very short, with two lateral erect appendages .. .. .

9. PRASOPHYLLUM.

Dorsal sepal concave. Lip below, entire or 2-lobed. Column very short .. .. .

8. MICROTIS.

Sepals and petals all linear. Lip uppermost, articulate, clawed; lamina peltate, irritable and mobile. Column long, winged .. .. .

10. CALEANA.

Sepals and petals narrow. Lip entire or 3-lobed, not jointed or irritable, disc with glandular processes, margin often fringed. Column long, winged above .. .. .

16. CALADENIA.

\*\* Leaves shorter, two or several, oblong or lanceolate or linear.

Leaves numerous; radical broad, sometimes wanting; cauline narrow. Flowers hood-shaped, green. Lateral sepals united at the base. Lip narrow, irritable, with a basal appendage .. .. .

11. PTEROSTYLIS.

Leaves 2-3, lanceolate. Upper sepal broad, concave; lateral narrow. Lip broad, papillose or ridged. Column not winged .. .. .

15. LYPERANTHUS.

Leaves 2, radical, oblong. Upper sepal broad, concave; lateral narrow-linear. Lip broad, with raised glands on the disc. Column winged, wings produced into 2 erect lobes at the top .. .. .

17. CHILOGLOTTIS.

\*\*\* Leaf solitary, broad.

Flower solitary, large, purple. Upper sepal broad, concave; lateral and petals long and filiform or minute. Lip large, broad, involute. Column very short .. .. .

20. CORYSANTHES.

Flower solitary. Upper sepal narrow, concave; lateral and petals lanceolate. Lip 3-lobed; disc with raised glands. Column long, winged above; wing produced upwards into 2 toothed lobes .. .. .

18. ADENOCILUS.

Flowers 1 or 2. Upper sepal broad, concave; lateral lanceolate. Petals minute. Lip broad, undivided; disc smooth. Column long, equally winged, wings not produced upwards .. .. .

19. TOWNSONIA.

Flowers several. Sepals and petals narrow, acuminate. Lip spreading, broad, concave. Column long .. .. .

19. ACIANTHUS.

Flowers 2-3. Sepals and petals linear, obtuse. Lip spreading, narrow, flat. Column long, winged above .. .. .

13. CYRTOSTYLIS.

\*\*\*\* Leafless. Stem tall, with brown sheathing scales.

Sepals and petals united into a 5-lobed ventricose tube .. .. . 21. GASTRODIA.

The above clavis is purely artificial, and is solely intended to facilitate the determination of the genera. The following arrangement, which is adapted from Hooker and Benthams "Genera Plantarum" and Engler's "Pflanzenfamilien," is more natural and shows the sequence adopted in this work:—

Tribe I. EPIDENDREÆ.—Anther lid-like, usually deciduous; cells parallel, distinct. Pollinia waxy, 1-4 in each cell, free, or those of each cell connected by a viscid appendage, not attached by their bases or by a caudicle to the rostellum.

1. DENDROBIUM. 2. BULBOPHYLLUM. 3. EARINA.

Tribe II. VANDEÆ.—Anther lid-like, usually deciduous, resting on the rostellum; cells usually confluent. Pollinia waxy, usually 2 or 4 in superposed pairs, attached singly or in pairs to a gland or process of the rostellum, which comes away with them when they are removed.

4. SARCOCHILUS.

Tribe III. NEOTTIEÆ.—Anther lid-like or erect and persistent; cells distinct, parallel. Pollinia granular or powdery.

Subtribe 1. *Spirantheæ*.

5. SPIRANTHES.

Subtribe 2. *Thelymitreæ*.

6. THELYMITRA.

Subtribe 3. *Diurideæ*.

7. ORTHOCERAS. 8. MICROTIS. 9. PRASOPHYLLUM.

Subtribe 4. *Pterostylideæ*.

10. CALEANA. 11. PTEROSTYLIS.

Subtribe 5. *Caladeniæ*.

12. ACIANTHUS. 13. CYRTOSTYLIS. 14. CALOCHILUS. 15. LYPERANTHUS. 16. CALADENIA. 17. CHILOGLOTTIS. 18. ADENOCILUS. 19. TOWNSONIA.

Subtribe 6. *Pogoniæ*.

20. CORYSANTHES.

Subtribe 7. *Gastrodiæ*.

21. GASTRODIA.

1. **DENDROBIUM**, Swartz.

Epiphytes. Stems long and branching, or short and simple and thick, sometimes reduced to pseudobulbs. Leaves coriaceous or fleshy, never plaited. Flowers often large and handsome, rarely small. Sepals nearly equal, the lateral ones dilated at the base, and obliquely adnate to the foot of the column, forming a short spur or pouch. Petals about as long as the upper sepal. Lip contracted at the base and adnate to the produced foot of the column, rarely clawed, usually 3-lobed; lateral lobes embracing the column or spreading; middle lobe broad or narrow, spreading or recurved; disc often lamellate. Column short, produced at the base, winged or angled or toothed at the top. Anther terminal, lid-like, 2-celled; pollinia 4, free, compressed, in collateral pairs in each cell.

A large genus of about 300 species, most abundant in the Malay Archipelago, but extending as far north as Japan, and southwards through Australia and Polynesia to New Zealand. The single species found in New Zealand is endemic, but is closely allied to the Polynesian *D. biflorum*, Swartz.

1. *D. Cunninghamii*, Lindl. Bot. Reg. sub. t. 1756.—Stems usually much branched, slender, rigid, wiry, terete, polished, 1-4 ft. long; usually pendulous, but small specimens growing on rocks or in exposed places are often erect. Leaves numerous, distichous, alternate,  $\frac{3}{4}$ -2 in. long,  $\frac{1}{4}$ - $\frac{1}{2}$  in. broad, linear-lanceolate, acute, rigid and coriaceous, striate and more or less conspicuously 3-nerved; sheaths truncate, grooved and transversely corrugated. Peduncles shorter or longer than the leaves, usually 1-3-flowered, rarely 3-6-flowered; pedicels slender; bracts short. Flowers  $\frac{3}{4}$  in. diam., white and pink. Upper sepal oblong-lanceolate, acute; lateral rather larger, broader at the base. Petals about equalling the sepals, oblong, obtuse. Lip attached by a short claw to the foot of the column, 3-lobed; lateral lobes small, ascending; middle lobe spreading, large, almost as broad as long; margins undulate; disc with 4 or 5 thin lamellæ. Capsule oblong,  $\frac{1}{2}$  in. long.—*A. Cunn. Precur.* n. 316; *Raoul, Choix*, 41; *Hook. f. Fl. Nov. Zel.* i. 240; *Handb. N.Z. Fl.* 262. *D. biflorum*, *A. Rich. Fl. Nouv. Zel.* 167, t. 26 (nct of Swartz). *D. Lessonii*, *Col. in Trans. N.Z. Inst.* xv. (1883) 326.

NORTH AND SOUTH ISLANDS, STEWART ISLAND: Lowland districts from the North Cape southwards. Sea-level to 2000 ft. December-February.

For some notes on the fertilisation, see a paper by Mr. G. M. Thomson in *Trans. N.Z. Inst.* xi. 419. I cannot separate Mr. Coleuso's *D. Lessonii* from the ordinary state of the plant, even as a variety.

2. **BULBOPHYLLUM**, Thouars.

Epiphytes. Rhizome creeping, often matted, usually more or less clothed with scarios sheathing scales. Pseudobulbs sessile in the axils of the scales, each crowned with 1 or rarely 2 leaves.

Flowers small or large, solitary, spiked or racemed on a peduncle arising from the base of the pseudobulbs. Sepals nearly equal, the lateral ones adnate to the foot of the column. Petals usually smaller than the sepals. Lip contracted at the base and jointed on to the produced foot of the column, usually small and recurved, generally mobile. Column short, erect, produced at the base, often 2-aristate at the top. Anther terminal, lid-like, 2-celled; pollinia 4 (rarely 2), free, in pairs in each cell.

A genus of nearly 100 species, with its chief centre of distribution in tropical Asia, but also found in tropical Africa, Australia, New Zealand, and sparingly in South America.

Leaves  $\frac{1}{2}$ -1 in. Peduncles 2-4-flowered. Lip orange-red.. 1. *B. tuberculatum*.  
Leaves  $\frac{1}{4}$ - $\frac{1}{2}$  in. Flowers solitary. Lip white .. .. 2. *B. pygmæum*.

1. *B. tuberculatum*, *Col. in Trans. N.Z. Inst.* xvi. (1884) 336, and xxii. (1890) 488.—Forming densely matted patches on the trunks or branches of trees. Pseudobulbs  $\frac{1}{4}$ - $\frac{1}{2}$  in. long, broadly oblong or nearly orbicular, almost smooth and unwrinkled when fresh, deeply rugose when dry, more or less clothed with white bullate scales. Leaves solitary on the pseudobulbs,  $\frac{1}{2}$ -1 in. long, linear-oblong, acute at both ends, thick and fleshy, slightly concave above, midrib prominent beneath, striate, under-surface with minute whitish dots. Peduncles very slender, almost filiform,  $\frac{1}{2}$ - $\frac{3}{4}$  in. long, 2-4-flowered; pedicels short; bracts minute. Flowers  $\frac{1}{2}$  in. long, white with a bright reddish-orange lip. Upper sepal oblong-lanceolate, subacute; lateral larger, triangular, broad at the base. Petals triangular, much smaller than the sepals. Lip almost as long as the sepals, hinged on to the produced base of the column; lamina oblong-ovate or subhastate, truncate at the base, concave, very thick and fleshy, lower part of disc with 2 minute raised ridges. Column very short, stout, 2-winged at the top. Capsule broadly oblong,  $\frac{1}{2}$  in. long.—*B. exiguum*, *Buch. in Trans. N.Z. Inst.* xvi. (1884) 397 (not of *F. Muell.*).

NORTH ISLAND: Auckland—Kaitia, *R. H. Matthews!* Lower Waikato, *Carse!* East Cape district, *Kirk.* Hawke's Bay—Petane, *A. Hamilton!* Wellington—Palmerston North, *A. Hamilton!* SOUTH ISLAND: Nelson—Collingwood, *Dall!* April-May.

A charming little plant. It was referred by Mr. Buchanan to the Australian *B. exiguum*, and no doubt is closely allied to it, principally differing in the smaller size and more compact habit, shorter peduncles, shorter and broader sepals and petals, and broader and thicker bright orange-red lip.

2. *B. pygmæum*, Lindl. *Gen. et Sp. Orch.* 58.—Minute, forming densely matted carpets on the trunks of trees or on rocks. Pseudobulbs  $\frac{1}{8}$ - $\frac{1}{4}$  in. diam., globose or globose-depressed, glabrous, much wrinkled when dry. Leaves solitary on the pseudobulbs, springing from a minute circular sheath,  $\frac{1}{4}$ - $\frac{1}{2}$  in. long, linear-oblong, obtuse, very thick and coriaceous, grooved down the middle and

minutely echinulate above, naked and longitudinally nerved beneath. Peduncles solitary from the base of the pseudobulbs, very short,  $\frac{1}{4}$ – $\frac{1}{2}$  in. long, 1-flowered; bract minute. Flowers very minute, whitish. Upper sepal narrow-ovate, acute; lateral rather larger, broadly triangular. Petals shorter than the sepals, oblong, subacute. Lip clawed on to the projecting foot of the column; claw long; lamina ovate, obtuse, thickened, disc with indistinct ridges. Ovary broadly oblong, gibbous, minutely echinulate.—*A. Cunn. Precur.* n. 317; *Raoul, Choix*, 41; *Hook. f. Fl. Nov. Zel.* i. 240; *Handb. N.Z. Fl.* 263. *B. ichthyostomum*, *Col. in Trans. N.Z. Inst.* xxvi. (1894) 319. *Dendrobium pygmaeum*, *Smith in Rees Cyclop.* xi. n. 27.

NORTH AND SOUTH ISLANDS: From the North Cape to Otago; in the South Island chiefly on the western side. Sea-level to 1500 ft. November–February.

I do not see upon what grounds Mr. Colenso has separated his *B. ichthyostomum*. The type specimens in his herbarium appear to me to be typical *B. pygmaeum*.

### 3. EARINA, Lindl.

Epiphytes. Stems tufted, simple, compressed; pseudobulbs wanting. Leaves distichous, alternate, narrow-linear. Flowers rather small, in terminal simple or branched bracteate racemiform panicles. Sepals about equal, spreading, free. Petals similar to the sepals. Lip affixed to the base of the column or its slightly produced foot, 3-lobed; lateral lobes small or large; middle lobe broad, entire or emarginate or 2-lobed. Column short, stout, sometimes produced at the base. Anther terminal, lid-like, 2-celled; pollinia 4, waxy, aggregated in pairs in each cell, free or cohering at the base by a short viscid appendage. Capsule oblong.

Besides the two species found in New Zealand, which are endemic, there are four others from the Pacific islands.

Slender. Panicles slender; flowers remote. Lip deeply 3-lobed; disc eglandular .. .. .	1. <i>E. mucronata</i> .
Stout. Panicles stiff; flowers close. Lip very obscurely 3-lobed; disc with 2 ridges .. .. .	2. <i>E. suaveolens</i> .

1. *E. mucronata*, *Lindl. in Bot. Reg.* sub. t. 1699.—Rhizome creeping. Stems numerous, 1–3 ft. long, slender, simple, pendulous or rarely erect, smooth, compressed and 2-edged, spotted. Leaves 3–6 in. long,  $\frac{1}{4}$ – $\frac{1}{2}$  in. broad, narrow-linear, acuminate, flat, smooth, thin but coriaceous, very finely striate. Panicle terminal, slender, sparingly branched, 2–5 in. long, many-flowered; bracts clasping, striate. Flowers rather distant, sessile,  $\frac{1}{2}$  in. diam. Sepals and petals linear-oblong, spreading, obtuse, pale-yellow. Lip darker yellow with a brownish-orange spot at the base, deeply 3-lobed; middle lobe broader than long, again divaricately 2-lobed; disc eglandular. Column short, stout. Pollinia attached at the base to a short caudicle. Capsule oblong,  $\frac{1}{2}$  in. long.—*A. Cunn. Precur.*

n. 315; *Raoul, Choix*, 41; *Hook. Ic. Plant.* t. 431; *Hook. f. Fl. Nov. Zel.* i. 239; *Handb. N.Z. Fl.* 262. *E. quadrilobata*, *Col. in Trans. N.Z. Inst.* xv. (1883) 325.

NORTH AND SOUTH ISLANDS, STEWART ISLAND, CHATHAM ISLANDS: Not uncommon in lowland districts throughout. Sea-level to 2000 ft. October–December.

2. *E. suaveolens*, *Lindl. Bot. Reg.* (1843) *Misc.* 61.—Stems stout, erect or pendulous, slightly compressed, 6–18 in. high. Leaves 2–4 in. long,  $\frac{1}{3}$ – $\frac{1}{2}$  in. broad, narrow-linear or narrow linear-lanceolate, acute, rigid, coriaceous, striate, midrib evident. Panicle terminal, stiff, 2–4 in. long, many-flowered; branches numerous, close-set; bracts sheathing, striate. Flowers sessile, much closer together than in *E. mucronata*,  $\frac{1}{4}$ – $\frac{1}{2}$  in. diam., waxy-white with a yellow centre, very fragrant. Sepals ovate-oblong, obtuse. Petals rather broader, obovate, narrowed at the base. Lip erect at the base and then bent outwards, broad, concave, very obscurely 3-lobed, disc with 2 crescent-shaped glands towards the base, margins undulate. Column short, stout. Pollinia pyriform, attached to a short caudicle at the base.—*E. autumnalis*, *Hook. f. Fl. Nov. Zel.* i. 239; *Handb. N.Z. Fl.* 262. *E. alba*, *Col. in Trans. N.Z. Inst.* xviii. (1886) 267. *Epidendrum autumnale*, *Forst. Prodr.* n. 319. *Cymbidium autumnale*, *Swartz in Nov. Act. Upsal.* vi. (1799) 72; *A. Rich. Fl. Nouv. Zel.* 169.

NORTH AND SOUTH ISLANDS, STEWART ISLAND: Not uncommon in lowland forests from the North Cape southwards. Sea-level to 2000 ft. March–June.

A handsome species, easily distinguished from *E. mucronata* by the shorter and stouter habit, more rigid leaves, denser panicles, waxy-white flowers, and almost entire lip, which has two raised ridges near the base. Mr. Colenso apparently published his *E. alba* under the supposition that *E. suaveolens* has no glands on the lip, but they are always present. Some notes on the fertilisation are given by Mr. G. M. Thomson in the *Trans. N.Z. Inst.* xi. 418.

### 4. SARCOCHILUS, R. Br.

Epiphytes. Stems short, rarely long; pseudobulbs wanting. Leaves distichous, flat, oblong or linear, coriaceous or fleshy. Flowers racemose or spicate; peduncles lateral. Sepals spreading, almost equal, free; the lateral ones often broader at the base and adnate to the produced foot of the column. Petals similar to the sepals or narrower. Lip attached to the base of the column, usually 3-lobed; lateral lobes small or large, fleshy or petaloid; middle lobe often greatly reduced; disc usually with callosities. Column erect, semiterete, not winged, produced at the base. Anther terminal, lid-like, 2-celled; pollinia 2, or 4 more or less connate in pairs, waxy, attached by a strap-shaped caudicle to the rostellum. Capsule linear or linear-oblong.

A genus of about 30 species, most of them from India, the Malay Archipelago, and Australia; a few from the Pacific islands, and one from New Zealand.

1. *S. adversus*, *Hook. f. Fl. Nov. Zel.* i. 241.—Roots numerous, long, wiry, terete. Stems short, 1–3 in. long, concealed by the imbricated sheathing bases of the leaves. Leaves few, distichous, spreading, 1–2½ in. long, ¼–¾ in. broad, linear-oblong to elliptic-oblong, obtuse or subacute, jointed above the sheathing base, thick and coriaceous, dark-green, often spotted with purple. Peduncles 1–4 from the axils of the lower leaves, slender, strict, 1–2½ in. long, 5–15-flowered; pedicels slender, erect; bracts small, broadly ovate. Flowers small, ¼–½ in. diam, green spotted with purple. Sepals oblong-ovate, obtuse. Petals similar but slightly narrower. Lip as broad as long, obscurely 3-lobed, very concave, with a fleshy gland on each side; tip obtuse, somewhat hooded. Column very short, stout. Capsule linear-oblong, ½–¾ in. long.—*Handb. N.Z. Fl.* 263. *S. breviscapa*, *Col. in Trans. N.Z. Inst.* xiv. (1882) 332.

NORTH AND SOUTH ISLANDS, STEWART ISLAND, CHATHAM ISLANDS: Lowland districts from the North Cape southwards, not common. October–November.

#### 5. SPIRANTHES, L. C. Rich.

Terrestrial herbs, with fibrous or tuberous roots. Stems leafy or sometimes leafless at the time of flowering. Flowers small, spirally arranged in a terminal spike. Sepals subequal; the dorsal one erect, more or less connivent with the petals into a hood; lateral free, erect or spreading. Lip sessile or clawed, concave, closely embracing the column at its broad base, often spreading and dilated at the tip; disc usually with tubercles or lamellæ near the base. Column short, terete. Anther erect, ovate or oblong, 2-celled; pollinia after dehiscence pendulous from the gland of the rostellum.

A genus of about 80 species, generally dispersed through most temperate or tropical regions.

1. *S. australis*, *Lindl. in Bot. Reg.* t. 823.—Root of several stout and fleshy almost tuberous fibres. Stem variable in size, 6–20 in. high, stout or slender, glabrous or nearly so below the inflorescence. Lower leaves varying from 2 to 6, 2–6 in. long, narrow-linear or linear-lanceolate, acuminate, sheathing at the base; upper ones reduced to sheathing scales. Spike slender, 2–6 in. long or more, spirally twisted, glandular-pubescent. Flowers numerous, small, sessile, close-set or rather distant, ⅓–½ in. long, rose-pink or white; bracts ovate, acuminate, usually as long as the flowers. Upper sepal oblong, obtuse, connivent with the petals into a hood; lateral free, acute. Lip broadly oblong, concave; the lower part embracing the column and bearing a small rounded gland on each side at the

base; upper part spreading and thickened; margins usually much crisped. Ovary glandular.—*Hook. f. Fl. Tasm.* ii. 15; *Handb. N.Z. Fl.* 272; *Benth. Fl. Austral.* vi. 314. *S. novæ-zealandiæ*, *Hook. f. Fl. Nov. Zel.* i. 243.

NORTH ISLAND: Auckland—Near Obora, *T. F. C.*; Kaitaia, *R. H. Matthews!* Great Barrier Island, *Kirk*; near Auckland, *T. F. C.*; Upper Waikato, *Colenso*; Rotorua, *T. F. C.* Taranaki—Swamps near New Plymouth; Ngaire Swamp, *T. F. C.* SOUTH ISLAND: Okarito, *A. Hamilton*. Sea-level to 1500 ft. January–February.

Also found in Australia, and in many parts of tropical and temperate Asia.

#### 6. THELYMITRA, Forst.

Terrestrial herbs, usually glabrous. Root of oblong or ovoid tubers. Leaf solitary, linear or lanceolate, often thick and fleshy but not terete; empty sheathing bracts 1 or 2 along the stem. Flowers few or many in a terminal raceme, sometimes reduced to one. Sepals and petals similar and equal or nearly so, spreading. Lip similar to the petals, quite free from the column at the base. Column short, erect, broadly 2-winged; the wings either produced behind the anther with a variously lobed or fringed or rarely entire margin, or with 2 prominent lateral lobes as long or longer than the anther; at the base the wings extend between the column and the lip and are united. Anther in front of the produced wing of the column or between its lateral lobes, erect, 2-celled; connective often produced; pollinia 2 in each cell, friable.

A genus of probably over 30 species, mostly natives of Australia and New Zealand, one species only being found in New Caledonia, and two in the Malay Archipelago. It is remarkable from the lip being quite free from the column and resembling the petals and sepals, so that the perianth has little of the irregular appearance of an orchid, but rather resembles that of an *Ixia* or *Sisyrinchium*. The New Zealand species are much alike in habit and general appearance, and in most cases cannot be distinguished from one another when out of flower, or when dried. Even when in the flowering state they require careful study before their differential characters can be understood. The following analysis is in several respects imperfect, but is the best that I can offer in the present state of our knowledge. I have in my herbarium specimens of at least three additional forms, but they cannot be safely described until more complete material is available.

*A. Cucullaria*. Column-wing extending behind the anther and usually overtopping it, hood-shaped, variously lobed or fringed, the lateral lobes tipped with a dense brush of cilia.

Column-wing with 3 short denticulate or fimbriate lobes at the back between the lateral lobes .. .. .	1. <i>T. ixioides</i> .
Column-wing with a broad entire or emarginate lobe between the lateral lobes, which are shorter than it ..	2. <i>T. longifolia</i> .
Column-wing with a truncate or bifid scarcely hood-shaped lobe between the lateral lobes, which are longer than it .. .. .	3. <i>T. intermedia</i> .
Column-wing with a hood-shaped lobe between the lateral lobes, which are much longer than it. Sepals and petals linear-oblong .. .. .	4. <i>T. Colensoi</i> .

*B. Macdonaldia*. Column wing extending behind the anther but shorter than it and not hood-shaped, variously lobed or crenate or fimbriate.

Tall, slender, 9–18 in. high. Flowers 3–8, large,  $\frac{3}{4}$ –1 in. diam., blue-purple .. .. . 5. *T. pulchella*.  
 Flexuous and wiry, 4–10 in. high. Flowers 1–3,  $\frac{1}{2}$  in. diam., flesh-coloured .. .. . 6. *T. imberbis*.

*C. Biaurella*. Column-wing not extending behind the anther, but with 2 prominent erect lateral lobes.

Flowers 3–6. Lateral lobes of the column-wing exceeding the short broad anther .. .. . 7. *T. venosa*.  
 Flowers 1–4. Lateral lobes of the column-wing not so long as the rather narrow anther .. .. . 8. *T. uniflora*.

*T. concinna* and *T. nervosa*, Col. in Trans. N.Z. Inst. xx. (1888) 207, and *T. fimbriata*, l.c. xxii. (1890) 490, are unknown to me.

1. *T. ixioides*, Swz. in Vet. Akad. Handl. Stockh. xxi. (1800) 228, t. 3.—Stem slender, 9–18 in. high. Leaf rather long but shorter than the stem, narrow-linear, thick, channelled in front. Flowers 2–8 or more in a raceme 2–6 in. long, rather large,  $\frac{3}{4}$ –1 in. diam. Sepals, petals, and lip broadly oblong or elliptic-oblong, obtuse or subacute. Column short, stout, not half as long as the perianth; the broad wing continued behind the anther and overtopping it, 3-lobed at the back and with a lateral lobe on each side at the front angle; lateral lobes the highest, pointing forwards and upwards, linear, tipped with a small dense tuft of cilia; the 3 intermediate lobes broader and shorter, truncate, denticulate or crenate, the middle one usually crested on the back. Anther rather narrow, pointed, much longer than the rostellum.—*Hook. f. Fl. Tasm.* ii. 6, t. 103B; *Benth. Fl. Austral.* vi. 317; *Fitzgerald, Austral. Orchid.* ii. pt. 3; *Berggr. in Minneskr. Fisiog. Sallsk. Lund.* (1877) 22.

NORTH ISLAND: Auckland—Kaitaia, *R. H. Matthews!* Whangaroa, *Petrie!* Bay of Islands, *Berggren!*; Te Aroha and Rotorua, *Petrie!* (specimens not in a fit state for accurate determination, but apparently the same). September–November. Also in Australia.

2. *T. longifolia*, *Forst. Char. Gen.* 98, t. 49.—Very variable in size and degree of robustness, stout or slender, 3–18 in. high. Leaf short or long, often overtopping the flowers in short-stemmed specimens, narrow-linear or linear-lanceolate, varying in breadth from  $\frac{1}{8}$  to  $\frac{3}{4}$  in. or even more, flat or involute, thick and coriaceous or fleshy, grooved and nerved. Flowers 2–16 in a raceme 1–6 in. long or sometimes solitary, variable in size,  $\frac{1}{3}$ – $\frac{3}{4}$  in. diam., colour varying from white to pink or blue. Sepals and petals oblong-ovate or ovate-lanceolate, acute or acuminate; lip usually broader and more obtuse. Column short, stout; the wing continued behind the anther and much longer than it, 3-lobed; the middle lobe the highest, broad, rounded, hood-shaped and projecting forwards over the anther, emarginate or shallowly 2-lobed, margins smooth,

entire; lateral lobes short, linear, terminated by a dense brush of white cilia. Anther much exceeding the rostellum.—*Hook. f. Handb. N.Z. Fl.* 270; *Benth. Fl. Austral.* vi. 319; *Fitzgerald, Austral. Orch.* i. pt. 6. *T. Forsteri*, Swz. in Vet. Akad. Handl. Stockh. xxi. (1800) 228; *A. Rich. Fl. Nouv. Zel.* 165, t. 25, f. 2; *A. Cunn. Precur.* n. 309; *Raoul, Choix*, 41; *Hook. f. Fl. Nov. Zel.* i. 243. *T. stenopetala*, *Hook. f. Fl. Antarct.* i. 69. *T. nemoralis* and *T. purpureo-fusca*, Col. in Trans. N.Z. Inst. xvii. (1885) 249. *T. alba*, Col. l.c. xviii. (1886) 272. *T. cornuta*, Col. l.c. xx. (1888) 206.

NORTH AND SOUTH ISLANDS, STEWART ISLAND, CHATHAM ISLANDS, AUCKLAND ISLANDS: Abundant from the Three Kings Islands and the North Cape southwards. Sea-level to 4000 ft. *Makaika*. November–December. Also in Australia and Tasmania.

Found in all soils and situations (except in the dense forest) and correspondingly variable. Its best distinguishing character is the large middle lobe of the column-wing, which forms a smooth rounded hood projecting over the anther and usually overtopping the lateral lobes, which are most densely ciliate at the tips. For an account of the fertilisation, see a paper by myself in Trans. N.Z. Inst. xiii. 291.

3. *T. intermedia*, *Berggr. in Minneskr. Fisiog. Sallsk. Lund.* (1877) 21, t. 5, f. 21–24.—Size and habit altogether that of slender forms of *T. longifolia*, and flowers similar in general appearance. Column-wing continued behind the anther and 3-lobed as in *T. longifolia*; but the intermediate lobe is much shorter, so that the tip of the anther is exerted beyond it, and the anterior angle on each side is incurved and acute; the lateral lobes longer, erect, exceeding the intermediate lobe, terminated by a much smaller and less dense tuft of cilia.

NORTH ISLAND: Bay of Islands, *Berggren*.

I only know this through Dr. Berggren's figure and description. It may be the same as the following, but that is a question that can only be settled by actual comparison of the types.

4. *T. Colensoi*, *Hook. f. Handb. N.Z. Fl.* 271.—“Very slender, 8–12 in. high. Leaf very narrow-linear, flexuous. Flowers 1–3, yellowish, on slender pedicels,  $\frac{1}{2}$  in. broad. Sepals and petals very narrow, linear-oblong, acute. Column very short; appendages very long, subulate, erect, plumose at the tip. Anther with a long point.”—*T. pauciflora*, *Hook. f. Fl. Nov. Zel.* i. 244 (not of R. Br.).

NORTH ISLAND: *Colenso* (Handbook).

I have seen no specimens that I can refer to this, and in the absence of any additional information have reproduced the description given in the Handbook.

5. *T. pulchella*, *Hook. f. Fl. Nov. Zel.* i. 244.—Stem tall, slender, often flexuous, 9–18 in. high or even more. Leaf shorter than the stem, long, linear, fleshy, grooved and channelled; empty

bracts 2 or 3, sheathing. Flowers 3-8 in a raceme from 2 in. to 6 in. long, large, handsome, blue-purple,  $\frac{3}{4}$ -1 in. diam. Sepals, petals, and lip broadly oblong or obovate, obtuse. Column less than half as long as the perianth, the wing continued behind the anther but much shorter than it, 3-lobed; middle lobe short and broad, emarginate or truncate; lateral lobes much longer than the middle lobe and almost equalling the anther, erect, lanceolate, acuminate, coarsely toothed. Anther broad, connective produced into a stout horn-like point.—*Handb. N.Z. Fl.* 271.

NORTH ISLAND: Clay hills from the North Cape to the Waikato River, not uncommon. November-December.

A well-marked species, easily distinguished by the large blue-purple flowers, broad obtuse sepals and petals, long erect coarsely jagged (not ciliate) lateral lobes of the column-wing, and broad and short middle lobe, which is much lower than the anther. I have seen no South Island specimens, and suspect that Monro's and Lyall's plants, mentioned by Hooker in the Handbook, are nothing more than large states of *T. uniflora*.

6. *T. imberbis*, Hook. f. *Fl. Nov. Zel.* i. 244.—Stem slender, wiry, often flexuous, 4-12 in. high. Leaf much shorter than the stem, narrow-linear, flexuous, thick and fleshy, grooved in front. Flowers 1-3, rarely more, short and broad, cup-shaped,  $\frac{1}{2}$  in. diam., flesh-coloured. Sepals and petals  $\frac{1}{2}$  in. long, broadly oblong or obovate-oblong, obtuse or apiculate. Column less than half as long as the perianth; the wing continued behind the anther but shorter than it, 3-lobed; middle lobe broad, truncate or obscurely 2-lobed, minutely warted on the back, margin thick, entire; lateral lobes longer, pointing forwards and upwards, triangular, acute, irregularly denticulate, without cilia. Anther large, connective produced into a blunt point much exceeding the column-wing.—*Handb. N.Z. Fl.* 271.

NORTH ISLAND: Clay hills from the North Cape to Rotorua, not uncommon. Sea-level to 1500 ft. October-November.

In the original description the flowers are said to be yellow, but they are flesh-coloured in all the specimens I have seen. It is probably identical with the Australian *T. carnea*, R. Br.

7. *T. venosa*, R. Br. *Prodr.* 314.—Stem stout or slender, 9-18 in. high or more. Leaf shorter than the stem, narrow-linear, thick, channelled. Flowers 3-6, large, handsome, purplish-blue, 1 in. diam. Sepals and petals  $\frac{1}{2}$  in. long, oblong or elliptic-oblong, obtuse or minutely apiculate, conspicuously veined; lip obovate, obtuse. Column short, stout, not half the length of the perianth; wing not continued behind the anther but with 2 erect lateral lobes which exceed the anther, lobes narrow-triangular, 1-2-toothed near the tip, which is usually twisted inwards. Anther rather short, ovate, connective narrowed into a short bifid beak not so long as the lateral lobes.—*Benth. Fl. Austral.* vi. 323. *Epiblema grandiflorum*, Buch. in *Trans. N.Z. Inst.* xiv. (1882) 357 (not of R. Br.).

NORTH ISLAND: Auckland—Swamps in the Upper Waikato, T. F. C.; Omatangi, near Lake Taupo, Berggren! Tarauaki—Ngairi Swamp, T. F. C. Wellington—Mungaroa Swamp, Travers, Kirk!

Very near to *T. uniflora* in the structure of the flower, but a taller and stouter plant, with numerous larger flowers, and with the lateral lobes of the column exceeding the anther. The late Mr. Buchanan informed me that it was the plant he referred to *Epiblema* in *Trans. N.Z. Inst.* xiv. It probably occurs in the South Island, but I have seen no specimens from thence. It is found in several localities in New South Wales.

8. *T. uniflora*, Hook. f. *Fl. Antarct.* i. 70.—Stem slender, 6-12 in. high or more. Leaf much shorter than the stem, very narrow-linear, channelled. Flowers 1-4, large, handsome, blue-purple,  $\frac{3}{4}$  in. diam. Sepals and petals obovate-oblong, obtuse or apiculate, veined; lip broader, obovate. Column short and stout, less than half the length of the perianth; wing reduced to 2 linear-triangular lateral lobes not connected by a rim or crest behind the anther, tip obscurely notched, usually twisted inwards. Anther large, broadly ovate, the connective produced into a bifid beak which overtops the column-lobes.—*Fl. Nov. Zel.* i. 244; *Handb. N.Z. Fl.* 271.

NORTH AND SOUTH ISLANDS, STEWART ISLAND, AUCKLAND ISLANDS: From Rotorua southwards, chiefly in upland districts. Sea level to 3500 ft. December-January.

The name *uniflora* is misleading, as the flowers are often more than one. It is very closely allied to the Tasmanian *T. cyanea*, Lindl., and may prove identical with it.

#### 7. ORTHOCERAS, R. Br.

Glabrous terrestrial herbs. Root of 1 or 2 ovoid tubers and numerous fleshy fibres. Leaves few, near the base of the stem, narrow-linear. Flowers rather large, sessile in a lax spike; bracts sheathing, acute. Upper sepal erect, incurved, deeply concave; lateral longer, narrow-linear or almost filiform, terete, erect. Petals short, erect, narrow, flat. Lip affixed to the base of the column, spreading, 3-lobed; lateral lobes broad; middle lobe large, ovate; disc with a thick callus. Column short, stout, upper part with 2 lateral erect lobes equalling the anther. Anther large, erect or slightly incurved, 2-celled; pollinia powdery.

One species only is known, found in both Australia and New Zealand.

1. *O. strictum*, R. Br. *Prodr.* 317.—Stem stout or slender, rigid, erect, wiry, 9-24 in. high. Leaves several near the base of the stem, sheathing, 2-9 in. long, linear or almost filiform, channelled, margins involute; above the leaves there are usually 2 or 3 long sheaths with short erect laminae. Spike 1-9 in. long, 3-12-flowered; flowers rather lax, green, greenish-purple or brownish-purple; bracts acuminate, the lower ones usually exceeding the



ovary. Upper sepal  $\frac{1}{4}$ – $\frac{1}{2}$  in. long, when spread out almost orbicular, much incurved, deeply concave; lateral filiform, erect or diverging,  $\frac{1}{4}$ –1 in. long. Petals thin, notched at the tip. Lip spreading or deflexed; lateral lobes broad, oblique; middle lobe much larger, ovate; disc with a large variously shaped callus.—*A. Cunn. Precur.* n. 310; *Benth. Fl. Austral.* vi. 332; *Fitzgerald, Austral. Orch.* i. pt. 3. *O. Solandri*, *Lindl. Gen. et Sp. Orch.* 512; *Hook. f. Fl. Nov. Zel.* i. 243; *Handb. N.Z. Fl.* 273. *O. rubrum*, *Col. in Trans. N.Z. Inst.* xviii. (1886) 273. *O. caput-serpentis*, *Col. l.c.* xxii. (1890) 490. *Diuris novæ-zealandiæ*, *A. Rich. Fl. Nouv. Zel.* 163, t. 25, f. 1.

NORTH ISLAND: Dry hills from the North Cape southwards, not uncommon.  
SOUTH ISLAND: Various localities in the Nelson Provincial District, *Bidwill*, *Kirk*! *T. F. C.* Sea-level to 2500 ft. December–January.

#### 8. MICROTIS, R. Br.

Glabrous terrestrial herbs; root of rounded tubers on fleshy fibres. Leaf solitary, long, narrow, terete, opened out near the stem and then continuous with the closed sheath. Flowers small, green, numerous, densely spicate, usually spreading or reflexed. Upper sepal erect, broad, concave, incurved; lateral lanceolate or oblong, spreading or recurved. Petals similar to the lateral sepals or smaller. Lip sessile at the base of the column, spreading, oblong, obtuse, truncate or 2-lobed, usually with calli near the base. Column very short, almost terete, upper part with 2 auricles or wings. Anther terminal, erect, 2-celled; pollinia 4, powdery.

The genus consists of 6 species inhabiting Australia, one of them extending to New Zealand. A seventh species has also been described from the Malay Archipelago. The genus has the habit and general appearance of *Prasophyllum*, but differs in the flowers not being reversed, and in the auricles of the column.

1. *M. porrifolia*, *R. Br. Prodr.* 320.—Very variable in size, degree of robustness, and number of flowers. Stems stout or slender, 3–24 in. high. Leaf terete, fistular, exceeding the spike or shorter than it. Spike  $\frac{1}{2}$ –6 in. long; flowers few or many, close-set or rather distant, minute, green, pedicels short; bracts small. Upper sepal broadly ovate, acute, deeply concave; lateral oblong, deflexed. Petals shorter, spreading. Lip horizontal or deflexed, oblong, obtuse or 2-lobed; margins much crisped; disc with 2 calli at the base and usually with an irregularly shaped tubercle or swelling near the tip. Column very short, stout; upper part with 2 small auricles. Pollinia attached to a very short caudicle.—*Hook f. Fl. Nov. Zel.* i. 245; *Handb. N.Z. Fl.* 266; *Benth. Fl. Austral.* vi. 347; *Fitzgerald, Austral. Orch.* ii. pt. i. *M. Banksii*, *A. Cunn. Bot. Mag.* sub. t. 3377; *Precur.* n. 311; *Raoul, Choix*, 41. *M. longifolia*, *Col. in Trans. N.Z. Inst.* xvii. (1885) 247. *M. papillosa*, *Col. l.c.* xviii. (1886) 269. *Epipactis porrifolia*, *Swz. in Vet. Acad. Stockh.* (1800) 233. *Ophrys unifolia*, *Forst. Prodr.* n. 311.

KERMADEC ISLANDS, NORTH AND SOUTH ISLANDS, STEWART ISLAND, CHATHAM ISLANDS: Abundant throughout. Sea-level to 2500 ft. October–December.

There appear to be differences in the shape and size of the calli on the lip, the shape of its extremity, and the extent to which the margin is crisped. The fertilisation has been described by Thomson in *Trans. N.Z. Inst.* xi. 422.

#### 9. PRASOPHYLLUM, R. Br.

Terrestrial glabrous herbs. Root of globose or ovoid tubers. Leaf solitary; sheath usually long; lamina terete, long or short, sometimes reduced to a short erect point. Flowers small, sessile in a lax or dense spike, reversed so that the lip is uppermost, usually abruptly bent at the top of the ovary and consequently spreading or reflexed. Upper sepal (inferior by the reversion of the flower) lanceolate or oblong, concave, usually arched over the column; lateral (superior) as long or rather longer, lanceolate or linear, free or more or less connate. Petals equalling the sepals or shorter, lanceolate or linear. Lip superior, sessile or shortly clawed, or sessile on the produced foot of the column, usually erect at the base and concave, spreading or recurved above, ovate or lanceolate, undivided; margins entire or undulate; disc with an adnate plate or longitudinally thickened along the median line. Column very short, not winged, but furnished with 2 erect lateral lobes; rostellum usually long, erect. Anther erect, placed behind the rostellum which often exceeds it, 2-celled; pollinia attached by a linear caudicle to the rostellum.

Species about 30, all confined to Australia, with the exception of one from New Caledonia and four from New Zealand, two of which seem to be the same as Australian species. The genus is closely allied to *Microtis*, but is at once distinguished by the reversed flowers and large lateral lobes to the column.

*A. Euprasophyllum.* Lip sessile at the base of the column. Perianth  $\frac{1}{2}$ – $\frac{1}{3}$  in. long.

Tall, 1–3 ft. high. Flowers  $\frac{1}{4}$ – $\frac{1}{2}$  in. Lip large, with a conspicuous recurved lamina; adnate plate not nearly reaching the tip .. .. . 1. *P. patens*.

Smaller, 4–12 in. Flowers  $\frac{1}{2}$  in. Lip shorter, with a smaller recurved lip; adnate plate extending almost to the tip. .. .. . 2. *P. Colensoi*.

*B. Genoplesium.* Leaf reduced to a sheathing bract just under the spike. Lip articulated on to a flat ribbon-like projection from the base of the column, usually mobile. Flowers very small,  $\frac{1}{10}$ – $\frac{1}{2}$  in. long.

Perianth pointing downwards, green. Lateral sepals ovate-lanceolate, not tipped with a gland. Lip oblong 3. *P. pumilum*.

Perianth horizontal, reddish. Lateral sepals narrow-lanceolate, acuminate, tipped by a minute gland. Lip lanceolate .. .. . 4. *P. rufum*.

1. *P. patens*, *R. Br. Prodr.* 318.—Stem stout or slender, 1–3 ft. high. Leaf sheathing the stem half-way up or rather more, the lamina shorter or longer than the spike. Spike rather lax, 2–5 in. long, many-flowered; bracts small, broad, obtuse. Flowers  $\frac{1}{4}$ – $\frac{1}{3}$  in. long, pale yellowish-green or whitish, sweet-scented. Ovary obovoid. Upper sepal ovate, acute, concave; lateral rather longer, lanceolate, quite free. Petals linear-oblong, obtuse. Lip sessile, as long as the sepals, erect at the base and then suddenly reflexed between the lateral sepals; adnate plate narrower than the disc and not extending much further up than the flexure of the lip; margins broad, thin, undulate. Column short; lateral lobes linear-oblong, obtuse, almost as long as the narrow erect rostellum, entire. Anther large, pointed, not quite equalling the rostellum.—*Hook. f. Fl. Tasm.* ii. 11, t. 111; *Benth. Fl. Austral.* vi. 339.

NORTH ISLAND: Auckland—Swamps at Maungatapere, Whangarei, *Carse!* Great Barrier Island, *Kirk!* Taranaki—Ngairu Swamp, abundant, *T. F. C.* December–January.

Easily distinguished from *P. Colensoi* by the much greater size, larger paler flowers, and longer lip, which has a much more conspicuous recurved lamina, the adnate plate not extending to the tip. The lateral lobes of the column are also much longer. It agrees well with Australian specimens of *P. patens*, except that the spike is usually denser.

2. *P. Colensoi*, *Hook. f. Fl. Nov. Zel.* i. 241.—Stem stout or slender, erect, 4–14 in. high. Leaf sheathing the stem for three-quarters its length or even more; lamina shorter than the spike or equalling it. Spike 1–3 in. long, many-flowered; bracts as short as the pedicel, broad, obtuse. Flowers about  $\frac{1}{2}$  in. long, dull-green or greenish-brown, slightly fragrant; ovary obovoid, gibbous. Upper sepal ovate-oblong, acute, concave; lateral rather longer, connate at the very base, lanceolate, acute, curved backwards. Petals linear-oblong, obtuse. Lip shorter than the sepals, sessile, ovate, tip acuminate, shortly recurved, adnate plate extending almost to the tip, margins undulate. Column very short, lateral lobes broadly notched, shorter than the rostellum. Anther broad, obtuse, not equalling the rostellum.—*Handb. N.Z. Fl.* 272. (?) *P. pauciflorum*, *Col. in Trans. N.Z. Inst.* xviii. (1886) 273.

NORTH AND SOUTH ISLANDS, STEWART ISLAND, ANTIPODES ISLAND: From the North Cape southwards, but rare and local to the north of Lake Taupo. Sea-level to 4500 ft. November–January.

A most abundant subalpine plant all through the mountains of the South Island. For some remarks on the fertilisation, see a paper by Mr. Thomson in the *Trans. N.Z. Inst.* xi. 425.

3. *P. pumilum*, *Hook. f. Fl. Nov. Zel.* i. 242.—Very slender, 6–16 in. high. Stem with a lacerated fibrous sheath at the base. Leaf reduced to a sheathing bract near the spike; lamina  $\frac{1}{2}$ –1 in. long, erect, usually reaching about half-way up the spike. Spike

dense, few- or many-flowered,  $\frac{1}{2}$ – $1\frac{1}{2}$  in. long. Flowers minute, the perianth about  $\frac{1}{10}$  in. long, curved, pointing downwards, greenish. Upper sepal ovate, acuminate, concave; lateral rather longer, free, ovate-lanceolate, acuminate. Petals the same shape as the lateral sepals, but shorter, and with the tips almost aristate. Lip articulate on a flat ribband-like projection from the foot of the column, mobile, oblong, acute, truncate at the base, not ciliate, disc almost wholly occupied by a thick adnate plate, which is obscurely 3-grooved towards the base. Column short, the lateral lobes broad, obliquely truncate and irregularly 2–3-notched at the tip. Anther large, apiculate, overtopping the small rostellum.—*Handb. N.Z. Fl.* 273.

NORTH ISLAND: Auckland—Dry hills from the North Cape to the Middle Waikato, not common. April–June.

4. *P. rufum*, *R. Br. Prodr.* 319.—Very similar in size and habit to *P. pumilum*, and like it with the leaf reduced to a sheathing bract just below the spike, the lamina very short and subulate. Spike few- or many-flowered,  $\frac{1}{2}$ – $\frac{3}{4}$  in. long. Flowers still more minute than in *P. pumilum*, the perianth about  $\frac{1}{12}$  in. long, horizontal, reddish or yellowish. Upper sepal ovate, acuminate, concave; the lateral much longer, quite free, lanceolate, acuminate, the points tipped with a small gland. Petals small, lanceolate, shorter than the upper sepal. Labellum articulate on a flat ribband-like projection from the foot of the column, mobile, lanceolate, acute, truncate at the base, adnate plate occupying most of the disc, thickest along the margins. Column very short, the lobes rather narrow, 2-toothed at the tip. Anther large, apiculate, overtopping the small rostellum.—*Benth. Fl. Austral.* vi. 344; *Fitzgerald, Austral. Orch.* ii. pt. 4. *P. nudum*, *Hook. f. Fl. Nov. Zel.* i. 242; *Handb. N.Z. Fl.* 272. *P. tunicatum*, *Hook. f. Fl. Nov. Zel.* i. 242. (?) *P. variegatum*, *Col. in Trans. N.Z. Inst.* xx. (1888) 208.

NORTH ISLAND: "Te Hawara, Port Nicholson, and Lake Taupo, *Colenso!*" (*Handbook*). SOUTH ISLAND: Marlborough—Port Underwood and Kenepuru, *Macmahon!*

The above description is drawn up from Mr. Macmahon's specimens, which correspond fairly well with the plate of *P. rufum* given by Mr. Fitzgerald in his "Australian Orchids." It is distinguished from the preceding species by the smaller horizontal usually reddish flowers, narrower lateral sepals tipped by a minute gland, much narrower lip, the adnate plate on which is thickest on the edges, and in the narrower lateral lobes of the column.

#### 10. CALEANA, R. Br.

Glabrous terrestrial herbs. Root of small rounded tubers on fleshy fibres. Leaf solitary, linear or lanceolate or oblong. Flowers solitary or 2–4 in a terminal raceme; bracts acute. Sepals and petals subequal, all linear; the upper sepal erect, the lateral sepals and petals spreading or deflexed (but the position apparently re-

versed through the ovary being recurved). Lip uppermost, jointed on to the base of the column or to a projection from it, mobile; claw linear, incurved; lamina ovate or oblong, peltate, undivided, entire, smooth or tuberculate. Column elongate, sometimes produced at the foot, broadly winged throughout its whole length, concave. Anther terminal, erect, 2-celled; pollinia 2-partite, granular.

A small genus of 4 species, all of them natives of Australia, 1 extending to New Zealand.

1. *C. minor*, R. Br. Prodr. 329.—Stem slender, wiry, almost filiform, 2-8 in. high, usually tinged with red. Leaf radical, about half as long as the stem, rather fleshy, channelled. Flowers 1-4, about  $\frac{1}{2}$  in. long including the ovary, greenish tinged with red, reversed; pedicels  $\frac{1}{4}$ - $\frac{1}{2}$  in.; bracts minute, acute. Sepals and petals narrow-linear, slightly dilated above the middle, nearly equal; upper sepal attached just above the top of the ovary, the lateral affixed to the basal projection of the column. Lip uppermost, very remarkable in shape; the lower portion claw-like and articulated on to the basal projection of the column; the upper part expanded into a broad lamina which is peltately attached to the claw; lamina convex above and covered with close-set reddish tubercles, which are largest towards the margins, under-surface smooth, concave. Column rather long, with a broad basal projection, broadly winged all round, concave, forming a horizontally placed cup or pouch.—*Cheesem. in Trans. N.Z. Inst.* xxiv. (1892) 411; *Kirk, l.c.* 425; *Benth. Fl. Austral.* vi. 366.

NORTH ISLAND: Auckland—Kaitiaki, R. H. Matthews! Rotorua, Rev. F. H. Spencer! Waioatapu, H. J. Matthews! December-January.

A most remarkable little plant. The column is horizontally placed, forming a broad pouch; the lamina of the lip, when at rest, is elevated by the slender elastic claw, and swings directly above it. When an insect alights on the lamina it overbalances, shutting up the insect within the concavity of the column. For a full account of the fertilisation of the genus, reference should be made to Mr. Fitzgerald's magnificent work on Australian Orchids (Vol. i. pt. 6).

#### 11. PTEROSTYLIS, R. Br.

Terrestrial leafy herbs. Root of small rounded tubers on long fleshy fibres. Leaves radical and cauline, either all similar or the radical broader and ovate or oblong, often subrosulate; the cauline lanceolate or linear or reduced to sheathing bracts. Flowers large or small, greenish, usually solitary, rarely several in a terminal raceme. Upper sepal erect, incurved, concave, conniving with the petals and forming a broad boat-shaped hood (*galea*). Lateral sepals adnate at the base to the foot of the column, more or less connate into an erect or recurved 2-lobed lower lip; the lobes often drawn out into long acuminate points. Petals lanceolate, falcate.

Lip attached by a short claw to the basal projection of the column, mobile; lamina linear or oblong, produced at the base above the claw into a long or short usually curved appendage. Column elongated, incurved, furnished on each side of the rostellum with a quadrangular or hatchet-shaped membranous wing, the base produced into a horizontal projection. Stigma on the face of the column below the wings, oblong. Anther terminal, erect, 2-celled; pollinia 4, granular, free.

About 40 species are known. Of the 11 found in New Zealand, 2 are common Australian plants, the others are endemic. The remainder of the genus is Australian, with the exception of one species in New Caledonia. The mode of fertilisation is most curious, and is well worth an attentive study. The upper sepal and petals connive, and form a hood, at the back of which the column is situated. The irritable lip hangs out of the entrance to the flower, and forms a convenient landing-place for insects. When touched by an insect it springs up, carrying the insect with it, and imprisoning it within the flower. The insect can only escape by crawling up the column and passing between the two membranous projecting wings, emerging directly in front of the anther. In doing this, it is first smeared with viscid matter from the projecting rostellum, and then drags away the pollinia, which can hardly fail to adhere to its sticky body. When visiting another flower, it must pass over the stigma before escaping, and is almost certain to leave some of the pollinia on its viscid surface. For a fuller account, see a paper by myself in *Trans. N.Z. Inst.* v. 352.

A. Antennæ. Lower lip erect, its lobes narrowed into long points embracing the galea.

\* No broad radical leaves. Cauline leaves linear, grass-like, sheathing the whole stem.

- Tall, 6-18 in. Leaves  $\frac{1}{2}$ - $\frac{3}{4}$  in. broad. Flower large, 2-3 in. long; sepals and petals produced into long filiform points . . . . . 1. *P. Banksii*.  
 Short, stout, 4-10 in. Leaves  $\frac{1}{2}$ - $\frac{3}{4}$  in. broad. Flower small,  $\frac{3}{4}$ -1 $\frac{1}{4}$  in. long; sepals and petals with short subulate points . . . . . 2. *P. australis*.  
 Slender, 4-10 in. Leaves  $\frac{1}{2}$ - $\frac{3}{4}$  in. broad. Flower small,  $\frac{1}{2}$ - $\frac{3}{4}$  in. long; sepals and petals with short subulate points . . . . . 3. *P. graminea*.

\*\* Radical leaves broad, oblong to ovate or orbicular, few or numerous and rosulate. Cauline leaves narrow, often reduced to sheathing bracts.

- Slender, 4-12 in. Lower leaves  $\frac{1}{2}$ -1 $\frac{1}{2}$  in., oblong; cauline 2-5, lanceolate, flat. Flower  $\frac{3}{4}$ -1 $\frac{1}{2}$  in.; galea not decurved . . . . . 4. *P. micromega*.  
 Stout or slender, 6-12 in. Lower leaves large, 1 $\frac{1}{2}$ -3 $\frac{1}{2}$  in., broadly oblong; cauline few, large, flat. Flower 1-1 $\frac{1}{2}$  in., galea much decurved at the tip . . . . . 5. *P. Oliveri*.  
 Stout, glabrous, 2-8 in. Lower leaves subrosulate, 1-1 $\frac{3}{4}$  in., elliptic-oblong; cauline of 1 or 2 sheathing bracts. Flower  $\frac{3}{4}$  in.; galea arched but not decurved . . . . . 6. *P. foliata*.  
 Small, 2-3 in. Lower leaves 2 or 3, large,  $\frac{3}{4}$ -2 in., broadly oblong; cauline wanting. Flower  $\frac{1}{2}$ - $\frac{3}{4}$  in. . . . . 7. *P. venosa*.  
 Slender, glabrous, 2-8 in. Lower leaves long-petioled; blade  $\frac{1}{2}$ - $\frac{3}{4}$  in., ovate; cauline narrow, flat. Flower  $\frac{1}{2}$ -1 in. Puberulous, 2-6 in. Lower leaves short-petioled; blade small, ovate; cauline of 2-4 sheathing bracts. Flowers  $\frac{1}{2}$ - $\frac{3}{4}$  in. . . . . 8. *P. trullifolia*.  
 . . . . . 9. *P. puberula*.

*B. Catochilus*. Lower lip reflexed. Basal appendage of lip entire, obtuse.

Leaves ovate-lanceolate. Flower solitary, large,  $\frac{3}{4}$ -1 in. long; lip filiform, clothed with golden-yellow hairs .. 10. *P. barbata*.

Leaves ovate. Flowers 2-8, small,  $\frac{1}{4}$  in. long; lip oblong, obtuse, glabrous .. .. . 11. *P. mutica*.

1. *P. Banksii*, *R. Br. ex A. Cunn. in Bot. Mag.* t. 3172.—Tall, slender, leafy, grassy, 6-18 in. high. Lower leaves reduced to scarious sheathing scales; cauline numerous, sheathing the whole stem, usually overtopping the flower but often shorter than it, 3-14 in. long,  $\frac{1}{4}$ - $\frac{1}{2}$  in. broad, narrow linear-lanceolate, acuminate, pale-green. Flower solitary, large, 2-3 in. long including the tails to the lateral sepals, green, often streaked with red or reddish-brown. Galea erect at the base and then curved forwards; upper sepal produced into a long caudate often filiform point; petals also caudate-acuminate or shortly filiform, but always much shorter than the upper sepal. Lower lip with the entire part broadly cuneate, the free lobes gradually narrowed into long filiform erect tails 1-2 in. long. Lip narrow linear-oblong, obtuse, its tip slightly exserted; basal appendage curved, repeatedly divided and penicillate at the tip. Column slender, more than half the length of the galea, upper lobe of wings with an erect subulate tooth at the outer angle; lower lobe narrow-oblong, obtuse.—*A. Cunn. Precur.* n. 313; *Raoul, Choix*, 41; *Hook. f. Fl. Nov. Zel.* i. 248; *Handb. N.Z. Fl.* 268. *P. emarginata*, *Col. in Trans. N.Z. Inst.* xv. (1883) 328. *P. patens*, *Col. l.c.* xviii. (1886) 270. *P. speciosa*, *Col. l.c.* xxii. (1890) 488. *P. auriculata*, *Col. l.c.* 489. *P. subsimilis*, *Col. l.c.* xxviii. (1896) 611.

NORTH AND SOUTH ISLANDS, STEWART ISLAND, CHATHAM ISLANDS: Abundant in shaded places from the North Cape southwards. Sea-level to 3500 ft. October-November.

The most widely spread of the New Zealand species. It varies much in size and degree of robustness, the size of the flower, and in the length of the filiform tails to the sepals and petals, &c. Mr. Colenso has made no less than 5 species based upon what appear to me to be exceedingly slight and inconstant differences. After a careful study of his descriptions and specimens I must confess my inability to distinguish any of them, even as varieties.

2. *P. australis*, *Hook. f. Fl. Nov. Zel.* i. 248.—Habit of *P. Banksii* but shorter, 4-10 in. high, rarely more. Leaves shorter and broader, seldom overtopping the flower,  $\frac{1}{2}$ - $\frac{3}{4}$  in. broad, linear-lanceolate, acute or acuminate. Flower small,  $\frac{3}{4}$ -1 $\frac{1}{4}$  in. long, including the points of the sepals. Galea much as in *P. Banksii*, but the upper sepal and petals are not produced into filiform points. Lower lip with the free lobes narrowed into short subulate erect points not exceeding the galea in length. Lip and column as in *P. Banksii*.—*P. Banksii* var. b, *Hook. f. Handb. N.Z. Fl.* 268.

SOUTH ISLAND: In various localities from Nelson to the south of Otago, but not common. STEWART ISLAND, CHATHAM ISLANDS: Abundant, *Lyall, Kirk! H. H. Travers, F. A. D. Cox! &c.* November-January.

No doubt very closely allied to *P. Banksii*, and to some extent connected with it by intermediate forms. But if it be merged with that species, then for the sake of consistency *P. graminea* should also be included, for it occupies just the same position on one side of *P. Banksii* that *P. australis* does on the other. It seems preferable to treat both as distinct though closely related species.

3. *P. graminea*, *Hook. f. Fl. Nov. Zel.* i. 248.—Habit of *P. Banksii*, but smaller and much more slender, 4-10 in. high. Leaves overtopping the flower or shorter than it, 1-5 in. long,  $\frac{1}{3}$ - $\frac{1}{4}$  in. broad, narrow-linear or narrow linear-lanceolate, acute or acuminate. Flower small,  $\frac{1}{2}$ - $\frac{3}{4}$  in. long, including the points of the sepals. Galea as in *P. Banksii*, but the upper sepal and petals, although acuminate, are not produced into filiform points or into very short ones. Lower lip with the free lobes narrowed into subulate or shortly filiform erect points almost equalling the galea. Lip and column as in *P. Banksii*.—*Handb. N.Z. Fl.* 268.

NORTH AND SOUTH ISLANDS, STEWART ISLAND: Not uncommon in shaded places in lowland districts from the North Cape southwards. September-November.

Differs from *P. Banksii* in the smaller size, narrower leaves, and smaller flower with very short tails to the sepals.

4. *P. micromega*, *Hook. f. Fl. Nov. Zel.* i. 248.—Slender, glabrous, 4-12 in. high. Lower leaves  $\frac{1}{2}$ -1 $\frac{1}{2}$  in. long,  $\frac{1}{4}$ - $\frac{1}{2}$  in. broad, ovate-oblong to linear-oblong or lanceolate, obtuse or acute, sessile or petiolate; cauline 2-5, smaller and narrower, sessile, flat, sheathing at the base, acute or acuminate. Flower large, solitary, erect,  $\frac{3}{4}$ -1 $\frac{1}{2}$  in. long. Galea erect at the base, then incurved, tip horizontal or nearly so; upper sepal narrow, acuminate; petals slightly shorter, broad, falcate, acuminate. Lower lip with the entire part cuneate, the free lobes very gradually narrowed into long filiform points embracing the galea, often quite 1 in. long. Lip narrow-linear, its tip exserted; basal appendage curved, penicillate. Column about half as long as the galea, upper lobe of wing with an erect subulate tooth, lower lobe oblong, obtuse.—*Handb. N.Z. Fl.* 268. *P. polyphylla*, *Col. in Trans. N.Z. Inst.* xxii. (1890) 489.

NORTH ISLAND: Auckland—Swamps near Lake Taupo, *Tryon!* near Tongariro, *H. Hill!* Wellington—Murimotu, *Petrie!* Karioi, *A. Hamilton!* swamps in the Wairarapa district, *Colenso!* Taranaki—Ngairu Swamp, *T. F. C.* December-January.

Best known by the slender habit, usually few radical leaves, numerous rather small flat cauline leaves, and large flower not decurved at the tip.

5. *P. Oliveri*, *Petrie in Trans. N.Z. Inst.* xxvi. (1894) 270.—Stout or slender, leafy, glabrous, 6-12 in. high. Lower leaves

few, large,  $1\frac{1}{2}$ – $3\frac{1}{2}$  in. long,  $\frac{3}{4}$ –1 in. broad, oblong-ovate or elliptic-oblong to oblong-lanceolate, acute, narrowed into a short broad petiole or almost sessile, thin and membranous, veins reticulated; cauline leaves 2 or 3, almost as long but narrower, lanceolate or oblong-lanceolate, acute or acuminate, flat, spreading, sheathing at the base. Flowers large, solitary or very rarely two,  $1$ – $1\frac{1}{2}$  in. long. Galea bent forwards from above the base and then curved sharply downwards so that the point often reaches the ovary; upper sepal produced into a long acuminate point; petals much shorter, falcate, acuminate. Lower lip with the entire part broadly cuneate, the free lobes gradually narrowed into long filiform points embracing the galea and sometimes  $1\frac{1}{2}$  in. long. Lip narrow-linear, obtuse; basal appendage short, curved, penicillate. Column slender, not half the length of the galea; wings with a short upper lobe bearing an erect subulate tooth at the outer angle, lower lobe very long, linear-oblong, obtuse.

SOUTH ISLAND: Nelson—Mount Arthur Plateau, *T. F. C. Canterbury*—Bealey, *Kirk!* Waimakariri Glacier, *T. F. C. Westland*—Kelly's Creek, *Petrie!* Otira Gorge, *Cockayne!* *T. F. C.* 1000–4000 ft. December–January.

Very close to *P. micromega*, but stouter, with much larger radical and cauline leaves, and with the flower very conspicuously decurved.

6. *P. foliata*, *Hook. f. Fl. Nov. Zel.* i. 249.—Rather stout, glabrous, 2–8 in. high. Lower leaves 2–5, subrosulate, sessile or petioled,  $1$ – $1\frac{3}{4}$  in. long, elliptic-oblong to linear-oblong, obtuse or acute, veins reticulated; cauline leaves reduced to 1 or 2 large sheathing erect lanceolate bracts  $\frac{1}{2}$ –1 in. long. Flower solitary, erect,  $\frac{3}{4}$  in. long. Galea erect at the base, curved forwards at the tip; upper sepal acute or acuminate; petals falcate, obtuse or subacute. Lower lip with the entire part short, broadly cuneate, the free lobes gradually narrowed into rather short filiform points embracing the galea but not much exceeding it. Lip linear-oblong, flat, obtuse; basal appendage short, curved, penicillate at the tip. Column not half the length of the galea, upper lobe of wing with a subulate tooth; lower lobe linear-oblong, obtuse.—*Handb. N.Z. Fl.* 268.

NORTH ISLAND: Ruahine Mountains and Cape Palliser, *Colenso!* Patangata, *Tryon!* SOUTH ISLAND: Marlborough, *Kirk!* Otago—*Buchanan!* Signal Hill, Millburn, Tuapeka, *Petrie!* Sea-level to 2500 ft. December–January.

Differs from *P. micromega* in the stouter habit, larger more reticulate and often decidedly rosulate radical leaves, cauline leaves reduced to sheathing bracts, smaller flowers with shorter points to the lateral sepals, and broader shorter lip.

7. *P. venosa*, *Col. in Trans. N.Z. Inst.* xxviii. (1896) 610.—Small, perfectly glabrous, 2–3 in. high. Leaves 2 or 3 near the base of the stem, large for the size of the plant,  $\frac{3}{4}$ –2 in. long, broadly

oblong to oblong-ovate or elliptic-oblong, obtuse or subacute, thin and membranous, veins conspicuously reticulated; cauline leaves wanting. Scape short; flower solitary,  $\frac{1}{2}$ – $\frac{3}{4}$  in. long. Galea erect at the base, sharply curved forwards towards the tip; upper sepal acute or acuminate; petals broadly falcate, acute. Lower lip broadly cuneate, the free lobes narrowed into filiform points exceeding the galea, sometimes recurved at the tips. Lip lanceolate, narrowed to a blunt point, rather thick, grooved, purplish; basal appendage penicillate at the tip. Column barely half as long as the galea, upper lobe of wing with an erect subulate point; lower lobe oblong, obtuse.—(?) *P. trifolia*, *Col. l.c.* xxxi. (1899) 281.

NORTH ISLAND: Ruahine Mountains, *Olsen!* SOUTH ISLAND: Nelson—Mount Frederic, near Westport, *Townson!* 2000–3500 ft.

So far as can be ascertained from the limited amount of material available, this is separated from *P. foliata* by the smaller size and proportionately larger leaves, the short scape, which wants the large sheathing bracts of *P. foliata*, the more sharply curved and more acute galea, and differently shaped lip.

8. *P. trullifolia*, *Hook. f. Fl. Nov. Zel.* i. 249.—Stem slender, glabrous, 2–6 in. high, seldom more. Radical leaves often wanting in flowering specimens or 1–4, in flowerless ones more numerous and subrosulate, petiolate; blade  $\frac{1}{4}$ – $\frac{1}{2}$  in. long, broadly ovate or orbicular-cordate or trowel-shaped, acute or obtuse; petiole as long or longer than the blade. Cauline leaves or bracts 3–5, flat, spreading,  $\frac{1}{2}$ –1 in. long, lanceolate or linear-lanceolate, acute or acuminate, the lower sometimes broader and petiolate. Flower solitary,  $\frac{1}{2}$ –1 in. long. Galea erect at the base and then gradually curved forwards; upper sepal lanceolate, acuminate; petals as broad, falcate, acuminate. Lower lip broadly cuneate, the lobes long and filiform, embracing the upper sepal and exceeding it. Lip linear, glabrous, obtuse, its tip exerted; basal appendage linear, much curved, penicillate at the tip. Column less than half the length of the galea; wings with a small triangular upper lobe or tooth; lower lobe oblong, obtuse.—*Handb. N.Z. Fl.* 269. *P. rubella*, *Col. in Trans. N.Z. Inst.* xviii. (1886) 271.

NORTH ISLAND: Lowland districts from the North Cape to Wellington, apparently rare and local to the south of the East Cape. SOUTH ISLAND: Marlborough—Mount Peter, *J. Macmahon!*

9. *P. puberula*, *Hook. f. Fl. Nov. Zel.* i. 249.—Stem slender, puberulous, especially below, 2–4 in. high. Leaves all radical, crowded in a rosette at the base of the stem, small, shortly petiolate,  $\frac{1}{2}$ – $\frac{3}{4}$  in. including the petiole, ovate or ovate-cordate, acute; bracts on the stem above the leaves 2–4, sheathing, erect, lanceolate, acuminate. Flower solitary, erect,  $\frac{1}{2}$  in. long. Galea erect, shortly and abruptly incurved towards the tip, the upper sepal acute, the petals as long or rather longer, obtuse. Lateral sepals united for nearly half their length into a narrow almost quadrangular lamina,

the lobes filiform, erect, separated by a broad truncate sinus which bears a small inflexed tooth in the middle. Lip linear-oblong, obtuse, its tip barely exerted; basal appendage linear, curved, penicillate at the tip. Column about half the length of the galea, the wings with a small erect triangular upper lobe or tooth, the lower lobe linear-oblong, obtuse.—*Handb. N.Z. Fl.* 269.

NORTH ISLAND: Auckland—Clay hills from the Kaipara Harbour southwards to the Thames and Middle Waikato, not common. SOUTH ISLAND: Nelson—Vicinity of Westport, *Townson!* September–October.

A distinct little plant, well marked by the puberulous stems, small rosulate leaves, the short blunt curved tip to the galea, and comparatively short filiform points to the lateral sepals.

10. *P. barbata*, *Lindl. Swan River App.* 53.—Stem stout or slender, glabrous, 4–8 in. high. Leaves radical, crowded at the base of the stem, often rosulate, erect, sessile,  $\frac{1}{4}$ – $\frac{3}{4}$  in. long, ovate-lanceolate or lanceolate, acute or acuminate. Stem above the leaves with 2–5 large loosely sheathing erect empty bracts. Flower solitary,  $\frac{3}{4}$ –1 in. long. Galea erect, incurved at the tip, oblong; upper sepal and petals both produced into short subulate points, the latter very narrow. Lower lip linear, deflexed, 2-lobed about half-way down, the lobes very narrow, acute or obtuse. Lip  $\frac{1}{2}$ – $\frac{3}{4}$  in. long, filiform, terete, exerted, pendulous, fringed with long golden yellow hairs and terminated by a large capitate or irregularly lobed purple gland; appendix very short, curved, penicillate at the tip. Column slender, erect; the wings each with a long erect subulate tooth on the front angle, the lower lobe narrow, ciliate.—*Benth. Fl. Austral.* vi. 362. *P. squamata*, *Hook. f. Fl. Nov. Zel.* i. 249; *Fl. Tasm.* ii. 20, t. 116; *Handb. N.Z. Fl.* 269 (not of *R. Br.*)

NORTH ISLAND: Auckland—Exact locality not stated, *Sinclair!* near Kaitaia, *R. H. Matthews!* Lower Thames Valley, from Kopu to Puriri and Kerikeri, *Adams!* between Mercer and Miranda, *T. F. C.*; Tirau and other localities in the Upper Thames Valley, *T. F. C.* October–November.

A very remarkable little plant, at once recognised by the filiform exerted lip, plumose with bright-yellow hairs. It is a common Tasmanian plant, and is also found in South Australia, Victoria, and New South Wales.

11. *P. mutica*, *R. Br. Prodr.* 328.—Rather stout, 2–5 in. high. Leaves radical, forming a rosette at the base of the stem, sometimes withering at the flowering season, shortly petiolate,  $\frac{1}{3}$ – $\frac{1}{2}$  in. long, ovate, acute, veins reticulated. Stem with 2–5 large sheathing bracts above the leaves. Raceme 2–8-flowered; flowers small, about  $\frac{1}{4}$  in. long, greenish-brown. Galea very broad, much incurved, obtuse or subacute at the tip. Lower lip small, reflexed, concave, nearly orbicular when spread out, 2-lobed almost to the middle. Lip on a very short flat claw, lamina broadly oblong, obtuse; appendage broad at the base, short and thick, entire, rounded or emarginate at the tip. Column erect; wings broad,

the lower lobe or auricle broad, obtuse.—*Hook. f. Fl. Tasm.* ii. 21, t. 117A; *Benth. Fl. Austral.* vi. 362; *Fitzgerald, Austral. Orch.* i. pt. 2; *Cheesem. in Trans. N.Z. Inst.* xv. (1883) 300. *P. tristis*, *Col. in Trans. N.Z. Inst.* xviii. (1886) 271.

NORTH ISLAND: Hawke's Bay—Waipawa River, *H. Hill!* SOUTH ISLAND: Canterbury—Lake Lyndon and Lake Grassmere, *J. W. Enys!* Otago—Lee Stream, *Sydney Fulton!* Horse Range, *Naseby,* St. Bathans, *Cambrian's,* *Petrie!* Sea-level to 2500 ft. November–January.

An abundant Australian plant, ranging from Queensland to Tasmania.

## 12. ACIANTHUS, R. Br.

Small tender terrestrial herbs. Root of rounded tubers at the end of long fleshy fibres. Leaf solitary, sessile, cordate. Flowers few or many in a raceme, rarely solitary; bracts usually small. Upper sepal erect or curved over the column, concave, rather narrow, acute or acuminate; lateral sepals narrower, often almost filiform, erect or spreading. Petals shorter than the sepals, subulate-lanceolate. Lip equalling the petals, sessile or nearly so, undivided, base with 2 adnate calli, disc smooth or papillose. Column elongated, erect or incurved, semiterete or winged; stigma cup-shaped, placed under the rostellum. Anther terminal, erect, 2-celled; pollinia 2 or 4 in each cell, granular.

A genus comprising 7 species: 4 in Australia, 2 in New Caledonia, and 1 in New Zealand.

1. *A. Sinclairii*, *Hook. f. Fl. Nov. Zel.* i. 245.—Stems slender, sometimes almost filiform, 1–6 in. high. Leaf near the base or almost half-way up the stem, sessile,  $\frac{1}{2}$ – $1\frac{1}{2}$  in. long, broadly ovate-cordate, acute or acuminate, deeply bilobed at the base, membranous, often purple beneath, veins reticulated. Flowers 2–12, shortly pedicelled,  $\frac{1}{4}$  in. diam., green; bracts ovate, acute, the lowest sometimes foliaceous. Upper sepal ovate-oblong, aristate, 3-nerved; lateral sepals and petals subulate-lanceolate, acuminate. Lip horizontal or deflexed, ovate-lanceolate, concave, base with 2 large calli, tip thickened and studded with minute fleshy papillae. Column arched over the lip, much thickened and expanded towards the tip. Pollinia 2 in each anther-cell, deeply bilobed.—*Handb. N.Z. Fl.* 264.

KERMADEC ISLANDS, NORTH ISLAND: Abundant in lowland districts throughout. SOUTH ISLAND: Marlborough—Pelorus Sound, *J. Macmahon!* Nelson—Dun Mountain, *Kirk!* near Westport, *W. Townson!* CHATHAM ISLANDS: Abundant, *F. A. D. Cox!* *Miss Seddon!* Sea-level to 2500 ft. May–August.

For an account of the fertilisation, see a paper by myself in *Trans. N.Z. Inst.* vii. 349.

## 13. CYRTOSTYLIS, R. Br.

Small delicate terrestrial herbs. Root of rounded tubers on long fleshy fibres. Leaf solitary, sessile, oblong to orbicular. Flowers few in a terminal raceme, often reduced to one; bracts small. Upper sepal linear or linear-lanceolate, erect or incurved, concave; lateral sepals and petals narrow-linear, spreading or deflexed. Lip horizontally spreading from the base of the column, undivided, oblong, flat, entire; base with 2 calli, produced into raised lines for some distance along the lamina. Column elongated, incurved, winged on each side towards the summit; stigma cup-shaped, placed just under the rostellum. Anther terminal, erect, 2-celled; pollinia 2 in each cell, falcate or lobed.

A genus of 2 closely allied species, one found in New Zealand, the other in Australia.

1. *C. oblonga*, Hook. f. *Fl. Nov. Zel.* i. 246.—Stems very slender, glabrous, 1–4 in. high. Leaf towards the base of the stem, sessile, spreading,  $\frac{1}{2}$ – $1\frac{1}{2}$  in. long, oblong or oblong-ovate, obtuse or subacute, cordate or rounded at the base, thin and membranous, flat, obscurely 3–5-nerved. Flowers solitary or in a 2–5-flowered raceme, greenish,  $\frac{3}{8}$  in. diam.; bracts small, ovate-lanceolate. Upper sepal narrow linear-obovate, erect; lateral sepals and petals narrow-linear, acute, spreading or deflexed. Lip as long as the sepals, linear-oblong, obtuse. Column slender, about  $\frac{3}{4}$  the length of the upper sepal. Pollinia 2 in each anther-cell, oblong-falcate.—*Handb. N.Z. Fl.* 264.

Var. *rotundifolia*.—Altogether like the type, but the leaf is orbicular-cordate,  $\frac{1}{2}$ – $1\frac{1}{2}$  in. diam.—*C. rotundifolia*, Hook. f. *Fl. Nov. Zel.* i. 246; *Handb. N.Z. Fl.* 264. *C. macrophylla*, Hook. f. *Fl. Nov. Zel.* i. c.

NORTH ISLAND: Not uncommon from the North Cape southwards. SOUTH ISLAND: Marlborough—Pelorus Sound, J. Rutland, J. Macmahon! Nelson—Buller Valley, T. F. C. Canterbury—Banks Peninsula, Armstrong; Broken River, J. D. Enys! T. F. C. Sea-level to 2500 ft. August–October.

I have been compelled to sink *C. rotundifolia* as a species. It differs in no respect except in the width of the leaf, and in several localities I have observed the two forms growing intermixed and gradually passing into each other.

## 14. CALOCHILUS, R. Br.

Glabrous terrestrial herbs. Root of oblong tubers. Leaves 1 or rarely 2 near the base of the stem, narrow-linear; usually there are 1 or 2 foliaceous sheathing bracts higher up. Flowers few in a terminal raceme, rather large, handsome; pedicels short; lower bract usually exceeding the ovary. Sepals almost equal, free; upper erect, broad, concave; lateral spreading. Petals smaller, broadly falcate. Lip as long or longer than the sepals, sessile, spreading or pendulous, undivided, the margins and whole surface except the narrow flexuous tip densely fringed with long hairs. Column short,

broadly winged; stigma broad, placed under the erect rostellum. Anther large, terminal, erect or incumbent, obtuse or pointed, 2-celled; pollinia granular.

A genus of 3 very closely related species, all natives of Australia, 2 of them extending to New Zealand as well.

Anther long, rostrate. Column-wing with a gland on each side near the base just within the front margin ..	1. <i>C. campestris</i> .
Anther short, obtuse. Column-wing without any gland, but 2 small erect lamellæ on each side of the base of the lip .. .. .	2. <i>C. paludosus</i> .

1. *C. campestris*, R. Br. *Prodr.* 320.—Stem stout, 6–18 in. high. Leaf usually solitary, rarely 2, much shorter than the stem, narrow-linear, thick, channelled; cauline leaves or bracts 1 or 2, sheathing. Flowers 2–8, greenish-purple; pedicels  $\frac{1}{2}$ –1 in. long; bracts acuminate. Upper sepal  $\frac{1}{2}$ – $\frac{3}{4}$  in. long, broadly ovate, acute, concave; lateral narrower. Petals shorter, broadly oblong, falcate, veined. Lip  $\frac{1}{2}$ – $\frac{3}{4}$  in. long; margins and upper surface except the slender flexuous tip covered with long reddish-purple hairs or fimbriæ, which are longest on the upper part of the lip, and shortest near the base, where they are reduced to clavate calli; usually there is a narrow strip across the very base of the lip which is smooth and bare. Column-wings dilated in front and produced into a rounded lobe on each side, on the inner face of which is a conspicuous gland. Anther long, triangular, rostrate.—*Benth. Fl. Austral.* vi. 315; *Fitzgerald, Austral. Orch.* i. pt. 4; *Kirk in Trans. N.Z. Inst.* xxiv. (1892) 427.

NORTH ISLAND: Auckland—Rotorua, Rev. F. H. Spencer! Petrie! November–December.

This doubtless has as wide a range as the following species, but so far I have seen no specimens except from Rotorua. These exactly match the plate in Fitzgerald's Australian Orchids, with the exception that the fimbriæ on the lip never show any trace of blue, but are always red.

2. *C. paludosus*, R. Br. *Prodr.* 320.—Very similar in habit and appearance to *C. campestris*, but usually (though not always) more slender, with a rather longer and narrower leaf. Flowers seldom more than 4. Sepals and petals much as in *C. campestris*. Lip longer, the surface and margins with long red fimbriæ, the linear bare tip longer, and the base with a thin longitudinal raised plate on each side. Column-wing dilated in front and produced into a rounded lobe on each side, not furnished with a gland on the inner face. Anther short, as broad as long, obtuse, neither acuminate nor rostrate.—*Benth. Fl. Austral.* vi. 316; *Fitzgerald, Austral. Orch.* i. pt. 4; *Buch. in Trans. N.Z. Inst.* xv. (1883) 240.

NORTH ISLAND: Auckland—Kaitiaki, R. H. Matthews! Aponga (near Whangarei), A. Thompson! Rotorua, Petrie! SOUTH ISLAND: Nelson—Vicinity of Collingwood, H. H. Travers! near Westport, W. Townson!

15. **LYPERANTHUS**, R. Br.

Terrestrial herbs, often black when dry. Stems rather stout. Leaves 1-3, sheathing at the base, broad or narrow. Flowers in a terminal raceme or spike, sometimes solitary; bracts large, sheathing. Upper sepal erect, incurved, broad, concave; lateral narrow, spreading or deflexed. Petals similar to the lateral sepals. Lip shorter than the sepals, with a broad erect claw sometimes dilated into small lateral lobes; lamina or middle lobe ovate or lanceolate, entire; disc with ridges or small calli. Column erect or incurved, not winged; stigma placed under the rostellum. Anther terminal, erect, 2-celled; pollinia 4, narrow, subterete, granular.

A somewhat ill-defined genus of 6 species, 4 of which are found in Australia, 1 in New Caledonia, and the remaining one in New Zealand.

1. **L. antarcticus**, *Hook. f. Fl. Antarct. ii. 544.*—Stems rather stout, 3-8 in. high. Leaves 1-3, sheathing at the base, 1-2½ in. long, the upper smaller, lanceolate or oblong-lanceolate, acute, rather coriaceous; veins numerous, parallel. Flowers 1-3, greenish, horizontal or nearly so, ½-¾ in. long; bracts large, cucullate, sheathing, ½-¾ in. long. Upper sepal large, broad, curved over the column, hooded, acute; lateral sepals and petals linear-subulate, acute. Lip with a very short claw; lamina ovate-oblong, obtuse or subacute, margins thick, disc with 5 or 6 slender longitudinal lamellæ. Column short, stout, curved.—*Handb. N.Z. Fl. 270.*

**SOUTH ISLAND:** Subalpine localities from Collingwood and the Spenser Mountains southwards, but not common. **STEWART ISLAND:** *Kirk!* **AUCKLAND ISLANDS:** *Le Guillon, Bolton, Kirk!* 2500 ft. to 4000 ft., descending to sea-level in Stewart Island and the Auckland Islands. December-February.

The upper sepal is much broader and more hooded than in any other species of the genus, the sepals and petals are less spreading, and the column shorter and broader.

16. **CALADENIA**, R. Br.

Slender terrestrial herbs, usually more or less pilose or villous, rarely glabrous. Root of small rounded tubers terminating fleshy fibres. Leaf solitary from near the base of the stem, linear or lanceolate, more rarely broader and oblong-lanceolate or oblong. Flowers on an erect slender scape, solitary or in few-flowered racemes; bracts small. Upper sepal erect or incurved, narrow, concave; lateral flat, spreading, or rarely all alike and spreading. Petals narrow, erect or spreading. Lip clawed on to the base of the column, undivided or 3-lobed, the lateral lobes when present erect, the middle lobe spreading or reflexed, the margins often toothed or fimbriate, the disc usually studded with linear or clavate sessile or stipitate calli. Column rather long, erect or incurved, more or less 2-winged above; stigma broad, prominent. Anther erect, terminal, 2-celled; pollinia granular.

About 30 species are known, all confined to Australia except the three following, which are endemic in New Zealand.

Slender. Leaf solitary, linear, ½-¾ in. broad.	Scape slender. Flower ¼-½ in. diam. Lip 3-lobed .. ..	1. <i>C. minor</i> .
Rather stout. Leaf solitary, linear, ¾-1 in. broad.	Scape stout. Flower ½-1 in. diam. Lip 3-lobed .. ..	2. <i>C. Lyallii</i> .
Rather stout. Leaves 2, oblong or lanceolate.	Flower ¾ in. diam. Lip undivided .. ..	3. <i>C. bifolia</i> .

1. **C. minor**, *Hook. f. Fl. Nov. Zel. i. 247, t. 56b.*—Stems very slender, 3-10 in. high, rarely more, glandular-pilose with spreading hairs. Leaf from near the base of the stem and always shorter than it, 1-8 in. long, ¼-½ in. broad, very narrow-linear, flat, striate, ciliate or pilose. Flower solitary or rarely 2, pink, about ½ in. diam. Sepals subequal, linear or linear-oblong, obtuse or subacute; upper sepal erect; lateral spreading or deflexed. Petals similar to the sepals, spreading. Lip shorter than the sepals, broad, 3-lobed; lateral lobes large, oblong, obtuse, erect, usually marked with transverse purplish bands; middle lobe lanceolate-deltoid, acuminate, reflexed, margins fringed with linear calli; disc with 2 continuous rows of bright-yellow stipitate calli. Column elongate, as long as the lip, incurved, broadly winged. Anther apiculate.—*Handb. N.Z. Fl. 267.* *C. variegata*, *Col. in Trans. N.Z. Inst. xvii. (1885) 248.*

Var. **exigua**.—Stem shorter and still more slender, almost filiform, 2-4 in. high. Sepals and petals lanceolate, acuminate. Middle lobe of lip with a single marginal gland on each side; disc with 2 rows of calli as in the type. Perhaps a distinct species.

**NORTH AND SOUTH ISLANDS:** From the North Cape to Otago, not uncommon. Sea-level to 2000 ft. September-December. Var. *exigua*: Kaitaia (Mongonui County), *R. H. Matthews!*

2. **C. Lyallii**, *Hook. f. Fl. Nov. Zel. i. 247.*—Rather stout, 4-12 in. high, pilose with long soft hairs. Leaf from near the base of the stem and much shorter than it, ¾-1 in. broad, narrow-linear, rather thick, channelled, sparingly pilose on the margins and under-surface. Scape stout, with a sheathing bract about the middle, 1-2-flowered. Flower large, ½-1 in. diam. Upper sepal ¾-1 in. long, obovate-oblong, erect or incurved, concave; lateral elliptic-oblong. Petals similar to the lateral sepals. Lip about half as long as the lateral sepals, 3-lobed; lateral lobes broad, jagged at the tip, often banded with purple; middle lobe small, recurved; disc with 4 rows of stipitate calli. Column rather long, broadly winged, incurved; anther shortly apiculate.—*Handb. N.Z. Fl. 267.*

**SOUTH ISLAND, STEWART ISLAND, AUCKLAND ISLANDS.**—Not uncommon in subalpine localities. Usually from 2500 ft. to 5000 ft., but descends to sea-level in the Auckland Islands. December-January.

A handsome little plant, much more robust than *C. minor*, and with much larger flowers.



3. *C. bifolia*, Hook. f. *Fl. Nov. Zel.* i. 247.—Stout or slender, glandular-pubescent, 3–9 in. high. Leaves two together towards the base of the stem, spreading, 1–2½ in. long, variable in shape, one usually much broader than the other, ovate or oblong to ovate-lanceolate or lanceolate, acute, sparingly glandular-pubescent, margins ciliate. Scape 1-flowered, with a sheathing bract a little distance below the flower. Flower white with a tinge of pink, nearly 1 in. diam. when fully expanded. Upper sepal narrow-oblong, obtuse, erect, concave; lateral spreading, linear-lanceolate. Petals shorter and narrower. Lip sessile by a narrow base, spreading, orbicular-obovate, rounded at the tip, undivided, margin entire; disc with two almost continuous lines of yellow calli extending from the middle to the base. Column elongate, incurved, 2-winged, wings not produced behind the anther.—Hook. f. *Handb. N.Z. Fl.* 267. *C. macrophylla*, Col. in *Trans. N.Z. Inst.* xvii. (1895) 396. *Chiloglottis Traversii*, F. Muell. *Veg. Chath. Is.* 51.

NORTH AND SOUTH ISLANDS, STEWART ISLAND, CHATHAM ISLANDS, AUCLAND ISLANDS: Not uncommon in upland districts from Lake Taupo and Mount Egmont southwards. Ascends to 4500 ft., descends to sea-level in the extreme south and in the outlying islands. December–January.

A curious plant, the genus of which is doubtful. It was referred to *Chiloglottis* by Mueller, and certainly is allied to it in habit, but it wants the essential character of the wings of the column produced into 2 lobes behind the anther. On the whole I think it is best retained in *Caladenia*.

#### 17. CHILOGLOTTIS, R. Br.

Terrestrial herbs, with small underground tubers. Leaves 2, radical or nearly so, oblong or linear-oblong. Scape 1-flowered, with a solitary bract below the flower. Upper sepal erect, incurved, concave, narrowed at the base; lateral narrow-linear or terete, spreading or reflexed. Petals lanceolate, falcate. Lip attached to the base of the column by a short or long claw, ovate or obovate, undivided; disc with variously arranged calli. Column elongated, incurved, winged; wings produced at the top into 2 erect lobes often equalling the anther. Stigma placed just under the rostellum. Anther terminal, erect, 2-celled; pollinia 4, granular.

A small genus of 7 species, 6 of which are natives of Australia, one of them extending to New Zealand, the remaining one confined to New Zealand. The genus differs from *Caladenia* principally in the 2-leaved stem and in the wing of the column extending behind the anther. *Caladenia bifolia* has the habit of *Chiloglottis*, but the column-wing is that of *Caladenia*, in which genus I have retained it.

Stout, upper sepal broad ovate-lanceolate; lateral sepals and petals erect. Lip very shortly clawed, trowel-shaped. Slender. Upper sepal linear-spathulate. Petals deflexed.

Lip with a very long narrow claw, lamina rhomboid .. 2. *C. formicifera*.

1. *C. cornuta*, Hook. f. *Fl. Antarct.* i. 69.—Usually rather stout, perfectly glabrous, 2–5 in. high. Leaves 2, close together, petiolate, spreading, 1–3 in. long, ½–1 in. broad, oblong or linear-oblong or oblong-lanceolate, acute or subacute, flat, rather fleshy when fresh; veins parallel, connected by transverse veinlets. Scape very short at first, but lengthening as the flower withers and sometimes 4–8 in. long in fruit, 1-flowered or very rarely 2-flowered; bract sheathing. Flower about ½ in. diam., green, sometimes spotted with purple. Upper sepal broadly ovate-lanceolate, acuminate, erect. Lateral sepals placed in front of the lip, linear-lanceolate. Petals ovate-lanceolate, acuminate, erect. Lip triangular-cordate or trowel-shaped, acute, concave; disc with 3 large stalked rounded calli near the base, 2 linear ones on each side higher up, and 3 smaller rounded ones between them. Column curved forwards, winged; the wings expanded above and produced upwards into 2 lobes exceeding the anther.—*Handb. N.Z. Fl.* 269.

NORTH AND SOUTH ISLANDS, CHATHAM ISLANDS, STEWART ISLAND, ANTIPODES ISLAND, AUCLAND AND CAMPBELL ISLANDS: Moist shaded places from Kaitaia and Mongonui southwards, not common. Sea-level to 3000 ft. October–December.

The calli on the labellum probably vary in number and shape, judging from Hooker's description in "Flora Antarctica."

2. *C. formicifera*, Fitzgerald, *Austral. Orch.* i. 3 (1877).—Slender, delicate, 2–3 in. high. Leaves 2, close together, sessile, spreading, 1–2 in. long, linear-oblong or oblong-lanceolate, obtuse, thin and membranous, margins often undulate when fresh; veins parallel, connected by transverse veinlets. Scape 2–3 in. high, 1-flowered; bract near the top, sheathing. Flower about ½ in. long. Upper sepal linear-spathulate, erect, acuminate; lateral about the same length, linear, acuminate. Petals linear-lanceolate, abruptly deflexed, about as long as the sepals. Lip horizontal or ascending, contracted below into a long and narrow claw, above suddenly expanded into a short and broad spoon-shaped or rhomboid lamina, the tip of which is usually reflexed; disc with numerous calli, the largest of which is placed at the base, and projects from it, with a kind of double head, towards the column; in front of this is a large flat heart-shaped gland, and rows of smaller calli reach the apex of the lip. Column arched forward, broadly winged.—*Cheesem. in Trans. N.Z. Inst.* xxxiii. (1901) 312.

NORTH ISLAND: Auckland—Kaitaia (Mongonui County), R. H. Matthews! September–October.

A very remarkable little plant, previously known only from eastern Australia. Mr. Matthews's specimens agree in all respects with Mr. Fitzgerald's beautiful plate.

18. **ADENOCHILUS**, Hook. f.

Slender terrestrial herbs. Leaf solitary, placed near the middle of the stem, ovate. Peduncle slender, 1-flowered, with 1 or 2 sheathing bracts between the flower and the leaf, the upper of which sometimes bears in its axil the minute rudiment of a second flower. Flower small. Upper sepal erect, incurved, concave or almost galeate; lateral lanceolate, placed under the lip. Petals linear-lanceolate, almost equalling the sepals. Lip shortly clawed on to the base of the column, 3-lobed; lateral lobes large, erect; middle lobe smaller, caudate, reflexed; disc and middle lobe with several rows of small stalked calli. Column slender, curved, winged; wings produced upwards into 2 toothed lobes. Stigma prominent, placed just under the rostellum. Anther terminal, erect, 2-celled; pollinia 4 in each cell, granular.

The genus is limited to two species: one endemic in New Zealand, the other (*A. Nortoni*, Fitzgerald) in Australia. It is closely allied to both *Caladenia* and *Chiloglottis*, differing from the former in the wing of the column extending behind the anther, and from the latter in the solitary leaf and glandular-pubescent perianth.

1. *A. gracilis*, Hook. f. *Fl. Nov. Zel.* i. 246, t. 56A.—Stem slender, glabrous, 5–10 in. high. Leaf sessile half-way up the stem,  $\frac{1}{2}$ –1 in. long, ovate or ovate-oblong, acute, membranous, veins reticulated. Flower about  $\frac{1}{2}$  in. diam., more or less finely glandular-pubescent. Ovary narrow, cylindrical,  $\frac{1}{2}$ – $\frac{3}{4}$  in. long. Upper sepal adnate to the back of the column towards the base, acuminate; lateral sepals and petals subsimilar, erect, acuminate. Lip much shorter than the sepals and petals and almost concealed by them; middle lobe much smaller than the lateral, caudate, reflexed; calli numerous, stipitate, yellow. Column broadly winged for its whole length, wings produced upwards behind the anther into two broad toothed lobes.—*Handb. N.Z. Fl.* 265.

NORTH ISLAND: Forests near Lake Waikaremoana, *Colenso*! SOUTH ISLAND: Nelson—Near Foxhill, *P. Lawson*! Buller Valley, *T. F. C.*; Mount Owen, *Townson*! Otago—Mount Maungatua, forests to the west of Lake Te Anau, *Petrie*! near Lake Hauaroa, *G. M. Thomson*! 500–2500 ft. November–January.

19. **TOWNSONIA**, n. gen.

A small slender terrestrial herb. Root of creeping fleshy caudicles thickened here and there into small tubers. Radical leaves 1–3 from the caudicles, rarely at the base of the flowering-stem, petiolate, ovate-orbicular. Cauline leaf or empty bract solitary half-way up the stem, sessile, ovate, acute, often much reduced in size. Flowers 1 or 2, small; perianth horizontal or deflexed. Upper sepal much incurved, broad, concave, almost galeate; lateral placed in front of the lip, lanceolate, margins involute. Petals minute, erect. Lip clawed on to the base of the

column; lamina erect, undivided, broadly ovate-rhomboid, subcordate at the base, entire, margins involute and clasping the column towards the base; disc smooth, without calli or ridges, or with an obscure thickening on each side near the base. Column rather shorter than the lip, erect, broadly and equally winged from the base; wings not continued upwards behind the anther. Stigma prominent, placed just under the small rostellum. Anther terminal, erect, 2-celled; pollinia free, granular.

A very curious little plant. It is clearly allied to *Adenochilus*, of which it has the habit, but differs in the smooth undivided lip, minute petals, and in the column-wings not being produced upwards behind the anther. The smooth undivided lip also separates it from *Chiloglottis*, *Caladenia*, *Burnettia*, and other allied genera. Believing it to form the type of a new genus, I have much pleasure in dedicating it to its discoverer, Mr. W. Townson, of Westport, to whom I am much indebted for specimens and information respecting the botany of the north-western portion of the South Island.

1. *T. deflexa*, *Cheesem.*—Very slender, 3–6 in. high. Radical leaves on slender petioles  $\frac{1}{2}$ –1 $\frac{1}{2}$  in. long; blade  $\frac{1}{4}$ – $\frac{1}{2}$  in., broadly oblong or orbicular-ovate, obtuse or apiculate, rounded or subcordate at the base, thin and membranous, veins reticulated. Cauline leaf ovate, acute, often very small and scale-like. Flowers small,  $\frac{1}{8}$ – $\frac{1}{4}$  in. long, greenish.

SOUTH ISLAND: Nelson—Vicinity of Westport, *Townson*! November–December.

20. **CORYSANTHES**, R. Br.

Dwarf very delicate succulent terrestrial herbs. Root of small rounded tubers on fleshy caudicles. Leaf solitary, ovate-cordate or orbicular or reniform. Flower solitary, large for the size of the plant, at first almost sessile on the leaf, but peduncle elongating considerably in fruit. Upper sepal large, erect and incurved, helmet-shaped; lateral free, small and linear, or long and filiform. Petals similar to the lateral sepals but smaller, sometimes wanting. Lip large, the lower portion tubular, the margins meeting behind the column and enclosing it; base with a rounded auricle on each side of the column or with a hollow conical spur; upper part truncate or expanded into a broad abruptly reflexed limb; margins entire or denticulate or fimbriate. Column short, straight, 2-winged at the top; stigma broad, placed just under the rostellum. Anther large, terminal, erect, 2-celled; pollinia 4, powdery, free.

A very curious genus of about 16 species, found in Malaya, Australia, and New Zealand, the species of each country being endemic.

*A. Lip produced downwards into 2 conical spurs at the base. Lateral sepals and petals minute.*

Leaf  $\frac{1}{4}$ – $\frac{1}{2}$  in., sessile, ovate-cordate .. .. 1. *C. Cheesemanii*.

B. Lip with 2 rounded orifices at the base. Lateral sepals and petals filiform, longer than the lip (except in *C. Matthewsii*).

- Leaf  $\frac{1}{2}$ -1 in., sessile, ovate- or orbicular-cordate. Lateral sepals and petals about half as long as the lip. Lip truncate, entire or minutely denticulate .. .. 2. *C. Matthewsii*.  
 Leaf  $\frac{3}{4}$ -1 $\frac{1}{2}$  in., sessile, ovate-oblong, rounded or cordate at the base. Lip truncate, coarsely toothed or fimbriate.. 3. *C. oblonga*.  
 Leaf  $\frac{1}{2}$ -2 in., sessile, oblong-ovate, acuminate. Upper sepal acuminate. Lip bent forwards and downwards, acuminate.. .. 4. *C. rivularis*.  
 Leaf  $\frac{1}{2}$ -1 $\frac{1}{2}$  in., sessile or shortly petiolate, broadly oblong or orbicular, apiculate. Upper sepal acute. Lip abruptly reflexed and expanded, apex acute .. .. 5. *C. rotundifolia*.  
 Leaf  $\frac{1}{2}$ -2 in., petiolate, orbicular or reniform, 3-lobed at the tip. Upper sepal obtuse. Lip abruptly reflexed and expanded, apex rounded .. .. 6. *C. triloba*.  
 Large and stout, 2-8 in. high. Leaf on a petiole  $\frac{1}{2}$ -3 in. long; lamina  $\frac{1}{2}$ -3 in., broadly oblong or orbicular. Upper sepal acute. Lip large, abruptly reflexed and much expanded .. .. 7. *C. macrantha*.

1. *C. Cheesemanii*, *Hook. f. ex T. Kirk in Trans. N.Z. Inst.* iii. (1871) 180.—A very small species,  $\frac{1}{2}$ -1 in. high when in flower, rarely more. Leaf sessile,  $\frac{1}{4}$ - $\frac{1}{2}$  in. long, ovate-cordate or orbicular-cordate, apiculate, membranous, veins conspicuous when dry. Flower sessile or shortly peduncled, about  $\frac{3}{8}$  in. long, dull-purple; bract short, sheathing. Upper sepal very large, helmet-shaped, curved over the lip, obtuse. Lateral sepals minute, subulate, erect, placed between the basal spurs of the lip. Petals frequently wanting, when present very minute, deflexed, placed under or behind the basal spurs of the lip. Lip very large, tubular, the margins involute and meeting behind the column and enclosing it, the base produced downwards on each side into a short conical spur; the mouth expanded and abruptly recurved; margins entire. Column short, stout, erect, with a large fleshy gland at the base. Anther terminal, very large. Capsule  $\frac{1}{2}$  in. long, linear-oblong, elevated on the greatly elongated peduncle, which is sometimes over 6 in. long.—*IC. Plant.* t. 1120.

NORTH ISLAND: Auckland—Kaitaia, *R. H. Matthews!* vicinity of Auckland, *T. F. C.* SOUTH ISLAND: Near Westport, *W. Townson!* June-July.

A very curious little plant, probably not uncommon, but easily overlooked, from its small size and early flowering-period. It is very closely allied to the Australian *C. bicalcarata*, and may prove identical with it.

2. *C. Matthewsii*, *Cheesem. in Trans. N.Z. Inst.* xxxi. (1899) 351.—Small, delicate,  $\frac{3}{4}$ -1 $\frac{1}{2}$  in. high. Leaf sessile,  $\frac{1}{2}$ -1 in. long, ovate-cordate or orbicular-cordate, acute or obtuse, membranous when dry, showing 1 or 2 circular veins on each side of the midrib connected by transverse veinlets. Flower shortly peduncled, about  $\frac{3}{8}$  in. long, horizontal or drooping, purplish-green; bract small, erect. Upper sepal very narrow at the base, broadened above and

hood-shaped, arched over the lip. Lateral sepals and petals small, linear-subulate, seldom more than  $\frac{1}{2}$  as long as the lip. Lip large, involute, the margins meeting behind the column and enclosing it, orbicular-cordate when spread out; base with a rounded auricle on each side; apex truncate, entire or very slightly denticulate; disc with a thickened patch covered with deflexed hairs. Column short, stout, curved, swollen in front at the base.

NORTH ISLAND: Auckland—Kaitaia (Mongonui County), *R. H. Matthews!* July-August.

Clearly allied to *C. oblonga*, but the flower is larger, the lateral sepals and petals much reduced in size, the upper sepal narrower at the base and more hood-shaped at the top, and the margin of the lip is not coarsely fringed.

3. *C. oblonga*, *Hook. f. Handb. N.Z. Fl.* 266.—Variable in size,  $\frac{1}{2}$ -2 in. high. Leaf sessile,  $\frac{3}{4}$ -1 $\frac{1}{2}$  in. long, ovate-oblong, apiculate, rounded or cordate at the base, thin and membranous, conspicuously veined when dry. Flowers small, shortly peduncled, solitary or very rarely two together, about  $\frac{1}{2}$  in. long, reddish-purple; bract rather large, sometimes foliaceous, erect. Upper sepal narrow, concave, oblong when spread out, obtuse or apiculate, arched over the lip. Lateral sepals and petals filiform,  $\frac{1}{4}$ - $\frac{3}{8}$  in. long. Lip involute, the margins meeting behind the column and enclosing it, broadly semicordate when spread out; base with a rounded auricle or orifice on each side; apex truncate, coarsely toothed or fimbriate, centre of disc with minute dentiform papillæ. Column short, stout, curved to the front, with a swelling at the base.—*Nematoceras oblonga*, *Hook. f. Fl. Nov. Zel.* i. 250, t. 57B.

NORTH AND SOUTH ISLANDS, STEWART ISLAND: Not uncommon on moist shaded banks from the North Cape southwards. Sea-level to 2000 ft. September-November.

4. *C. rivularis*, *Hook. f. Handb. N.Z. Fl.* 266.—Very delicate and membranous, 1-2 $\frac{1}{2}$  in. high. Leaf sessile,  $\frac{1}{2}$ -2 in. long, ovate or oblong-ovate, acuminate, deeply cordate or almost 2-lobed at the base, very thin and membranous, veins conspicuous, reticulated. Flower shortly pedunculate or sessile between the lobes of the leaf,  $\frac{1}{2}$ - $\frac{1}{2}$  in. long; bract narrow, acuminate. Upper sepal narrow, concave, arched over the lip, gradually tapering into a long filiform point. Lateral sepals and petals filiform, 1-2 in. long, the petals usually exceeding the sepals. Lip involute, the margins meeting behind the column and enclosing it, broadly ovate-cordate when spread out; base with a rounded auricle or orifice on each side; upper portion curved forwards and downwards, acuminate or apiculate, margins undulate, entire. Column very short, stout, erect.—*Nematoceras rivularis*, *Hook. f. Fl. Nov. Zel.* i. 251.

NORTH AND SOUTH ISLANDS, STEWART ISLAND: In damp wooded ravines from the North Cape southwards, but often local. Sea-level to 2000 ft. September-November.

A very remarkable and distinct species, easily recognised by the thin acuminate leaf, very long filiform petals and lateral sepals, by the filiform point to the upper sepal, and acuminate lip.

5. *C. rotundifolia*, *Hook. f. Handb. N.Z. Fl.* 266.—Variable in size,  $\frac{1}{2}$ –2 in. high. Leaf sessile or shortly petiolate,  $\frac{1}{2}$ –1 $\frac{1}{4}$  in. long, broadly oblong or orbicular, tip rounded and apiculate, deeply cordate or 2-lobed at the base, rather fleshy, membranous when dry, veins reticulated. Peduncle at first very short, but elongating as the flower withers. Flower  $\frac{1}{2}$  in. long, dull-purple or purplish-green; bract short. Upper sepal narrow, concave, arched over the lip, acuminate. Lateral sepals and petals filiform, 1–1 $\frac{1}{2}$  in. long. Lip tubular below, the margins meeting behind the column and enclosing it, base with a rounded auricle on each side; upper part abruptly recurved and expanded, tip acute, margins very minutely denticulate. Column short, stout, bent backwards.—*C. orbiculata*, *Col. in Trans. N.Z. Inst.* xxiii. (1891) 389. *Nematoceras rotundifolia*, *Hook. f. Fl. Nov. Zel.* i. 251.

NORTH AND SOUTH ISLANDS, STEWART ISLAND, AUCKLAND AND CAMPBELL ISLANDS: Moist wooded ravines throughout, but often local. Sea-level to 2500 ft. September–December.

This may not be the *C. rotundifolia* of the Handbook, which is described as having a truncate lip. It differs from *C. rivularis* in the more coriaceous leaf, with a rounded tip, in the upper sepal not being produced into a filiform point, and in the broader reflexed portion of the lip. From small forms of *C. macrantha* it is best distinguished by the almost sessile leaf and much smaller lip with an acute or acuminate tip. Mr. R. H. Matthews sends me specimens from Kaitaia with the leaves deeply lobed on each side, so as to be almost panduriform.

6. *C. triloba*, *Hook. f. Handb. N.Z. Fl.* 265.—Rather stout, variable in size. Leaf on a petiole  $\frac{1}{2}$ –2 in. long; blade  $\frac{1}{2}$ –1 $\frac{1}{2}$  in. diam., reniform or orbicular, more or less distinctly 3-lobed at the tip, middle lobe acute, cordate at the base, fleshy when fresh, membranous when dry. Peduncle at first short, but elongating as the flower withers, and in fruit often 4–8 in. long. Flower  $\frac{1}{2}$ – $\frac{3}{4}$  in. long, dull-purple; bract rather small. Upper sepal narrow at the base, dilated above, obovate-spathulate when spread out, arched over the lip, concave, obtuse at the tip. Lateral sepals and petals filiform, erect,  $\frac{1}{2}$ –2 in. long. Lip involute, tubular below, the margins meeting behind the column and enclosing it, and with a rounded auricle or orifice at the base on each side; upper part abruptly reflexed and much expanded laterally and downwards, forming a broad saucer-like entrance to the flower; margins erose or nearly entire. Column short, stout, bent backwards.—*C. hypogæa*, *Col. in Trans. N.Z. Inst.* xvi. (1884) 336. *Nematoceras triloba*, *Hook. f. Fl. Nov. Zel.* i. 250.

NORTH AND SOUTH ISLANDS, STEWART ISLAND: Shaded places from the North Cape southwards, but often local. Sea-level to 2000 ft. July–September.

7. *C. macrantha*, *Hook. f. Handb. N.Z. Fl.* 266.—Much larger than the other species, 2–8 in. high or more. Leaf on a petiole  $\frac{1}{2}$ –3 in. long; lamina  $\frac{3}{4}$ –2 in. diam., broadly oblong or orbicular, obtuse or apiculate or rarely 3-lobed at the tip, cordate or 2-lobed at the base, thick and fleshy when fresh, thin and membranous when dry, veins finely reticulate. Peduncle from the base of the petiole, at first short, but elongating as the flower withers, often 4–10 in. long in fruit. Flower large,  $\frac{1}{2}$ –1 in. long, dark-purple; bract small. Upper sepal narrow, concave, arched over the lip, somewhat expanded above, acute or acuminate. Lateral sepals and petals filiform, 1–2 in. long. Lip large, tubular below, the margins meeting behind the column and enclosing it, base with a rounded auricle on each side, upper part abruptly recurved and much expanded all round, margins undulate, minutely erose or denticulate. Column short, stout, bent backwards.—*C. papillosa*, *Col. in Trans. N.Z. Inst.* xvi. (1884) 337. *Nematoceras macrantha*, *Hook. f. Fl. Nov. Zel.* i. 229, t. 57A.

NORTH AND SOUTH ISLANDS, STEWART ISLAND, CHATHAM ISLANDS, AUCKLAND AND CAMPBELL ISLANDS: Not uncommon in damp shaded places throughout. Sea-level to 2500 ft. October–December.

Closely allied to *C. triloba*, but much larger, the leaves rarely 3-lobed at the tip, the upper sepal acute or acuminate, and the lip larger. Both it and *C. triloba* frequently have the peduncle bent backwards, so that the flower lies with the upper sepal undermost and the lip above.

## 21. GASTRODIA, R. Br.

Leafless terrestrial brownish herbs. Root long, tuberous, usually parasitic on the roots of other plants. Stem simple, erect, furnished with lax sheathing scales. Flowers in a terminal raceme. Sepals and petals connate into a ventricose 5-lobed tube more or less slit on the anterior side. Lip shorter than the perianth, attached at the base to the foot of the column, and adnate at the back to the perianth-tube; lamina erect, furnished with longitudinal raised lines or naked, margins undulate. Column long or short, narrowly 2-winged; rostellum small; stigma near the base of the column, prominent. Anther lid-like, incumbent; pollinia free, granular.

A small genus of 8 or 9 species, ranging from New Zealand and Australia northwards to Malaya, the Himalayas, China, and Japan.

- |   |                             |
|---|-----------------------------|
| Raceme 2–8 in., many-flowered. Perianth $\frac{3}{4}$ in. Column elongated, $\frac{3}{4}$ the length of the lip .. .. .                                       | 1. <i>G. sesamoides</i> .   |
| Raceme 6–12 in., very many flowered. Perianth $\frac{1}{2}$ in. Column very short, barely $\frac{1}{2}$ the length of the lip .. .. .                         | 2. <i>G. Cunninghamii</i> . |
| Stem slender, almost filiform. Raceme 1–3 in., 3–5-flowered. Perianth $\frac{1}{2}$ in. Column very short, barely $\frac{1}{2}$ the length of the lip .. .. . | 3. <i>G. minor</i> .        |

*G. Hectori*, Buch. in Trans. N.Z. Inst. xix. (1887) 214, is shown by the specimens in Mr. Buchanan's herbarium to be a *Prasophyllum*, probably *P. patens*, R. Br.

1. *G. sesamoides*, R. Br. *Prodr.* 330.—Root very long and tuberous. Stem stout or slender, 1–2½ ft. high, mottled grey; sheathing scales loose, truncate or with an obtuse point. Raceme 2–8 in. long, many-flowered; bracts scarious, broadly ovate, shorter than the pedicels. Flowers brownish-white, about ¾ in. long without the ovary, drooping. Perianth ventricose, gibbous at the base, shortly 5-lobed; lobes short and broad, ovate, constricted at the base. Lip slightly shorter than the perianth; lamina oblong, with 2 thick ridges up the median line, which coalesce into one near the tip, margins much crisped and undulate. Column elongate, almost as long as the lip, angular, narrowly winged above; stigma a large protuberance at the very base.—*Hook f. Fl. Tasm.* ii. 31, t. 126; *Benth Fl. Austral.* vi. 309; *Fitzgerald, Austral. Orch.* ii. pt. 5; *Petrie in Trans. N.Z. Inst.* xxvi. (1894) 272.

NORTH ISLAND: Auckland—Kaitia, R. H. Matthews! Northern Wairoa, T. F. C.; Great Barrier Island, Kirk! near Auckland, T. F. C.; East Cape district, Adams and Petrie! SOUTH ISLAND: Westland—Kelly's Creek, Petrie! Sea-level to 1500 ft. December–January.

The long slender column at once separates this from the following species, which it otherwise much resembles. In Australia it ranges from Queensland to Tasmania.

2. *G. Cunninghamii*, Hook. f. *Fl. Nov. Zel.* i. 251.—Habit and appearance of *G. sesamoides* but usually smaller and more slender, 1–3 ft. high or even more. Stem brownish, often striped and spotted with purple or fawn colour. Raceme 6–10 in. long, very many-flowered, pedicels slender, ½–¾ in.; bracts ovate, acute, scarious. Flowers brownish-white, ½ in. long without the ovary, drooping. Perianth tubular, much swollen at the base, split half-way down on the anterior face, shortly 5-lobed; lobes broad, ovate-deltoid, acute. Lip rather shorter than the perianth; lamina narrow trowel-shaped with 2 papillose ridges running up the middle and uniting near the tip; margins involute, membranous, much crisped and undulate. Column very short, barely ¼ the length of the lip.—*Handb. N.Z. Fl.* 263; *Petrie in Trans. N.Z. Inst.* xxv. (1893) t. 20, f. 1–4. *G. leucopetala*, Col. in *Trans. N.Z. Inst.* xviii. (1886) 268.

NORTH AND SOUTH ISLANDS, STEWART ISLAND, CHATHAM ISLANDS: Not uncommon in dark shaded places, but easily overlooked. Sea-level to 2000 ft. *Perei*; *Makaika*. November–January.

The starchy thick and tuberous root was formerly collected by the Maoris and eaten, especially in the Urewera district.

3. *G. minor*, Petrie in *Trans. N.Z. Inst.* xxv. (1893) 273, t. 20, f. 5–7.—Stem umber-brown, not spotted, very slender, 8–15 in.

high, ½ in. diam. at the base; sheathing scales few, oblique. Raceme 1–3 in. long, 3–5-flowered; pedicels slender, ¼ in. long; bracts short, broad, scarious. Flowers brownish tipped with dirty-white, ½ in. long without the ovary, drooping. Perianth ventricose, gibbous at the base, split about half-way down on the anterior side, shortly 5-lobed; lobes rounded-ovate, undulate. Lip hardly shorter than the perianth; lamina linear-oblong, obtuse, with 2 thick median ridges; margins incurved, thickened, slightly crumpled. Column very short, barely ¼ the length of the lip.

SOUTH ISLAND: Otago—Opibi Creek, near Dunedin, Petrie! January.

Dried specimens differ very little in appearance from slender forms of *G. Cunninghamii*; but according to Mr. Petrie there are important differences in the lip and column.

From Manual of the New Zealand Flora. Appendix.  
Additions and corrections. pp1151–2.

LXXIX. ORCHIDEÆ.

*Thelymitra*.—I have been unable to identify *T. formosa*, Col. in *Trans. N.Z. Inst.* xvi. (1884) 338; *T. concinna*, Col. l.c. xx. (1888) 207; *T. nervosa*, Col. l.c. 207; and *T. fimbriata*, Col. l.c. xxii. (1890) 490.

*T. longifolia*.—Ascends to 4,500 ft. on Mount Kakaramea, Taupo, where it is associated with the next species.

4 bis. *T. decora*, Cheesem. n. sp.—Stem slender, 6–12 in. high or more. Leaf shorter than the stem, narrow-linear, thick and fleshy, channelled, ¼–½ in. broad; empty bracts 1–3, the upper one broader and more membranous. Flowers 1–4, about ½ in. diam., dark-blue, the two lateral petals obscurely spotted with brown. Sepals and petals ovate-oblong, subacute. Column short, stout, about half the length of the perianth, the wing continued behind the anther and longer than it, 3-lobed; middle lobe the shortest but exceeding the anther, hood-shaped, truncate, the margin thick and fleshy and denticulate, the back minutely warted, the anterior angle on each side slightly produced and acute; lateral lobes much larger than the middle lobe, pointing forwards, terminated by a dense rounded brush of cilia. Anther broad; connective terminating in a stout horn-like point.

NORTH ISLAND.—Summit of Mount Kakaramea, Taupo, and hills near the base of Ngauruhoe, alt. 3000–5000 ft., T. F. C. January.

This is probably nearer to Berggren's *T. intermedia* than to any other species, but (judging from his plate and description) differs in the broader and more truncate middle lobe of the column-wing, which is denticulate on the margin and warty on the back, and not at all bifid, and in the much shorter and more densely ciliate lateral lobes. *T. longifolia* is at once removed by the much longer and more distinctly hooded middle lobe of the column-wing, with an entire margin and smooth back, and by the shorter and more densely ciliate lateral lobes, which do not exceed the middle lobe.

**4 ter. *T. pachyphylla*, Cheesem. n. sp.**—Stem tall, stout or rather slender, 9–18 in. high or more. Leaf shorter than the stem, usually very thick and fleshy, grooved and channelled, variable in breadth, sometimes as much as  $\frac{3}{4}$  in. across; empty bracts 2 or 3, thick and fleshy, sheathing. Flowers 3–6 or more in a raceme, large and handsome,  $\frac{3}{4}$ –1 in. diam., blue-purple. Sepals and petals oblong-ovate or broadly oblong, subacute. Column short, stout, about half as long as the perianth, the wing continued behind the anther but hardly as long as it, 3-lobed; middle lobe short, broad, indistinctly hood-shaped, truncate at the top with an even or denticulate margin; lateral lobes longer than the middle one, erect or pointing forwards, flattened, the margins divided into numerous simple or branched fimbriae. Anther broad; connective produced into a stout horn-like point which usually overtops the middle lobe of the column-wing.

**SOUTH ISLAND:** Nelson—Vicinity of Westport, *Townson!* Westland—Kumara, *Brame!*

This has doubtless been confused with *T. pulchella*, from which, however, it totally differs in the structure of the column. In *T. pulchella* the middle lobe of the column-wing is much shorter than the anther, while the lateral lobes are barely as long as it, and are irregularly toothed or jagged, and not at all ciliate or fimbriate. In the present species the middle lobe almost equals the anther, while the lateral lobes are longer than it, and are provided with numerous fimbriae. *T. longifolia* differs in the smaller flowers, much longer and distinctly hooded middle lobe of the column-wing, and in the shorter lateral lobes, which terminate in a dense rounded brush of white cilia.

***T. imberbis*.**—Mr. R. H. Matthews sends a variety with cream-coloured flowers from Kaitaia (Mongonui County).

***Orthoceras strictum*.**—Vicinity of Westport, *Townson!* The most southern locality yet recorded.

***Prasophyllum rufum*.**—Vicinity of Westport, not uncommon in mossy stony places up to 1000 ft., *Townson!* I suspect that the New Zealand plant will prove to be a different species to the Australian, and it is also probable that the North Island plant described in the Handbook under the name of *P. nudum* is distinct from Macmahon's and Townson's South Island

specimens. Mr. Townson's specimens have a broad obtuse lip, but in Fitzgerald's Australian Orchids (Vol. ii, Part 4) the lip of *P. rufum* is represented as lanceolate and acute.

***Pterostylis micromega*.**—Swamps near Lake Tongongoe, Kaitaia, *R. H. Matthews!* Coromandel, *Joliffe* (Handbook).

***P. venosa*.**—Nelson—Ranges between Motueka and Takaka, *Rev. R. H. Spencer!*

***P. barbata*.**—Bare clay hills at Whangarei, *W. T. Ball!*

***Corysanthes rivularis*.**—Add to the synonyms *Acianthus rivularis*, *A. Cunn. Precur. n. 312.*

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The species in Cheeseman's *Manual* which have different current names are as follows:

*Caladenia bifolia* (*Aporostylis bifolia*).

*C. minor* var. *exigua* (*C. carnea*).

*Calochilus campestris* (actually *C. robertsonii*).

*Corysanthes* (*Corybas*) *cheesemanii*.

*Corysanthes macrantha* (*Corybas macranthus*).

*Corysanthes matthewsii* (*Corybas unguiculatus*).

*Corysanthes oblonga* (*Corybas oblongus*).

*Corysanthes rivularis* (*Corybas acuminatus*).

*Corysanthes rotundifolia* (*Corybas rivularis*).

*Corysanthes triloba* (*Corybas trilobus*).

*Cyrtostylis oblonga* var. *rotundifolia* (*C. reniformis*).

*Cyrtostylis rotundifolia* was first described by Hooker in 1853. Cheeseman reduced it to a variety of *C. oblonga*. *Cyrtostylis* has been officially reinstated by Jones and Clements in 1988,<sup>12</sup> and our two species are *C. oblonga* and *C. reniformis*, which latter includes *rotundifolia* and *macrophylla*.

*Earina suavolens* (*E. autumnalis*).

*Microtis porrifolia* (*M. unifolia*).

*Prasophyllum rufum* (*P. nudum*).

*Pterostylis barbata* (*P. plumosa*).

*P. mutica* (*P. tristis*).

*P. puberula* (*P. nana*). Kupp (1932)<sup>13</sup> included *P. puberula* in *P. nana*, and was followed in this by Hatch (1949)<sup>14</sup> and by Moore (1970)<sup>15</sup>.

*Sarcochilus* (*Drymoanthus*) *adversus*.

*Spiranthes australis* (*sinensis*).

*Thelymitra imberbis* (*T. carnea*).

*T. pachyphylla* (*T. pulchella*).

*T. uniflora* and *T. venosa* (*T. cyanea*): he noted "It is very closely allied to the Tasmanian *T. cyanea*, Lindl., and may prove identical with it". Indeed, *T. uniflora* and the N.Z. plants called *T. venosa* are both now regarded as *T. cyanea* which becomes the correct name.

*Townsonia deflexa* (*Acianthus viridis*). Cheeseman made no reference to the Tasmanian plant described by Hooker as *Acianthus viridis*, still the accepted generic name, though with the earlier specific name given by Schlechter.

His *Thelymitra decora* was a new description, and the name stands. His *Thelymitra pachyphylla* was included by Moore in *T. pulchella*;<sup>16</sup> Hatch had used the name *T. pachyphylla* for another *Thelymitra* later described by Moore as *T. hatchii*.<sup>17</sup>

*From Contributions to a Fuller Knowledge of the Flora of New Zealand: No. 1. Transactions of the New Zealand Institute 1906. 39: 447.*

#### LXXIX. ORCHIDÆ.

##### *Thelymitra ixioides*.

*Mrs. H. J. Matthews* forwards undoubted specimens of this species collected at Rotorua.

##### *Thelymitra intermedia*.

To this I refer, with some doubt, a pink-flowered species collected by *Mrs. H. J. Matthews* in the vicinity of Rotorua. In most respects it agrees with Berggren's plate and description, with the exception that the lateral lobes of the column-wing are not so slender as represented by Berggren.

##### *Thelymitra decora*.

This species also has been gathered at Rotorua by *Mrs. H. J. Matthews*. Her specimens are larger and stouter than those collected by myself to the south of Lake Taupo, and have more numerous and rather larger flowers, but the structure of the flowers is precisely the same.

##### *Pterostylis barbata*.

Among *Leptospermum* scrub near Cowes, Waiheke Island; *J. H. Harvey!*

##### *Corysanthes oblonga*.

*Mr. R. H. Matthews*, of Kaitia, sends a curious variety with the flowers entirely green, showing no sign of red whatever.

From Contributions to a Fuller Knowledge of the  
Flora of New Zealand: No.2. Transactions of the  
New Zealand Institute 1907. 40: 283-4.

## LXXIX. ORCHIDACEÆ.

*Thelymitra ixioides*.

Among *Leptospermum* scrub at Cowes, Waiheke Island;  
*J. H. Harvey!*

*Thelymitra intermedia*.

Vicinity of Kaitaia; *R. H. Mathews!* Also a single  
specimen gathered near Cowes, Waiheke; *J. H. Harvey!*

*Thelymitra decora*.

This species has evidently a much more extended range  
than I supposed when I first described it. Waimarino Plains,  
and south-western base of Tongariro, growing sparingly amongst  
*T. uniflora* and *T. longifolia*, altitude 2,500-3,700 ft.; *T. F. C.*  
Near Taumarunui; *T. F. C.* Among *Leptospermum* scrub at  
Cowes, Waiheke; *J. H. Harvey!*

*Thelymitra uniflora*.

The most abundant species on the Waimarino Plains, be-  
tween Central Trunk Railway and Ruapehu; altitude, 2,000-  
3,500 ft.

Most plentiful on boggy ground, amongst *Schœnus pau-  
ciflorus*, *Carpha*, *Oreobolus*, &c., but not absent from the drier  
portions of the plains as well.

*Pterostylis barbata*.

I am indebted to *Mr. B. A. Morison*, of Wanganui, for  
sending me a sketch of what is undoubtedly this species, pre-  
pared from specimens obtained by *Mr. E. H. Atkinson* at Day's  
Bay, near Wellington. This is a marked southern extension  
of the range of the species, which was not previously known  
further south than the Upper Thames Valley. *Mr. J. H.  
Harvey* forwards a 2-flowered specimen obtained on Waiheke  
Island.

*Lyperanthus antarcticus*.

Moist places on the subalpine meadows of Mount Hector,  
Tararua Range; altitude, 3,000-4,000 ft.; *D. Petrie!*

So far as I am aware, this is the first record of the occurrence  
of the species in the North Island.

*Caladenia minor*, var. *exigua*.

Vicinity of Cowes, Waiheke Island; *J. H. Harvey!*

*Caladenia bifolia*.

Waimarino Plains, and saddle between Ngauruhoe and  
Ruapehu; altitude, 2,500-4,500 ft.; *T. F. C.*

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From Contributions to a Fuller Knowledge of the  
Flora of New Zealand: No.3. Transactions of the  
New Zealand Institute 1909. 42: 209.

## LXXIX. ORCHIDACEÆ.

*Pterostylis*.

An interesting paper on the fertilisation of the Australian species of  
this genus, written by *Mr. Oswald H. Sargent*, is printed in the *Annals of  
Botany* for April, 1909.

*Pterostylis foliata*, Hook. f.

I am indebted to *Mr. Guthrie Smith* for fresh specimens of this species,  
collected at Tutira Lake, Hawke's Bay. They show that it varies greatly in  
size, the specimens ranging from 4 in. to 18 in. in height. The leaves are  
rather fleshy when fresh, and the reticulated veins are by no means obvious,  
except in dried specimens. A character that has not been previously  
mentioned is that the ovary and upper part of the peduncle are glandular-  
pubescent.



From *New Species of Plants. Transactions of the New Zealand Institute* 1910. 43: 177-8.

4. *Thelymitra Matthewsii* Cheesem. sp. nov.

*T. variegata* Lindl. affinis, sed caule multo brevior, floribus singularibus, gynostemio non cristato.

Caulis gracilis, flexuosus, 9-14 cm. longus. Folium solitarium, 3-6 cm. longum, spiraliter contortum, lineare, basi ampliato. Bractea 2. Flos solitarius, ratione plantae magnus, 1-2 cm. diametro. Perianthium sub-regulare, patens. Sepala et petala similia, lanceolata vel ovato-lanceolata, acuta vel acuminata. Gynostemium breve, bialatum, aliis magnis, crassis, clavatis, obtusis, apice non fimbriatis aut lobatis.

*Hab.*—North Island: Mangonui County, low hills between Lake Tongongoe and the coast; *R. H. Matthews!*

Stem slender, wiry, flexuose, 4-6 in. high. Leaf solitary, sheathing the stem at the base, the sheath finely and closely puberulous; lamina  $1\frac{1}{2}$ - $2\frac{1}{2}$  in. long, much expanded at the base, and then suddenly narrowed into a linear blade, which is usually spirally twisted so as to coil round the stem; margins involute. Bracts 2, the lower one below the middle of the stem, the upper almost close to the flower, both broad and sheathing. Flower solitary, large for the size of the plant,  $\frac{1}{2}$ - $\frac{3}{4}$  in. diameter. Perianth-segments alike, lanceolate or oblong-lanceolate, acute or shortly acuminate, dark purplish-blue with darker longitudinal veins. Column much shorter than the perianth-segments, not produced at the back behind the anther, but furnished with two large lateral lobes which equal the anther in height, and which are oblong or oblong-falcate, obtuse, somewhat flattened but thick and fleshy, not lobed nor furnished with cilia. Occasionally there are evidences of a slight crest connecting the lateral lobes at the base. Anther very large, oblong, obtuse. Base of the column purplish; lateral lobes and anther bright yellow.

A charming little plant, worthily dedicated to its discoverer, who has added more to our knowledge of the New Zealand orchids than any other observer of late years. It is closely allied to the Western Australian *T. variegata* Lindl., principally differing in the much smaller size, in the solitary flowers, and in the column-wing scarcely crested on the back behind the anther. Mr. Matthews informs me that the remarkable spiral twist or coil in the leaves is constant in all the specimens he has seen. This peculiarity is also more or less observable in *T. variegata*.

*Thelymitra matthewsii* was regarded as extinct, but a solitary plant was found by Doug McCrae in the Far North in 1988.<sup>18</sup>

From *Contributions to a Fuller Knowledge of the Flora of New Zealand: No. 4. Transactions of the New Zealand Institute* 1910. 43: 183-4.

LXXIX. ORCHIDACEAE.

*Spiranthes australis* Lendl.

Near Kaitaia; *R. H. Matthews!* Waipapakauri and Rangaunu Heads; *H. Carse.* Sphagnum swamps at Waihi, Ohinemuri County; *H. B. Devereux!*

*Thelymitra ixioides* Swz.

This has been gathered by *Mr. J. H. Harvey* at Taumarere, Bay of Islands.

*Thelymitra decora* Cheesem.

Taumarere, Bay of Islands; *J. H. Harvey!* Tirau, Upper Thames Valley; *T. F. C.*

*Corysanthes Matthewsii* Cheesem.

Mossy slopes in shaded localities near Fairburn, Mangonui County; *H. Carse!* Aponga, Whangarei County; *A. Thompson.*

From *A New Genus and some New Species of Plants. Transactions of the New Zealand Institute* 1911. 44: 162.

5. *Corysanthes Carsei* Cheesem. sp. nov.

Ab *C. unguiculata* R. Br. differt floribus angustioribus, labello apiculo minore, sepalo postico emarginato.

Planta perpusilla, acaulis, florifera 8-12 mm. alta. Folium solitarium, membranaceum, ovato-cordatum, acutum, 6-10 mm. longum. Flos solitarius, pro planta majusculus, horizontalis vel deflexus, supra folium subsessilis. Sepalum posticum basi angustum, tunc lato-cucullatum, apice incurvatum et emarginatum. Sepala lateralia parva, linearia. Labellum magnum, 10 mm. longum, orbiculatum, marginibus valde involutis. Columna brevis, curvata.

*Hab.*—North Island: Peaty swamps between Lake Tongongoe and the coast, Mangonui County; *H. Carse* and *H. B. Matthews!*

A small delicate species,  $\frac{1}{2}$ - $\frac{3}{4}$  in. high when in flower. Leaf sessile,  $\frac{1}{4}$ - $\frac{1}{2}$  in. long, ovate-cordate, acute, membranous. Flower sessile or very shortly pedunculate, about  $\frac{1}{2}$  in. long, horizontal or deflexed, dull-purplish

Upper sepal very narrow at the base, then suddenly expanded, so that the upper two-thirds is broadly oblong and hood-shaped, extreme tip incurved and emarginate and slightly thickened and papillose. Lateral sepals placed under the lip, small, narrow-linear, 4-5 mm. long. Lateral petals still smaller, 3 mm. long. Lip large, tubular, the margins involute, meeting behind the column and enclosing it, orbicular or broader than long when spread out, extreme tip produced into a minute projecting lamina, between which and the overhanging emarginate tip of the upper sepal is the only entrance to the front of the flower. Immediately inside the entrance the surface of the lip is furnished with a broad patch of stiff papillae all pointing towards the interior of the flower, and which is continued as a narrow band down the median line of the lip. At the base of the lip the margins on each side are rolled up on themselves, thus forming two minute circular openings leading to the base of the flower. Column short, stout, curved. Capsule not seen.

This is a very curious little plant, closely allied to the Australian *C. unguiculata*; but, judging from Mr. Fitzgerald's beautiful drawing, that species has a much broader flower, the upper sepal is wider and not incurved or emarginate at the tip, the projecting lamina at the apex of the lip is much smaller, and the papillae within the lip are confined to the median line, whereas they also form a broad patch to the right and left of the median line in *C. Carsei*. There is also a relationship to *C. Matthewsii*; but, among other differences, it has a much narrower dorsal sepal, and the lip wants the projecting lamina of *C. Carsei*.

The numerous additions made to the orchid flora of the North Cape district by Mr. R. H. Matthews, and the discovery of the present species by Messrs. Carse and H. B. Matthews, shows how much might be done by careful investigation in most parts of the Dominion.

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Cheeseman recognised the similarity of *Corybas carsei* to the Australian *C. unguiculatus*, but felt the differences were enough to warrant describing the former as a separate species. Hatch agreed,<sup>19</sup> but Moore merged the two, giving a long but not altogether satisfactory explanation.<sup>20</sup> *C. carsei* now stands.

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From Some New Species of Plants. Transactions of the New Zealand Institute 1912. 45: 96.

#### 4. *Caladenia exigua* Cheesem. sp. nov.

*C. minor* Hook. f. affinis, sed differt caule minore et graciliore, sepalis et petalis acuminatis, labelli lobo intermedio margine 1-glanduloso.

Erectus, gracillimus, 8-15 cm. altus. Caulis strictus, tenuis, glanduloso-pilosus, basi unifolius. Folium parvum, anguste lineare, 2-6 cm. longum, 1 mm. latum, parce pilosum. Flores 1 aut raro 2, sepalo intermedio erecto, anguste lanceolato, acuminato; lateralibus petalisque similibus, patentibus vel deflexis; labello lato, 3-lobo, disco glandulis 2-seriatis stipitatis ornato; lobo intermedio margine 1-glanduloso.

*Hab.*—North Island: *Leptospermum* scrub near Kaitaia, Mongonui County; R. H. Matthews and H. B. Matthews!

Stems shorter and more slender and wiry than in *C. minor*, 2-5 in. high, sparingly glandular-pilose. Leaf solitary from the base of the stem, small, very narrow linear,  $\frac{3}{4}$ -2 $\frac{1}{2}$  in. long, broad, very sparingly pilose or almost glabrate. Flowers seldom more than one; sepals and petals subequal, all narrow-lanceolate and acuminate, upper sepal erect, the rest spreading or deflexed. Lip broad, 3-lobed; disc with two continuous rows of bright-yellow stipitate glands as in *C. minor*; intermediate lobe with only one marginal stipitate gland on each side; lateral lobes with transverse purplish bands.

Since I published this in the Manual as var. *exigua* of *C. minor* I have been supplied by Mr. H. B. Matthews with an extensive series of both fresh and dried specimens of the various *Caladeniae* found near Kaitaia. Mr. Matthews has always contended for the specific distinctness of *C. exigua*, and his specimens prove that the differences are constant, and are also accompanied by a difference in the flowering season, *C. exigua* flowering at Kaitaia from the 10th September to the 25th September, while *C. minor* blooms during October and the early part of November. I accept *C. exigua*, therefore, as differing from *C. minor* in its much smaller size and more slender habit; in the smaller flowers; in the sepals and petals being narrow-lanceolate and acuminate, instead of linear and obtuse as in *C. minor*; and in the middle lobe of the lip having only one stipitate gland on each side, whereas *C. minor* has several.

Hatch again relegated *Caladenia exigua* to a variety of *Caladenia carnea*.<sup>21</sup> Moore lumped all the previously described varieties of *C. carnea* into the species.<sup>22</sup> *C. exigua* is now recognised as *calata*.

From Contributions to a Fuller Knowledge of the  
Flora of New Zealand: No.5. Transactions of the  
New Zealand Institute 1913. 46: 5-6.

LXXIX. ORCHIDACEAE.

*Bulbophyllum tuberculatum* Col.

I am indebted to Mr. H. B. Matthews, of Kaitaia, for an ample supply of living specimens in full flower of this beautiful little plant. He informs me that it is usually found on the upper portions of the stem and branches of the kahikatea (*Podocarpus dacrydioides*), growing mixed with mosses and *Hepaticae*, and that it is a rare circumstance to find specimens anywhere near the ground. This may account for the small number of localities recorded up to the present time.

*Bulbophyllum pygmaeum* Lindl.

Mr. H. B. Matthews also states that in Mongonui County *B. pygmaeum* is found more plentifully on *Knightia excelsa* than on any other tree. I have also noticed its comparative abundance on *Knightia* in other districts.

*Prasophyllum rufum* R. Br.

Tutira, Hawke's Bay; *H. Guthrie-Smith!* Waimarino Plains, western side of Ruapehu; *E. Phillips Turner!*

*Corysanthes Cheesemanii* Hook. f.

Mr. H. B. Matthews sends a two-flowered specimen, collected in the vicinity of Kaitaia.

From New Species of Flowering-plants. Transactions  
of the New Zealand Institute 1914. 47: 46.

2. *Pterostylis Matthewsii* Cheesem. n. sp.

*P. foliatae* affinis, sed differt foliis rosulatis et multo numerosioribus, floribus majoribus conspicue deflexis.

Planta terrestris, robusta, glabra vel parce puberula, 8-12 cm. alta. Folia radicalia 6-8, ad basin caulis rosulata, petiolata, 2-4 cm. longa, 1-1.5 cm. lata, oblonga vel oblongo-ovata, acuta vel subacuta, ad basin truncata vel subcordata; venis conspicue reticulatis. Folia caulina (bractea) 2, vaginata, acuta, 2-2.5 cm. longa. Flos solitarius, pro planta majusculus, conspicue deflexus, 2.5 cm. longus. Galea valde curvata; sepalo postico acuto, lateralibus usque ad dimidium fere connatis, oblique lanceolatis, breviter acuminatis. Petala falcata, lanceolata, acuminata, sepalo postico fere aequilonga. Labellum breviter unguiculatum; lamina anguste ligulata, obtusiuscula, basi appendice brevi apice lacerato-incisa dohata. Columna gracilis; auriculis apice breviter acuminatis.

*Hab.*—North Island: Mangonui County, crest of ridge leading to Puke-miro Hill, near Kaitaia, *H. B. Matthews!*

Stout, glabrous or sparingly puberulous, 3-5 in. high. Lower leaves 6-8, rosulate at the base of the stem, petiolate,  $\frac{3}{4}$ -1 $\frac{3}{4}$  in. long, oblong or oblong-ovate, acute or subacute, truncate or almost subcordate at the base, thin and membranous; venation conspicuous, consisting of 2 or 3 parallel longitudinal veins on each side of the midrib, connected by numerous transverse veinlets. Cauline leaves or bracts usually 2, erect and sheathing the greater part of the stem above the leaves,  $\frac{3}{4}$ -1 $\frac{1}{4}$  in. long, lanceolate or oblong-lanceolate, acute. Flowers solitary, large for the size of the plant,  $\frac{3}{4}$ -1 in. long,  $\frac{1}{2}$  in. broad, strongly curved outwards and downwards from the base, so that the tip becomes almost horizontal and points to the stem below the ovary. Upper sepal acute or acuminate; petals almost equal in length, falcate, lanceolate, acuminate. Lateral sepals (lower lip) connate to the middle, the free portions gradually narrowed into short filiform points embracing the galea. Lip narrow-ligulate, flat, obtuse; basal appendage short, penicillate at the tip. Column slender; auricles with an acuminate tooth at the tip.

No doubt nearly related to *P. foliata*, but easily separated by the more numerous rosulate radical leaves, which are obviously petiolate and truncate or even subcordate at the base, and by the strongly deflexed flowers. The flowers of *P. foliata* are always erect at the base, and although the upper part curves forward it never becomes deflexed to anything like the extent of *P. Matthewsii*. I have much pleasure in dedicating the plant to its zealous discoverer, who, with his father, the late Mr. R. H. Matthews, has done excellent work in investigating the orchid flora of the extreme northernmost portions of the Dominion.

Rupp (1932)<sup>13</sup> recognised *Pterostylis matthewsii* as identical with the Australian *P. nutans*. Hatch<sup>23</sup> and Moore agreed<sup>24</sup>.

3. *Pterostylis trullifolia* Hook. f. var. *gracilis* Cheesem. n. var. (Illustrations N.Z. Flora, t. 194b, left-hand figure.)

Taller and more slender than the type, sometimes 9 in. high. Radical leaves usually wanting in flowering specimens, and seldom more than 1 or 2 in barren plants. Cauline leaves narrower. Flowers smaller,  $\frac{1}{2}$ – $\frac{2}{3}$  in. long; lobes of the lower lip shorter in proportion.

*Hab.*—North Island: Vicinity of Auckland, Waitakerei, and Hunua Ranges, T. F. C.; Thames, J. Adams! Kaitaia, R. H. Matthews!

I have been acquainted with this for many years. It probably has the same range as the type, with which it sometimes grows intermixed.

A.S. George selected a type at Kew for *Pterostylis trullifolia* and Moore accepted his decision.<sup>24</sup> When Hatch wrote (1949)<sup>23</sup> the type had not been determined, he knew that one of his three varieties would eventually be "sunk".

**From Contributions to a Fuller Knowledge of the  
Flora of New Zealand: No. 6. Transactions of the  
New Zealand Institute 1919. 51: 90.**

LXXIX. ORCHIDACEAE.

*Thelymitra pachyphylla* Cheesem.

To this species I refer specimens of a *Thelymitra* collected by Mr. H. B. Matthews between Erua and Makatote, to the west of Ruapehu. It agrees with *T. pachyphylla* in the broad and flat erect staminodia, the margins of which are furnished with simple or branched fimbriae; and the size, mode of growth, and foliage are all very similar. But the flowers are smaller, and the middle lobe of the column shorter and crenulate.

**From New Species of Plants. Transactions of the New  
Zealand Institute 1915. 48: 214–5.**

7. *Thelymitra pauciflora* R. Br., Prodr. 314; Fitzgerald, "Australian Orchids," vol. 1, part 6, t. 2.

Stems slender, wiry, flexuous, 6–12 in. high, rarely more. Leaf much shorter than the stem, narrow-linear,  $\frac{1}{10}$ – $\frac{1}{8}$  in. broad, rarely more, thick and fleshy, longitudinally grooved, deeply channelled in front, and thus concave. Flowers 1–6,  $\frac{1}{2}$  in. long, usually pale-blue or whitish-blue. Sepals and petals narrow ovate or ovate-lanceolate, acute. Column short, stout, the wing continued behind the anther and longer than it, 3-lobed; the middle lobe much the largest and also the highest, narrower than in *T. longifolia*, thick and swollen, projecting over the anther, deeply emarginate or 2-lobed, brownish-red at the base, bright yellow towards the tip; lateral lobes smaller at the base, projecting forwards almost horizontally, then suddenly bent upwards and erect, terminated by a dense brush of white cilia. Anther broad, connective produced into a short point.

*Hab.*—North Island: *Leptospermum*-clad hills in the Auckland district, T. F. C.; hills near Pukekohe, W. Townson! vicinity of Kaitaia (Mongonui County), H. B. Matthews! Probably widely distributed in the Auckland Provincial District. Flowers from the middle of October to mid-November.

I have been acquainted with this for many years, and have been accustomed to regard it as a variety of *T. longifolia*, to which species Mr. Bentham reduced Brown's *T. pauciflora*. But the structure of the column is very different from that of *T. longifolia*, and as long as the species of the genus are principally founded on deviations in the form of that organ it is difficult to avoid the belief that the two plants are distinct. The late Mr. R. F. Fitzgerald, in his magnificent work on Australian orchids, unhesitatingly accepted this view; and a comparison of the figures of the two species given by him shows how great the differences are. The receipt of a large parcel of fresh specimens of *T. pauciflora* collected by Mr. Townson near Pukekohe gave me an opportunity of reviewing the matter, with the result of fully supporting the correctness of Mr. Fitzgerald's opinion. *T. pauciflora* differs from *T. longifolia* in its smaller size and more slender habit; in its narrower and deeply channelled leaf; in the smaller flowers; and especially in the middle lobe of the column-wing, which is deeply emarginate or 2-lobed, whereas it is much broader, more hood-shaped, and barely emarginate in *T. longifolia*. I should perhaps say that in all essential points New Zealand specimens agree with the drawing given by Mr. Fitzgerald of *T. pauciflora*.

Hooker's *T. Colensoi*, which has not been collected of late years, and which was originally referred to *T. pauciflora*, differs from that plant, according to Hooker, "in the very narrow sepals and petals, very short column, and very long erect appendages."

From Some Additions to the New Zealand Flora.  
Transactions of the New Zealand Institute  
1919. 51: 93-5.

3. *Earina aestivalis* Cheesem. n. sp.

Affinis *E. mucronata* a qua differt caulibus robustioribus firmioribusque, foliis latioribus et brevioribus, floribus majoribus, labello longiore, lobis lateralibus majoribus et acutioribus.

*Hab.*—North Island: Near Ahipara, *R. H. Matthews!* and at Kaiaka, *H. Carse!* both localities in Mongonui County. In forest at Muriwai, and near the mouth of the Waitakare River; *T. F. C.* Forest by the Waikanae River, Wellington; *B. H. Morison!*

Rhizome creeping, much as in *E. mucronata*. Stems numerous, 9-18 in. long, suberect or drooping, smooth, compressed, rather broader and stouter than in *E. mucronata*, and firmer. Leaves 3-6 in. long,  $\frac{1}{3}$ - $\frac{1}{2}$  in. broad, flat, stiff, erect, narrow-linear, acute or acuminate; midrib and veins conspicuous on the under-surface, not so evident above. Panicle terminal, 2-5 in. long; branches or racemes 3-7, rarely more, 1-1 $\frac{1}{2}$  in. long, 4-7-flowered; bracts short and broad, clasping, many-striate. Flowers larger than in *E. mucronata*,  $\frac{1}{2}$  in. diam. or more. Sepals and petals similar in size and shape, linear-oblong, subacute. Lip longer than in *E. mucronata*, and brighter in colour; lateral lobes wider and more acute. Column short, stouter.

I have been acquainted with this plant for several years, having gathered specimens at the mouth of the Waitakare River as far back as 1895. But the differences between it and *E. mucronata* are mainly comparative, and before describing it I was anxious to satisfy myself as to how far they were constant. Since then I have seen specimens gathered in several localities between the North Cape peninsula and Wellington; and as I find that the distinguishing characters—viz., stouter and stiffer habit, broader and more rigid leaves, larger flowers, longer lip with broader lateral lobes, and stouter column—are constant throughout, I cannot any longer refuse it distinction as a separate species. In addition to the above, there is the important fact that it flowers from the beginning of January to the first week in February, whereas the flowering period of *E. mucronata* is two months earlier at least, stretching from the first week in October to the middle or end of November. At Muriwai, a few miles to the north of the mouth of the Waitakare River, I observed it in full bloom on the 16th January, 1916; while typical *E. mucronata* growing in the vicinity had practically matured its capsules.

Cheeseman expresses his difficulty in separating *Earina aestivalis* from the very similar *E. mucronata*. Both Hatch and Moore included it in *E. mucronata*. Hatch regarded the differences as the result of its rigorous coastal habitat,<sup>25</sup> as did Moore.<sup>26</sup>

4. *Thelymitra aemula* Cheesem. n. sp.

Species ad *T. ixioides* proxime accedit, sed differt columnae lobis lateralibus multo elongatis, et lobo mediano non cristato.

Caules robusti vel graciles, 18-60 cm. longi. Folium anguste lineare, crassum, canaliculatum. Folia caulina vel bracteae vacuae 2. Flores 3-8, caerulei, in racemum 4-10 cm. longum dispositi. Sepala et petala oblonga vel ovato-oblonga, obtusa vel subacuta. Columna brevis, crassa, superne attenuata, 5-loba; lobis lateralibus elongatis, complanatis, penicillatis; lobo mediano breve, dorso non cristato.

*Hab.*—North Island: *Leptospermum* scrub at Birkdale, near Auckland; *H. B. Matthews!*

Stems stout or slender, 6-16 in. high. Leaf shorter than the stem, narrow-linear, thick, channelled in front. Cauline leaves or empty bracts 2. short. Flowers 3-8, about  $\frac{1}{2}$  in. in diameter, blue, rather closely placed in a raceme 1 $\frac{1}{2}$ -4 in. long. Sepals and petals oblong or ovate-oblong, obtuse or subacute. Column short, stout, broad at the base, narrowed above, winged; the wing extending behind the anther and free from it except at the base, 5-lobed: the two lateral lobes twice the length of the others, flattened, fringed with cilia for the greater part of their length; middle lobe short and broad, thickened and denticulated at the tip, but smooth at the back; the two intermediate lobes distinct from the central one, reaching half the height of the lateral lobes, broad, thick, and fleshy, jagged at the top. Anther broad, produced into a pointed tip that just overtops the level of the median lobe of the column-wing.

This interesting discovery is due to the activity of Mr. H. B. Matthews, so well known from the many additions made by him to the orchid flora of the North Cape peninsula. It is doubtless very closely allied to *T. ixioides* and the Australian *T. canaliculata*, but appears to constantly differ in the lateral lobes of the column being much longer, flattened, and more copiously penicillate; and the middle lobe, although denticulate at the top, is not at all warted or crested at the back. The flowers appear to be invariably blue; but the column is surrounded by a narrow band of violet just below the lobes, above which the colour is bright yellow.

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Hatch kept *Thelymitra aemula* separate from *T. ixioides*, though commented that it was related to and probably derived from the typical form of *T. ixioides*,<sup>27</sup> a similarity that Cheeseman had recognised. Moore thought *T. aemula* "seems likely to have been based on a form of *T. ixioides* with unspotted flowers".<sup>28</sup> The two are now regarded as distinct.

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From *Illustrations of the New Zealand Flora*.  
Wellington, Government Printer, 1914. Volume  
II, plates 191-199, and text.

PLATE 191.—BAGNISIA HILLII AND BULBOPHYLLUM  
TUBERCULATUM.

FAMILY BURMANNIACEÆ.  
ORCHIDACEÆ.]

[GENERA BAGNISIA, BECC., AND  
BULBOPHYLLUM, THOUARS.

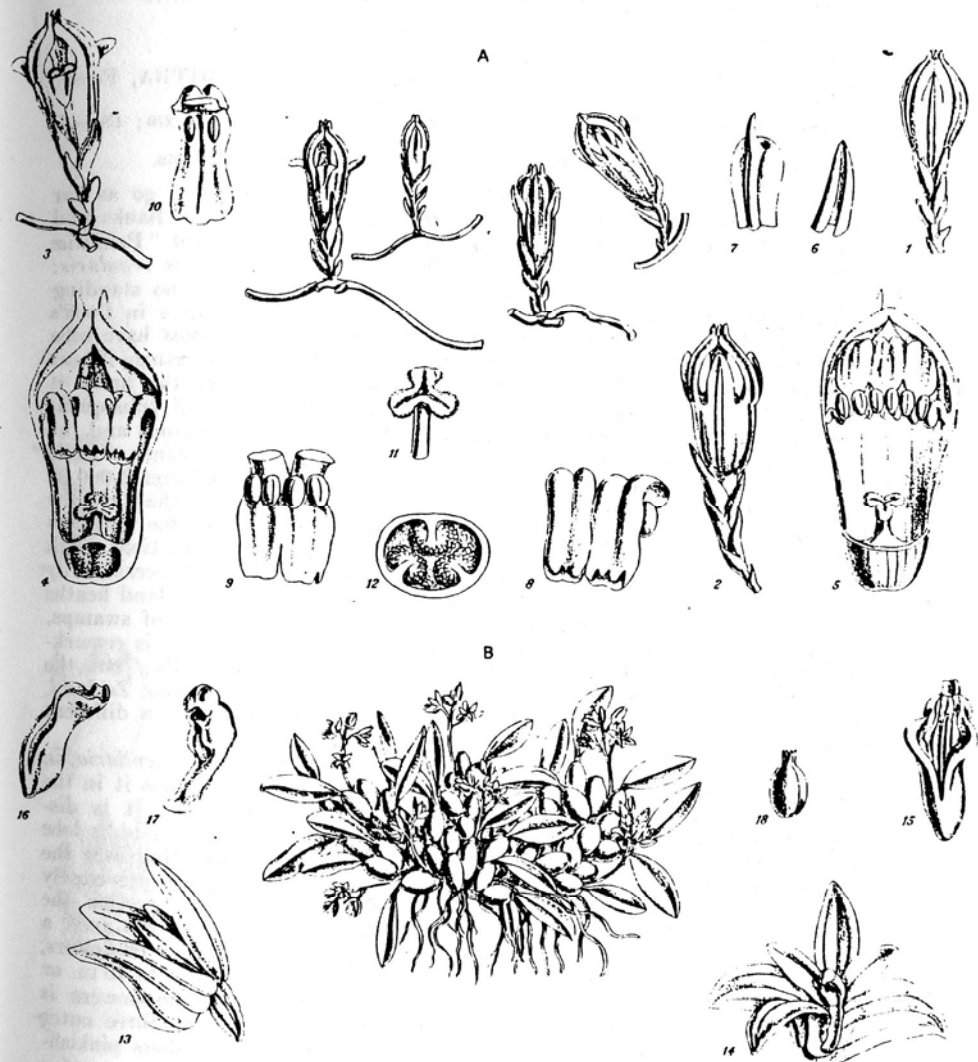
*Bagnisia Hillii*, *Cheesem. in Ker Bulletin* (1898), 420; *Trans. N.Z. Inst.* xli (1909), 140.

*Bulbophyllum tuberculatum*, *Col. in Trans. N.Z. Inst.* xvi (1884), 336; *Cheesem. Man. N.Z.*  
*Fl.* 664.

*Bulbophyllum tuberculatum*, the second species figured on the accompanying plate, is a charming but little-known plant. It was first described by Mr. Colenso in 1884, from specimens collected by Mr. A. Hamilton at Petane, Hawke's Bay. At a later date Mr. Hamilton also gathered it in woods near Palmerston North. It has since been found near Kaitaia by Mr. R. H. Matthews, in the Lower Waikato by Mr. Carse, in the East Cape district by Mr. L. Wall, and near Collingwood by Mr. Dall. In all probability it is not uncommon in forest districts in the North Island and the northern portions of the South Island; but as it is principally found on the upper branches of tall forest-trees it is not at all easy to detect its presence. Although agreeing in habit with *B. pygmaeum*, it differs in the larger size, 2-4-flowered peduncles, and larger flowers with a bright orange-red lip. The lip of *B. pygmaeum* is always white.

PLATE 191A. *Bagnisia Hillii*, drawn from specimens collected by Mr. H. Hill in forests at Opepe, near Lake Taupo. Fig. 1, flower-bud just previous to expansion ( $\times 2$ ); 2, flower in a more advanced stage, the outer perianth-segments commencing to spread outwards ( $\times 2$ ); 3, fully mature flower, the outer perianth-segments reflexed ( $\times 2$ ); 4, section of flower, showing the stamens sharply deflexed within the perianth-tube, the anthers concealed behind the greatly expanded and connivent connectives ( $\times 4$ ); 5, the same with the stamens turned upwards, showing three pairs of anther-cells ( $\times 4$ ); 6, outer perianth-segment ( $\times 3$ ); 7, inner perianth-segment ( $\times 3$ ); 8, a pair of stamens seen from the inside of the perianth-tube ( $\times 8$ ); 9, the same seen from the other side, showing the anther-cells ( $\times 8$ ); 10, a single stamen with dehiscent anther-cells ( $\times 8$ ); 11, stigma ( $\times 6$ ); 12, section of ovary, showing the three parietal placentas and the numerous ovules ( $\times 6$ ).

PLATE 191B. *Bulbophyllum tuberculatum*, drawn from specimens collected near Kaitaia by Mr. R. H. Matthews. Figs. 13 and 14, different views of flower ( $\times 8$ ); 15 and 16, front and side view of lip (greatly enlarged); 17, column (greatly enlarged); 18, ripe capsule ( $\times 4$ ).



M. G. Smith del.  
J. N. Fitch sculp.

A BAGNISIA HILLII, *Cheesem.*  
B BULBOPHYLLUM TUBERCULATUM, *Col.*

West Newman sculp.

PLATE 192. THELYMITRA LONGIFOLIA AND  
THELYMITRA PULCHELLA.

FAMILY ORCHIDACEÆ.]

[GENUS THELYMITRA, FORST.

*Thelymitra longifolia*, Forst. Char. Gen. 98, t. 49; Hook. J. Handb. N.Z. Fl. 270; Cheesem. Man. N.Z. Fl. 669.

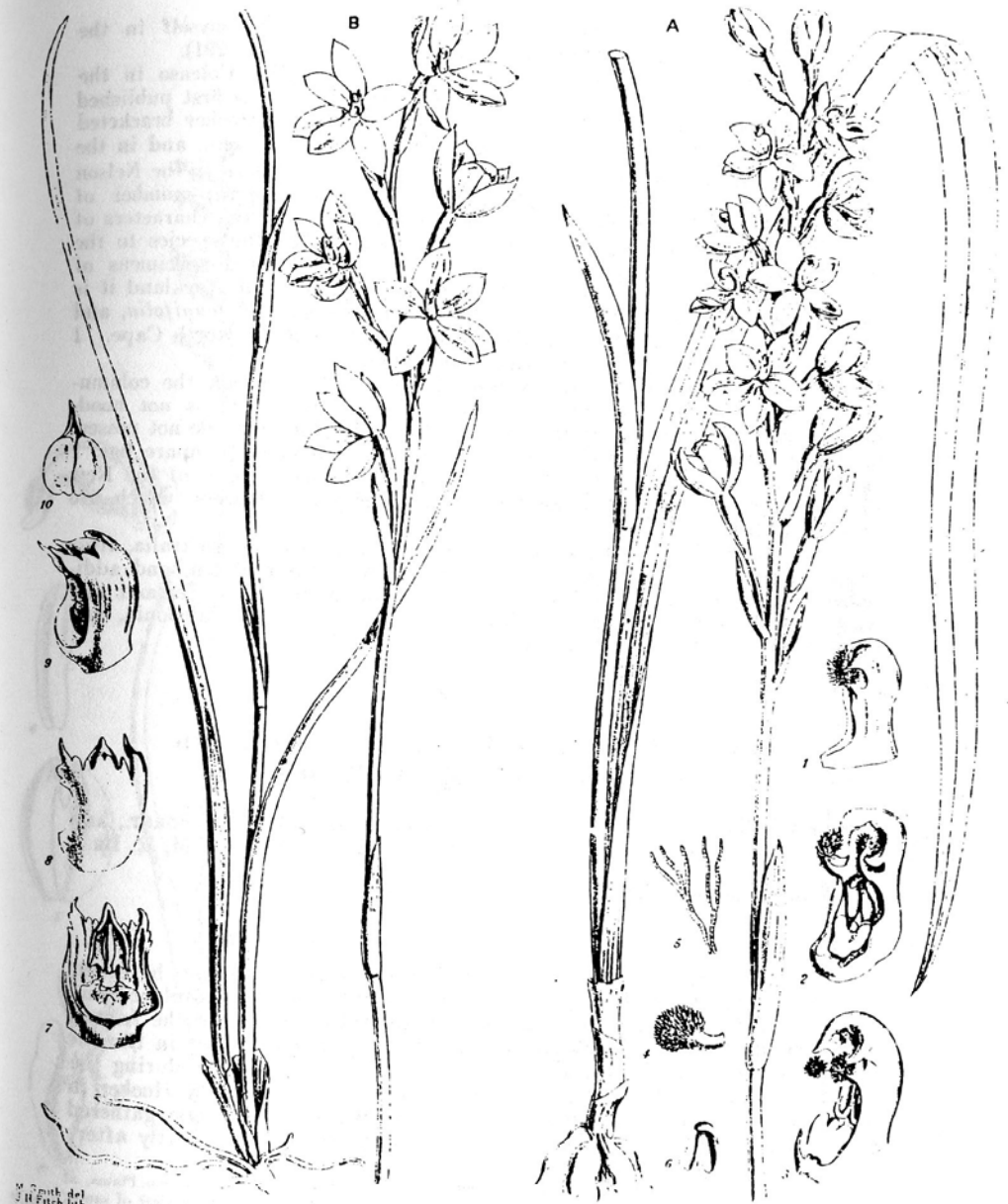
*Thelymitra pulchella*, Hook. J. Fl. Nov. Zel. i, 244; Cheesem. Man. N.Z. Fl. 670.

For the first discovery of *Thelymitra longifolia* we have to go as far back as October, 1769, when it was gathered at Tolaga Bay by Banks and Solander during Cook's first voyage. Solander, in his manuscript "Primitiæ Floræ Novæ Zelandiæ," described it under the name of *Scrapius regularis*; but as this work was never actually published his names have no standing in botanical literature. It was also collected by the two Forsters in Cook's second voyage, but in what locality is not stated, although it must have been either in Queen Charlotte Sound or Dusky Bay. After their return it was published in their "Characteres Generum Plantarum" under the name it bears at the present time. It has been observed by almost all subsequent botanists, and is now known to range from the Three Kings Islands and the North Cape southwards to Stewart Island and the Auckland Islands. It is common at sea-level, and ascends the mountains to a height of over 4,000 ft. Although mainly a heath-plant, and nowhere more abundant than on the *Leptospermum*-clad hills that form such a large percentage of the northern part of the North Island, it is really found in all soils and situations, with the exception that it does not occur in dense forests, although occasionally seen in light bush. When it is mentioned that in addition to lowland heaths it is also plentiful on sand-dunes, ledges on seacliffs, the margins of swamps, subalpine meadows, &c., it will be seen that its range of habitats is remarkably wide. It is said to have an extensive range in Australia; but the specimens I have seen from thence hardly match those from New Zealand, and if really belonging to the same species should be treated as a different variety. It has also been recorded from New Caledonia.

*T. longifolia* falls into a section of the genus known as *Cucullaria*, in which the column-wing is produced behind the anther, and overtops it in the form of a hood-shaped projection furnished with lateral lobes. It is distinguished from the other species of the section by the very large middle lobe of the column-wing, which forms a smooth rounded hood projecting over the anther, and which considerably overtops the lateral lobes, which are closely and densely ciliate at their tips. In the allied species of the section the lateral lobes are longer than the middle lobe, which does not form such a prominent hood. It is very variable in size, stoutness, and number of flowers, varying from less than 6 in. in height, with a single small flower, to 18 in. or 20 in., with twelve to fifteen large flowers. The colour of the flowers is mainly white, with a greenish-purple tinge on the back of the three outer perianth-segments; but some varieties have blue flowers, and others pinkish-

PLATE 192A. *Thelymitra longifolia*, drawn from specimens collected in the vicinity of Auckland. Fig. 1, side view of column; 2 and 3, front views of same; 4, lateral lobe of column, terminated by a dense mass of cilia; 5, some of the cilia; 6, dehiscent anther. (All magnified.)

PLATE 192B. *Thelymitra pulchella*, drawn from specimens collected near Mongonui Harbour. Fig. 7, front view of column; 8, back view of same; 9, side view of same; 10, dehiscent anther. (All enlarged.)



A. THELYMITRA LONGIFOLIA, Forst.  
B. THELYMITRA PULCHELLA, Hook. f.

red. For an account of the fertilization, see a paper by myself in the "Transactions of the New Zealand Institute" (vol. xiii (1881) 291).

*Thelymitra pulchella* was originally discovered by Mr. Colenso in the North Island, but I am ignorant of the exact locality. It was first published by Sir J. D. Hooker in the "Flora Novæ Zelandiæ"; but Hooker bracketed with Colenso's plant some specimens collected by Lyall in Otago; and in the "Handbook" he also included a plant gathered by Sir D. Monro in the Nelson Provincial District. But although I have examined a great number of *Thelymitra* from the South Island I have found none with the characters of *T. pulchella*, and am inclined to doubt the occurrence of the species to the south of Cook Strait. In fact, I have not seen undoubted specimens of *T. pulchella* from the south of the Waikato River. North of Auckland it is common on *Leptospermum*-clad hills, often associated with *T. longifolia*, and is particularly abundant between the Bay of Islands and the North Cape. I have not seen it at a greater elevation than 800 ft.

*T. pulchella* belongs to the section *Macdonaldia*, in which the column-wing extends behind the anther, but is shorter than it, and is not hood-shaped; and the lateral lobes, though often toothed or fimbriate, do not possess the dense tufts of cilia so obvious in the section *Cucullaria* (compare figs. 1 and 9 of the accompanying plate). It is one of the handsomest of the New Zealand species, from the large size of the blue-purple flowers, which are often an inch in diameter or even more.

The centre of distribution of the genus *Thelymitra* is in Australia, from whence thirty species are known. New Zealand contains eleven, and additional species will be recorded. As already stated, the New Zealand and Australian *T. longifolia* (or an allied form) occurs in New Caledonia, and there is an outlying species (*T. javannica*, Blume) in Java.

PLATE 193.—THELYMITRA UNIFLORA AND PRASOPHYLLUM COLENSOI.

FAMILY ORCHIDACEÆ. [GENERA THELYMITRA, FORST., AND PRASOPHYLLUM, R. BR.

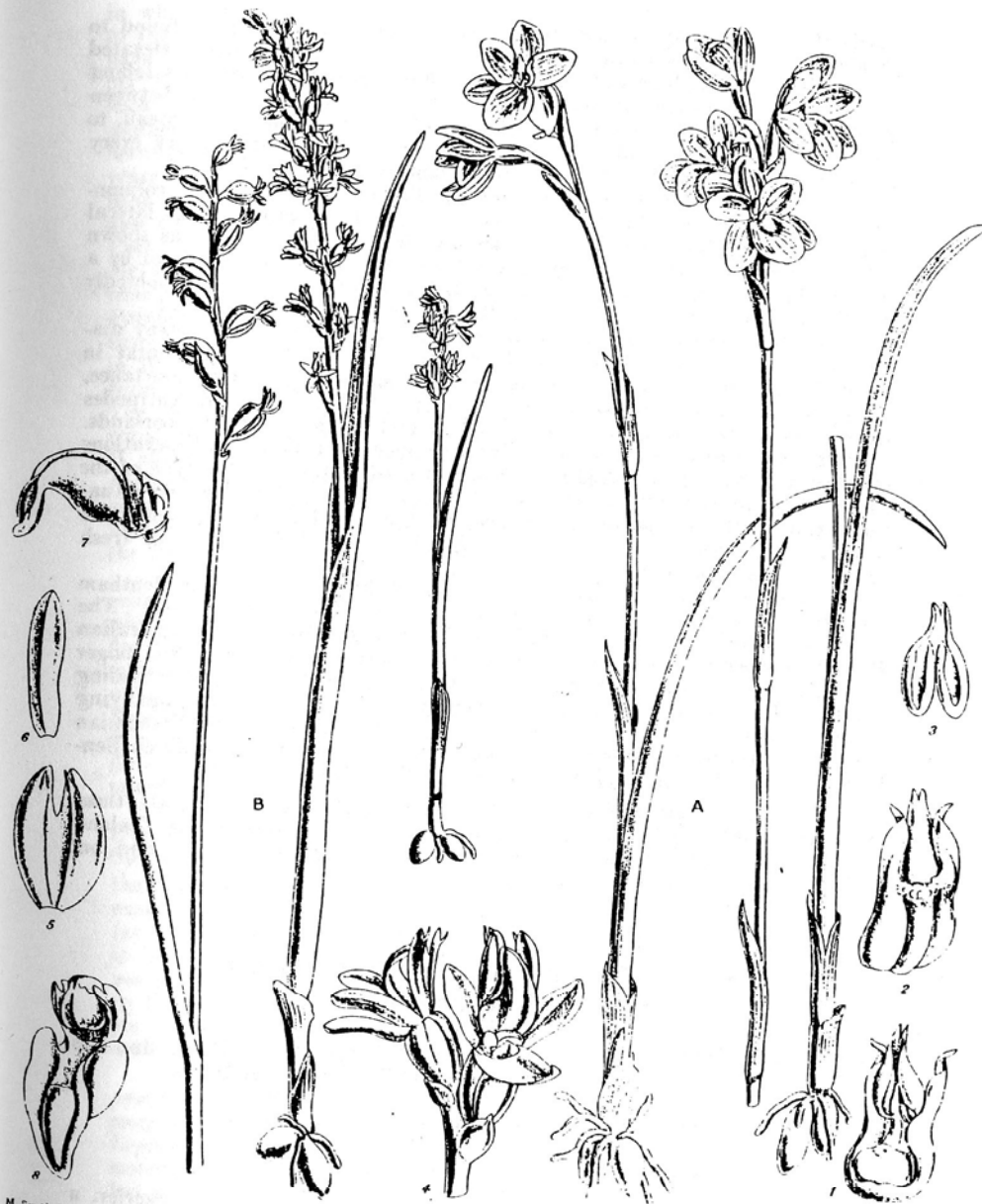
*Thelymitra uniflora*, Hook. *J. Fl. Antart.* i, 70; *Cheesem. Man. N.Z. Fl.* 672.

*Prasophyllum Colensoi*, Hook. *J. Fl. Nov. Zel.* i, 241; *Cheesem. Man. N.Z. Fl.* 675.

*Thelymitra uniflora* was first observed on the Auckland Islands by Lieut. Le Guillon, one of the officers of the French exploring-ships "Astrolabe" and "Zélée," which, under the command of Admiral D'Urville, visited the Islands in March, 1840. Le Guillon's specimens were very imperfect; but in November of the same year it was again collected by Sir J. D. Hooker during the Antarctic voyage of Sir J. C. Ross. In 1844 it was published by Hooker in the "Flora Antarctica" under the name it still bears. It was first gathered in New Zealand proper by Dr. Lyall, at Milford Sound; and shortly after-

PLATE 193A. *Thelymitra uniflora*, drawn from specimens collected on the Waimarino Plains, at the western base of Ruapehu; altitude 3,000 ft. Fig. 1, front view of column; 2, back view of same; 3, delisced anther. (All enlarged.)

PLATE 193B. *Prasophyllum Colensoi*, drawn from specimens obtained in the same locality as the preceding. Fig. 4, two flowers (x 5); 5, the two lateral sepals, connate below the middle (x 8); 6, one of the petals (x 8); 7, side view of lip and column (x 10); 8, front view of same (x 10).



A. THELYMITRA UNIFLORA, Hook. *J.* 1: 3. B. PRASOPHYLLUM COLENSOI, Hook. *J.* 4-9.



wards in eastern Otago by Mr. Buchanan. Since then it has been found to be abundant on the margins of peaty swamps or on damp, open, elevated moorlands as far north as Rotorua. It descends to sea-level in Stewart Island and in several localities in the South Island, but is most abundant between 2,000 ft. and 3,500 ft. It is specially plentiful on the Waimarino Plateau, to the west of Tongariro and Ruapehu, where in the month of January every peaty swamp is adorned with its dark-blue flowers.

*T. uniflora* belongs to Lindley's section *Biaurella*, in which the column-wing does not extend behind the anther, but has two prominent erect lateral lobes. In *T. uniflora* these lobes are more or less spirally involute, as shown in figs. 1 and 2 of the accompanying plate, and are sometimes connected by a crest at the back of the anther (see fig. 2). Its nearest ally is undoubtedly the Tasmanian *T. cyanea*, if, indeed, the two plants are not identical.

*Prasophyllum Colensoi*, as its name indicates, was one of the many discoveries made by Mr. Colenso, but I am not aware of the exact habitat in which it was first found. This, however, is not of any great importance, seeing that it is now known to extend from the North Cape to Antipodes Island, and to be one of the most abundant orchids in subalpine moorlands. Whether the form so generally distributed in mountain districts at elevations ranging from 2,000 ft. to 5,000 ft., and which must be taken as the type of the species, is quite the same as that which is sparsely found in lowland situations, and which extends to the extreme north of the Dominion, is not quite certain. The question cannot be settled until a detailed comparison of fresh specimens has been made.

*P. Colensoi* belongs to the typical section of the genus, called by Bentham *Euprasophyllum*, in which the lip is sessile at the base of the column. The only other species of the section found in New Zealand is the Australian *P. patens*, which differs in its much greater size, larger paler flowers, and longer lip, which has a much larger recurved lamina, the adnate plate not extending almost to the tip, as it does in *P. Colensoi* (see fig. 8 of the accompanying plate). The nearest ally of *P. Colensoi*, however, is probably the Tasmanian plant described by R. Brown under the name of *P. alpinum*, but which Bentham, in the "Flora Australiensis," merges with *P. fuscum*.

The genus *Prasophyllum* contains about thirty-five species. Of these, thirty-two are found in Australia (including Tasmania), four in New Zealand, two of which are apparently identical with Australian species, and one (*P. calopterum*, Rehb. f.) in New Caledonia.

## PLATE 194.—PRASOPHYLLUM PUMILUM AND PTEROSTYLIS TRULLIFOLIA.

FAMILY ORCHIDACEÆ.]

[GENERA PRASOPHYLLUM, R. BR., AND  
PTEROSTYLIS, R. BR.]

*Prasophyllum pumilum*, Hook. f. *Fl. Nov. Zel.* i, 242; *Cheesem. Man. N.Z. Fl.* 675.

*Pterostylis trullifolia*, Hook. *Fl. Nov. Zel.* i, 249; *Cheesem. Man. N.Z. Fl.* 682.

*Prasophyllum pumilum* was originally discovered by Mr. J. Edgerley, a gentleman of considerable scientific attainments, who collected plants in the northern portion of New Zealand in the years 1841-42, and who forwarded his specimens to Sir W. J. Hooker at Kew. I do not know the exact station

in which Mr. Edgerley obtained the species, but as his travels were confined to the district between the Hauraki Gulf and the Bay of Islands it must have been somewhere within those limits. A little later it was gathered by Mr. Colenso, probably at the Bay of Islands; and, according to the "Hand-book," it was collected in the vicinity of Auckland by Dr. Sinclair. Its southern limit, so far as I am aware, is on the *Leptospermum*-clad hills between Rangiriri and the Whangamarino River, where I observed it many years ago. Both Mr. Kirk and myself have gathered it in several stations near Auckland, although (as in all its localities) in small quantity. I have also collected it at Coromandel, in several stations between Helensville and Port Albert, at Whangarei, at the Bay of Islands, and at Mongonui. Mr. R. H. Matthews and Mr. Carse have both found it to be "not uncommon" near Kaitaia, and Mr. Kirk has recorded it from the tract of country between Parengarenga and the North Cape. It is purely a heath-plant, and I have never seen it except on the comparatively bare clay hills which are so frequent in the North Auckland Peninsula, and which, from the quantity of kauri-resin that has been dug from them, are locally known as "gum-lands." The vegetation on these hills is mainly composed of stunted *Leptospermum scoparium*, mixed with varying proportions of *Pomaderris phyllofolia* and *P. elliptica* (and less commonly *P. Edgerleyi*), *Leucopogon fasciculatus*, *Dracophyllum Urvilleanum*, and other shrubs, together with some sedges, *Pteris aquilina*, and several small herbaceous plants. It is in open places of perhaps a yard or so in extent, often covered with *Campylopus* and other mosses, that the *Prasophyllum* is usually found.

*Prasophyllum pumilum* belongs to an altogether different section of the genus to that which includes *P. Colensoi*, figured in the previous plate, and which bears the name of *Genoplesium*. In it the lip is articulated on to a flat ribband-like projection from the base of the column, and is more or less mobile. Its nearest ally, according to Hooker, is the Tasmanian *P. despectans*, with which I am not acquainted; but it is also comparatively close to the New Zealand plant which I have for the present referred to the Australian *P. rufum*, but which differs from *P. pumilum* in the horizontal (not deflexed) flowers, in the narrower lip and lateral sepals, the latter being tipped by a minute gland, and in the narrower lateral lobes of the column.

*Pterostylis trullifolia* is another of the discoveries made by Mr. J. Edgerley, having been collected by him at the Bay of Islands in 1841. About the same time, or very shortly afterwards, it was gathered by Mr. Colenso in the same district. Since then it has been observed by every botanist who has examined the vegetation of the northern portion of the North Island, for, so far as the district to the north of the Bay of Plenty and Kawhia is concerned, it is one of the most abundant of the terrestrial orchids. In the southern portion of the North Island it is decidedly rare and local, although it extends to the neighbourhood of Wellington. In the South Island the only locality yet recorded is Mount Peter, in northern Marlborough, where it was detected some years ago by Mr. J. H. Macmahon.

*P. trullifolia* has a somewhat wider range of habitats than *Prasophyllum pumilum*. Although often found on *Leptospermum*-clad hills, it requires more shade than the *Prasophyllum*, and delights in sheltered nooks in tall *Leptospermum*, where there is a plentiful supply of humus and not too much moisture. It is also common in mossy places in tolerably dry and open forest, but is seldom seen where the forest is thick and dense. Its altitudinal range is from sea-level to 2,000 ft. or a little more. Two well-marked varieties are commonly seen. The first, which must be regarded as the type, has a rather

large flower often an inch in length, and the petiolate radical leaves are usually present in flowering specimens, and frequently very numerous in barren ones, forming a conspicuous rosette. The other variety, which may be distinguished as var. *gracilis*, is taller and more slender, with a smaller flower varying from  $\frac{1}{2}$  in. to  $\frac{3}{8}$  in. in length; the cauline leaves are narrower, the radical leaves are seldom present in flowering specimens, and in barren plants are fewer in number and smaller. Both varieties are figured in the accompanying plate.

The genus *Pterostylis* has a very similar geographical distribution to that of *Thelymitra* and *Prasophyllum*. It contains approximately about fifty species, of which thirty-six or thirty-seven are Australian. Eleven species are found in New Zealand, two of them being the same as Australian forms; three are known from New Caledonia, one of them being probably identical with an Australian species; and a single species (*P. papuana*, Rolfe) is found in New Guinea.

### PLATE 195.—PTEROSTYLIS BANKSII.

FAMILY ORCHIDACEÆ.]

[GENUS PTEROSTYLIS, R. BR.

*Pterostylis Banksii*, R. Br. ex A. Cunn. in Bot. Mag. t. 3172; Hook. J. Fl. Nov. Zed. i, 248; Cheesem. Man. N.Z. Fl. 679.

*Pterostylis Banksii*, which is by far the finest species of the genus found in New Zealand, was first discovered by Banks and Solander at Mercury Bay in November, 1769, during Cook's first voyage. Solander, in his manuscript Flora of New Zealand, referred it to the genus *Arethusa*, but gave no detailed account of it, for he supposed that it was identical with an Australian plant described in another part of his manuscripts. It was not again seen until 1826, when the talented and enthusiastic Allan Cunningham gathered it on the banks of the Kawakawa River, Bay of Islands. Since then it has been found to range through almost the whole length of the Dominion, from the North Cape to Stewart Island, and from sea-level to nearly 4,000 ft.

*P. Banksii* is usually found along the sides of lightly wooded gullies, or on the margin of forest lands, and sometimes occurs in considerable quantities. It is variable in size, sometimes attaining a height of quite 18 in. or even more, at other times barely reaching 6 in. Specimens of the sizes quoted above have been collected by myself in a single locality growing under uniform conditions; but, speaking generally, the taller specimens are found in sheltered places along the sides of ravines, and the smaller in more open situations. The large green flowers, often streaked with red or reddish-brown, and with the three sepals all furnished with long filiform tails, have a most curious and bizarre appearance, and always attract the notice of strangers when seen for the first time.

PLATE 194A. *Prasophyllum pumilum*, drawn from specimens collected by Mr. R. H. Matthews near Kaitiā, Mongonui County. Fig. 1, two flowers; 2, the two lateral sepals, connate at the base; 3, lateral petals, lip, and column; 4, side view of lip and column; 5, front view of column, with the ribband-like base of the lip. (All enlarged.)

PLATE 194B. *Pterostylis trullifolia*, drawn from specimens collected in the vicinity of Auckland. Fig. 6, flower ( $\times 14$ ); 7, a single petal ( $\times 2$ ); 8, lip and column ( $\times 4$ ); 9, lip with its appendix ( $\times 6$ ); 10, front view of column, with the wings spread open ( $\times 6$ ); 11, tip of appendix to the lip, highly magnified.



A. PRASOPHYLLUM PUMILUM, *Bot. Beech.* 1-5.  
B. PTEROSTYLIS TRULLIFOLIA, *Bot. Beech.* 6-12.

West, Newman imp.

The remarkable fertilization of *Pterostylis* was first described by myself in the "Transactions of the New Zealand Institute" (vol. v, p. 352 *et seq.*). The upper sepal and petals are connate into a hood, at the back of which the column is placed. The tip of the lip, which is extremely sensitive, hangs out of the entrance to the flower, thus forming a convenient landing-place for insects. When touched by an insect it springs up, carrying the insect with it, and thus enclosing it within the flower. The position then occupied by the lip is that shown in fig. 2 of the accompanying plate, and the insect is enclosed in the space between the lip and the column. The hood-like flower prevents any escape to the right or left of the lip, and as the lip remains closely appressed to the projecting wings of the upper part of the column as long as the insect is present, the only mode of escape is by crawling up the front of the column and passing between the wings (see fig. 4). In doing this, it is first smeared with viscid matter from the rostellum, which projects at the back of the passage between the wings, and then drags away the pollinia, which can hardly fail to adhere to its sticky body. When visiting another flower it must pass over the stigma before escaping, and can hardly fail to leave some of the pollinia on its viscid surface. From the above, it is clear that the fertilization of the flower depends entirely on the irritability of the lip. With the view of proving this, on one occasion I removed the lip from twelve flowers while young, so that insect visitors would not be compelled to crawl out of the flower by the passage between the wings of the column. When these flowers commenced to wither they were examined, when it was found that they were not fertilized, and that not a single pollen-mass had been removed from the anther. I have also repeatedly placed minute insects on the lip, thus causing them to become entrapped, and in several instances I have seen these escape from the flower in the manner described above, bearing pollinia on their backs. The whole of the New Zealand species of *Pterostylis* are fertilized in the manner described above; and, according to the researches of the late Mr. Fitzgerald, it is also the manner employed in the Australian species.

PLATE 195. *Pterostylis Banksii*. drawn from specimens collected in the vicinity of Auckland. Fig. 1, petal ( $\times 2$ ); 2, lip and column ( $\times 2$ ); 3, lip alone ( $\times 2\frac{1}{2}$ ); 4, front view of column, the wings spread open ( $\times 2$ ).



M. Smith del.  
J. N. Petch. lith.

Watt, Howman 1897

PTEROSTYLIS BANKSII, R Br.

## PLATE 196.—PTEROSTYLIS FOLIATA.

FAMILY ORCHIDACEÆ.]

[GENUS PTEROSTYLIS, R. BR

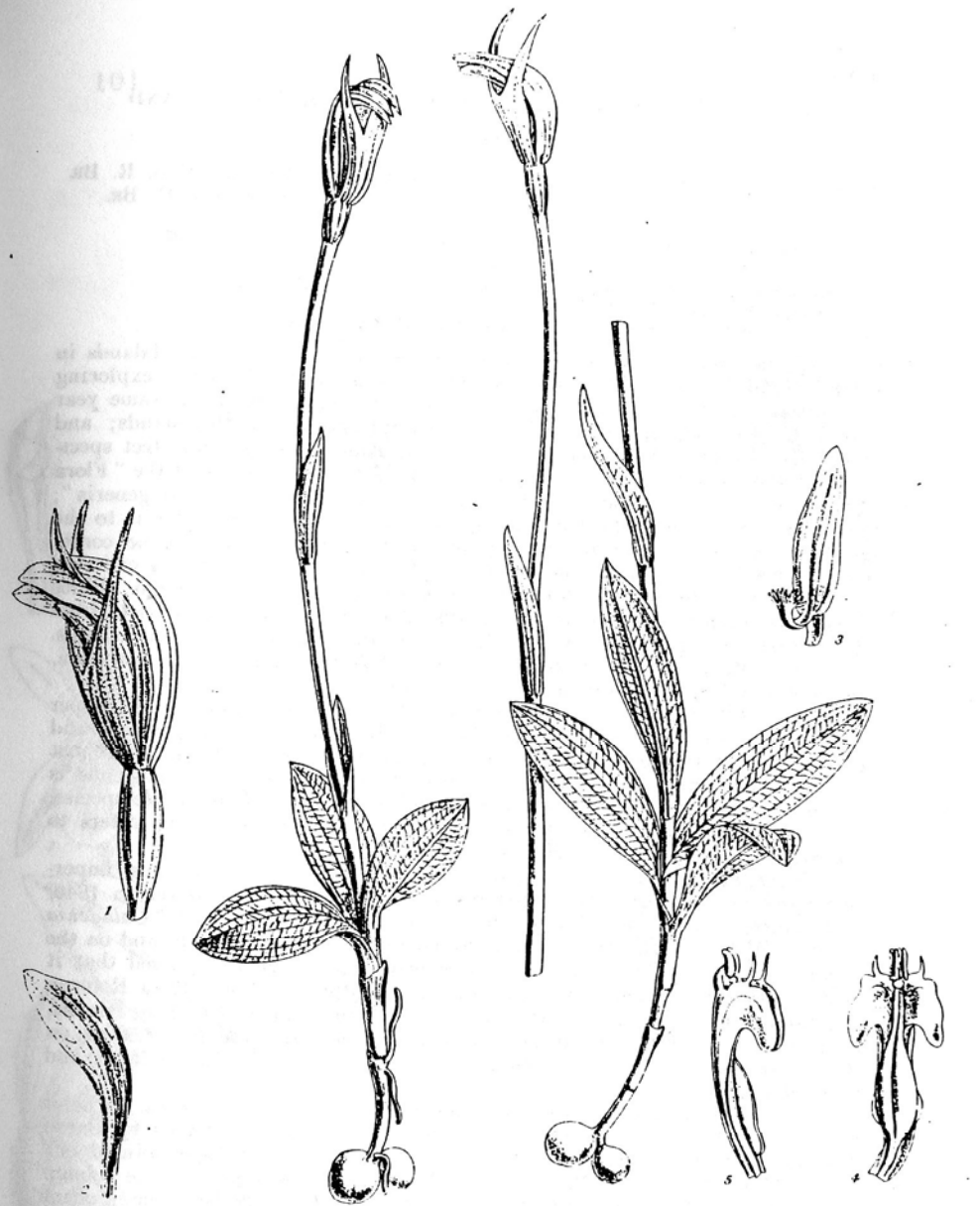
*Pterostylis foliata*, Hook. *J. Fl. Nov. Zed.* i, 249; *Cheesem. Man. N.Z. Fl.* 681.

This is one of the numerous species the discovery of which is due to Mr. Colenso, who for many years was, to use the words of Sir J. D. Hooker, "the foremost New Zealand botanical explorer." He first collected it near Cape Palliser in 1845; and again in 1847 near the summit of the Ruahine Mountains, where it was associated with *Catadenia bifolia*, figured in the following plate. Subsequently he obtained it in several other localities on the eastern side of the North Island, where it has also been gathered by Mr. Tryon, Mr. Guthrie-Smith, and others. In 1863 Mr. Buchanan collected it on the uplands of eastern Otago, where, some years afterwards, it was also observed by Mr. Petrie. Mr. Kirk obtained it in a single station in Marlborough; but these two districts are the only known localities in the South Island. It is usually found in *Sphagnum* bogs, and it ranges from sea-level to 3,500 ft. elevation.

I have never had the good fortune to examine *Pterostylis foliata* in its native habitat, and am consequently greatly indebted to Mr. Guthrie-Smith for an ample supply of specimens in a fresh state collected by him on the margin of Lake Tutira, in northern Hawke's Bay, and from which the accompanying plate has been prepared. His specimens proved that the species varies greatly in size, some of them barely exceeding 4 in. in height, while others reached quite 18 in. When fresh the leaves are rather fleshy, and the reticulated veins are by no means obvious; but when dried the leaves become much thinner, and the veins decidedly conspicuous, as shown in the plate. The upper part of the peduncle, the ovary, and occasionally the lateral sepals, are more or less glandular-pubescent, a character that has not been mentioned in previous descriptions of the plant.

As a species *P. foliata* is allied to *P. micromega*, but differs in the stouter habit, larger more reticulate and usually rosulate radical leaves, in the cauline leaves being reduced to sheathing-bracts, and in the smaller flowers with much shorter points to the lateral sepals. *P. Oliveri* is separated by the same characters, and by the much larger conspicuously decurved flower. According to Dr. Schlechter, it is closely allied to the New Caledonian *P. Bureauviana*, a species with which I am not acquainted.

PLATE 196. *Pterostylis foliata*, drawn from specimens collected by Mr. Guthrie-Smith on the margin of Lake Tutira, Hawke's Bay. Fig. 1, flower ( $\times 2$ ); 2, petal ( $\times 2$ ); 3, lip ( $\times 3$ ); 4 and 5, front and side view of column ( $\times 3$ ).



PTEROSTYLIS FOLIATA. Hook. f.

West Newman imp

PLATE 197.—LYPERANTHUS ANTARCTICUS AND  
CALADENIA BIFOLIA.

FAMILY ORCHIDACEÆ.]

[GENERA LYPERANTHUS, R. BR.  
CALADENIA, R. BR.

*Lyperanthus antarcticus*, Hook. f. *Fl. Antarct.* ii, 544; *Chesem. Man. N.Z. Fl.* 687.

*Caladenia bifolia*, Hook. f. *Fl. Nov. Zel.* 247; *Chesem. Man. N.Z. Fl.* 689.  
*Chiloglottis Traversii*, F. Muell. *Veg. Chath. Is.* 51.  
*Chiloglottis bifolia*, Schlechter in *Engl. Bot. Jahr.* band 45, p. 383.

*Lyperanthus antarcticus* was first discovered in the Auckland Islands in March, 1840, by Lieut. Le Guillon, a member of Admiral D'Urville's exploring expedition in the "Astrolabe" and "Zélée." In November of the same year Sir J. C. Ross, in the "Erebus" and "Terror," also visited the islands; and Sir J. D. Hooker, who accompanied the expedition, obtained imperfect specimens of the plant. All that Hooker could do in the first volume of the "Flora Antarctica" was to allude to the plant under the heading "dubii generis"; but an examination of Le Guillon's specimens enabled him to refer it to the genus *Lyperanthus*, and in the supplement to the second volume he consequently described it under the name it still bears. In 1863 it was collected by Sir James Hector and Mr. Buchanan in the interior of Otago. Since then it has been found to have a wide distribution in subalpine districts from the Tararua Range southwards to Stewart Island and the Auckland Islands. In New Zealand it is most common between 2,500 ft. and 4,000 ft. elevation, but it descends to sea-level in Stewart Island.

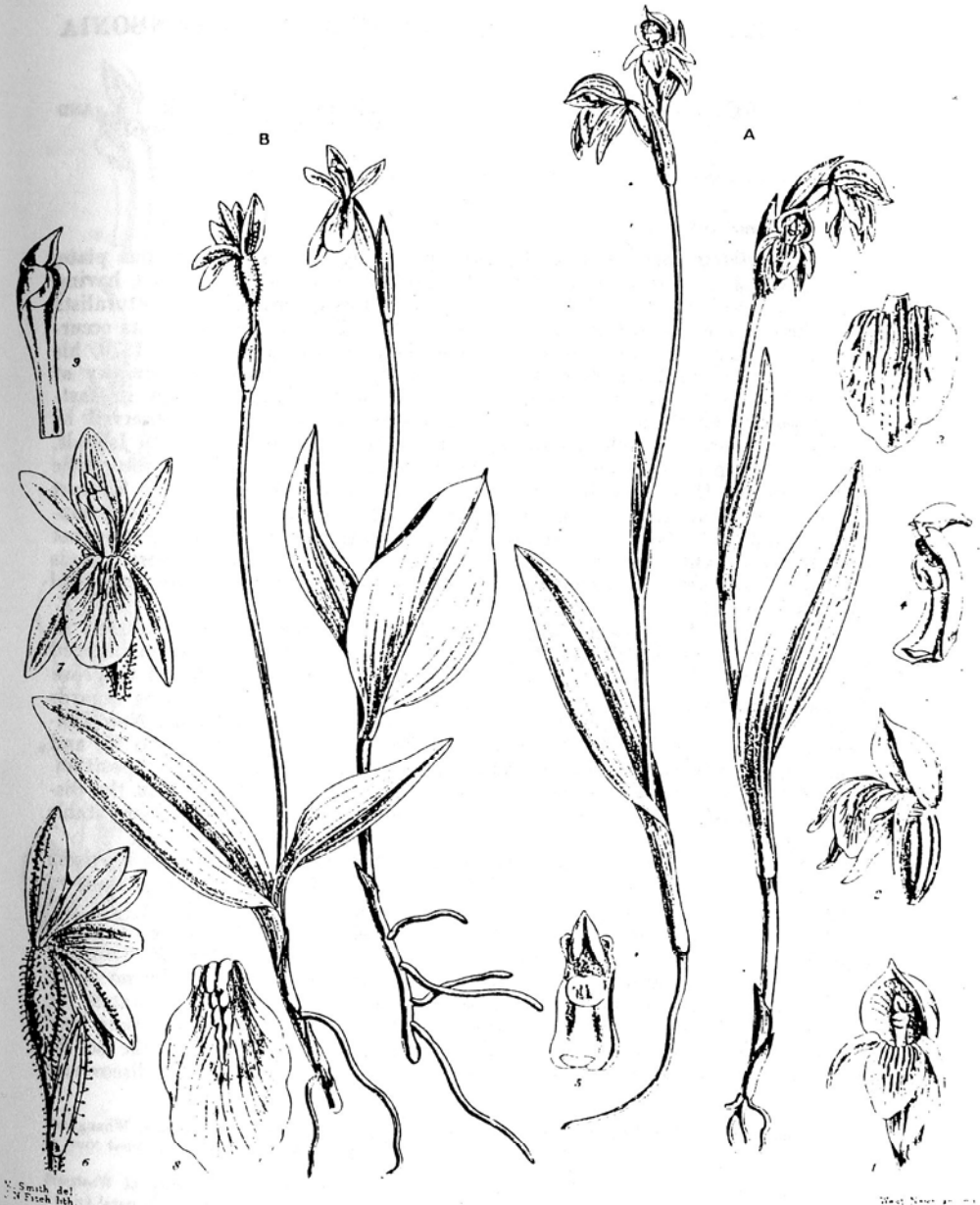
*Lyperanthus antarcticus* differs from the type of the genus in the upper sepal being much broader and more hooded, in the less spreading sepals and petals, and in the shorter and broader column, but the differences are not sufficient for generic distinction. According to Dr. Schlechter, the genus is confined to Australia and New Zealand, and is limited to four or five species. The New Caledonian plants formerly placed in the genus he now refers to *Megastylis* (see *Engl. Bot. Jahr.* vol. 45, 384).

*Caladenia bifolia* was also first collected on the Auckland Islands, imperfect specimens having been gathered thereon by Sir J. D. Hooker in 1840, and referred to in the "Flora Antarctica" under the heading "*Caladenia* No. 5." A few years later it was collected in Otago by Dr. Lyall, and on the Ruahine Range by Mr. Colenso. Subsequent exploration has proved that it is by no means uncommon in montane and subalpine districts from Rotorua and Taupo southwards to Stewart Island; it is also found in the Chatham Islands, Antipodes Island, and the Auckland Islands. It ascends as high as 4,500 ft. on the Nelson mountains, but descends to sea-level in the Chatham Islands and Stewart Island.

*Caladenia bifolia* is a somewhat anomalous member of the genus, its habit being precisely that of *Chiloglottis*, to which it has been referred by Baron Mueller, and more recently by Dr. Schlechter. But, as I have pointed out in the Manual, it wants the essential character of the wings of the column produced into two lobes behind the anther. In this respect the student should compare fig. 9 of the accompanying plate, showing the column of *Caladenia bifolia*, with fig. 4 of Plate 198, representing the column of *Chiloglottis cornuta*. On the whole, I am still of opinion that the species is best placed in *Caladenia*.

PLATE 197A. *Lyperanthus antarcticus*, drawn from specimens collected on the Auckland Islands by Mr. B. C. Aston. Fig. 1, front view of flower (x 2); 2, side view of same (x 2); 3, lip, showing the longitudinal lamellæ (x 4); 4, side view of column (x 4); 5, front view of column (x 4).

PLATE 197B. *Caladenia bifolia*, drawn from specimens collected in the Mount Arthur Plateau, Nelson, at an altitude of 4,000 ft. Fig. 6, side view of flower (x 2); 7, front view of flower (x 2); 8, lip, showing the two lines of calli (x 4); 9, column (x 4).



A LYPERANTHUS ANTARCTICUS, Hook. f. 1 5  
B CALADENIA BIFOLIA, Hook. f. 6 9

PLATE 198.—CHILOGLOTTIS CORNUTA AND TOWNSONIA DEFLEXA.

FAMILY ORCHIDACEÆ.]

[GENERA CHILOGLOTTIS, R. BR., AND TOWNSONIA, CHEESEM.

*Chiloglottis cornuta*, Hook. *J. Fl. Antarct.* i, 69; *Cheesem. Man. N.Z. Fl.* 690.

*Townsonia deflexa*, *Cheesem. Man. N.Z. Fl.* 692.

*Chiloglottis cornuta*, like the two species figured in the previous plate, was first collected during the Antarctic expedition of Sir J. C. Ross, having been gathered on Campbell Island by Dr. Lyall, one of the naturalists attached to the expedition, in December, 1840. The first record of its occurrence in New Zealand proper was published by Mr. T. Kirk in 1870, his specimens having been obtained at Northcote, in the immediate vicinity of the City of Auckland, a locality where it still exists, although in fast-diminishing numbers. Almost immediately afterwards it was observed by several botanists in various portions of both the North and the South Islands, and at the present time it is known to extend through almost the whole length of the Dominion, from the North Cape district southwards to Stewart Island, the Chatham Islands, Antipodes Island, and the Auckland and Campbell Islands. In fact, there are few districts in the Dominion where it cannot be obtained, although it is rarely present in considerable numbers. It is usually found amongst humus in moist shaded places, and ranges from sea-level to quite 3,000 ft.

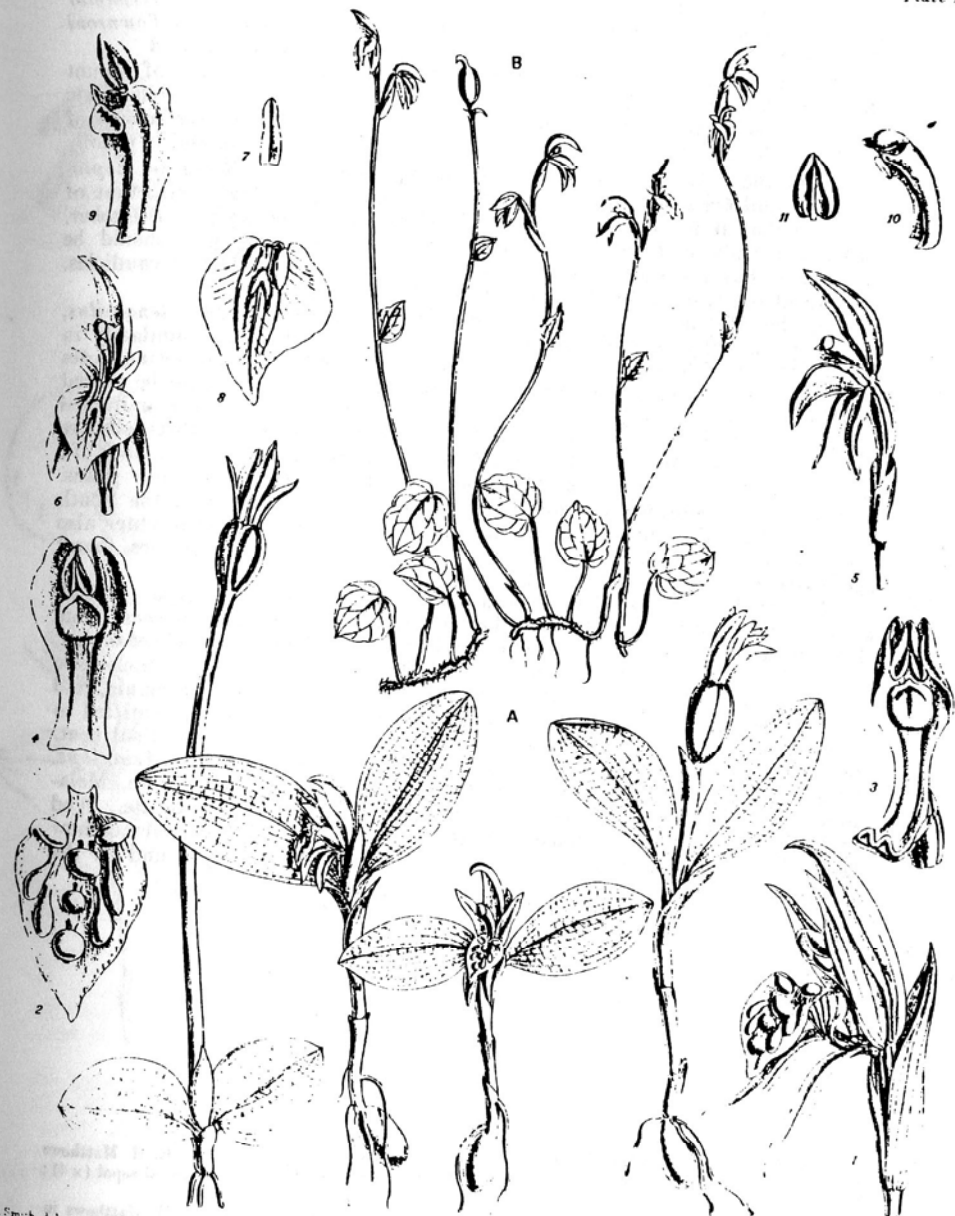
In Sir J. D. Hooker's original description of the species, published in the "Flora Antarctica" (vol. 1, p. 69), he makes the remark, "I am inclined to think that the glands on the disc of the labellum will be found to prove a variable character." This surmise has been fully verified, both as regards specimens from the islands to the south of New Zealand and from New Zealand proper. I find that the number of the glands varies from 6 to 12, and that the glands themselves are very inconstant in size, shape, and position. Facts like these show that such variable organs are of little value in the discrimination of species, unless they are accompanied by other and more stable differences.

In addition to *C. cornuta*, the genus *Chiloglottis* contains six or seven Australian species, one of which (*C. formicifera*, Fitzgerald) also extends to New Zealand.

The charming little plant figured in this plate under the name of *Townsonia deflexa* was discovered in the vicinity of Westport by Mr. W. Townson in the year 1904, and up to the present time has been gathered by no other botanist. As stated in the Manual, the generic name commemorates the services rendered to botanical science by Mr. Townson, who more than any other person has contributed to the elucidation of the flora of the southwestern portion of the Nelson Provincial District. Among the discoveries

PLATE 198A. *Chiloglottis cornuta*, drawn from specimens collected at Maungatapere, Whangarei, by Mr. H. Carac. Fig. 1, side view of flower ( $\times 3$ ); 2, lip, showing glands ( $\times 5$ ); 3, front view of column ( $\times 5$ ); 4, the same with the wings spread open ( $\times 5$ ).

PLATE 198B. *Townsonia deflexa*, drawn from specimens collected in the vicinity of Westport by Mr. W. Townson. Fig. 5, side view of flower ( $\times 3$ ); 6, front view of same ( $\times 3$ ); 7, petal ( $\times 5$ ); 8, lip (the ridges much too conspicuous) ( $\times 5$ ); 9 and 10, front and side views of column ( $\times 5$ ); 11, dehiscid anther ( $\times 6$ ).



M. Smith del.  
J. N. Fitch lit.

A CHILOGLOTTIS CORNUTA, Hook.  
B TOWNSONIA DEFLEXA, Cheesem.

West Newman imp.

made by him are the following species illustrated in this work: *Aciphulla Townsoni* (Plate 62), *Dracophyllum Townsoni* (Plate 130), *Gentiana Townsoni* (Plate 139), *Veronica divaricans* (Plate 148), and the plant now figured.

Mr. Townson informs me that *T. deflexa* occurs on the spurs of Mount Rochfort, Mount Frederic, and the Paparoa Mountains, which collectively form the coast ranges immediately to the north and south of the mouth of the Buller River. It ranges from 1,500 ft. to 2,000 ft. elevation, and is usually found on the mossy surface of rocks and logs under the shelter of *Leptospermum* and *Olearia Colensoi*, its colour harmonizing so closely with that of the moss that it is easily overlooked. It blooms in November and December, and when fully mature the flowers have a purplish tinge. It should be mentioned that the radical leaves are usually produced on special caudices, and not at the base of the flowering-stem.

In the Manual I regarded *Townsonia* as a close ally of *Adenochilus*, relying principally on the structure of the column and the close similarity in habit. Dr. R. Schlechter, who has recently published some interesting notes on the genus (Fedde, Repertorium, ix, 249), suggests that it should be placed in the vicinity of *Acianthus*, with which it agrees in the smooth undivided lip, devoid of any projections or protuberances beyond two or three obscure ridges. He also points out that the Tasmanian *Acianthus viridis*, Hook. f., is very closely allied to *T. deflexa*, and must be placed in the same genus. *Townsonia* is therefore a genus of two species—one confined to the South Island of New Zealand, the other endemic in Tasmania. Dr. Schlechter also traces an affinity to the genus *Stigmatodactylus*, which has three species, found respectively in Japan, India, and Java.

Dr. Schlechter considers *Townsonia* to be an Antarctic type (*typisch antarktische*). But surely he uses the term in an entirely different sense from that understood by most New Zealand botanists. Genera like *Colobanthus*, *Acaena*, *Azorella*, *Nertera*, *Phyllachne*, *Rostkovia*, *Oreobolus*, &c., which have species in the extreme south of South America, New Zealand, Tasmania, and the circumpolar islands, may well be called Antarctic, and we are entitled to speculate on their probable previous existence on the Antarctic Continent. But in the case of *Townsonia*, whose nearest allies are the genera *Acianthus*, *Adenochilus*, and *Stigmatodactylus*, which have a purely Australian, Melanesian, and Malayan distribution, the term seems inappropriate. And especially is it so when we consider that the *Orchidaceæ* of New Zealand show absolutely no relationship to the few members of the family found in the extreme south of South America.

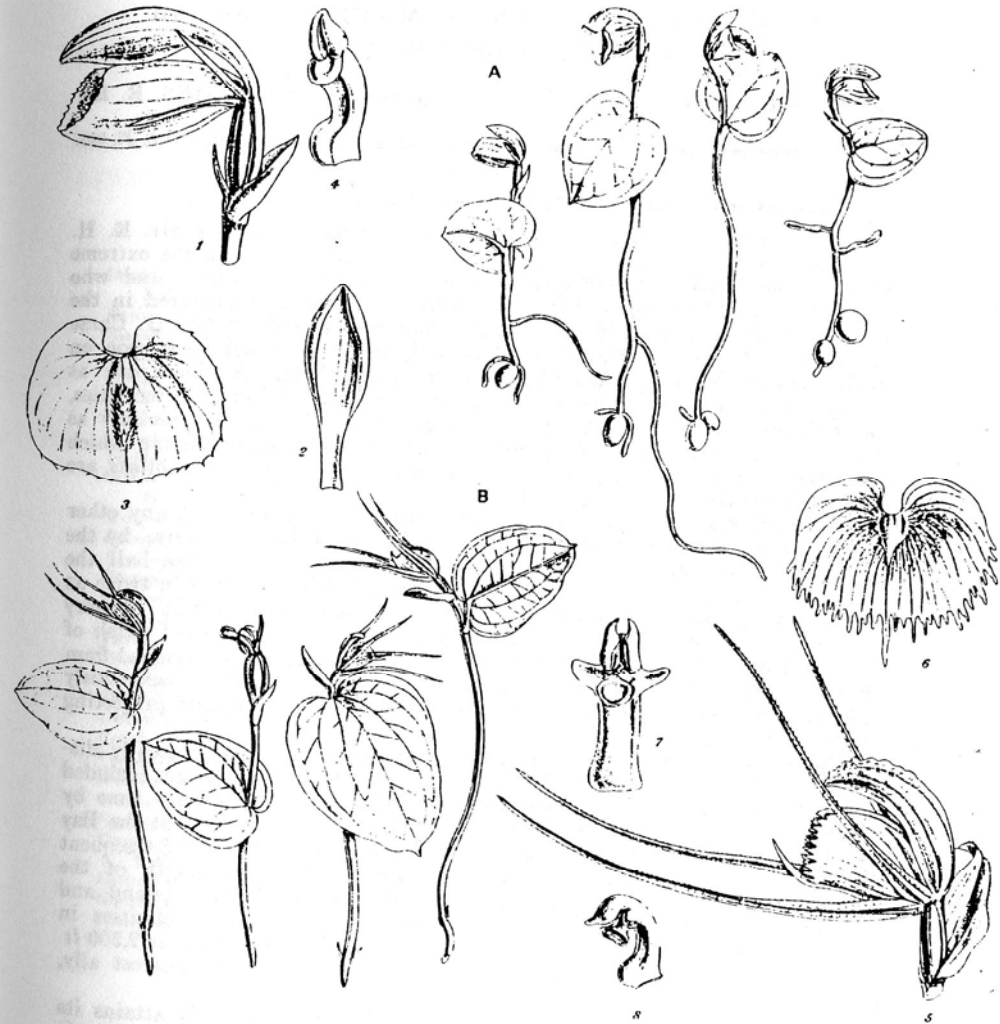


PLATE 199A. *Corysanthes Mathewsii*, drawn from specimens collected by Mr. R. H. Mathews in the vicinity of Kaitiaki, Mongonui County. Fig. 1, side view of flower ( $\times 4$ ); 2, dorsal sepal ( $\times 4$ ); 3, lip spread open ( $\times 4$ ); 4, column ( $\times 6$ ).

PLATE 199B. *Corysanthes oblonga*, drawn from specimens collected by Mr. R. H. Mathews in the vicinity of Kaitiaki. Fig. 5, side view of flower ( $\times 1$ ); 6, lip spread open ( $\times 1$ ); 7, front view of column ( $\times 6$ ); 8, side view of same ( $\times 6$ ).

PLATE 199.—CORYSANTHES MATTHEWSII AND  
CORYSANTHES OBLONGA.

FAMILY ORCHIDACEÆ.]

[GENUS CORYSANTHES, R. BR

*Corysanthes Matthewsii*, Cheesem. in *Trans. N.Z. Inst.* xxxi (1899), 351; *Man. N.Z. Fl.* 693.

*Corysanthes oblonga*, Hook. *J. Handb. N.Z. Fl.* 694; *Cheesem. Man. N.Z. Fl.* 694.

*Corysanthes Matthewsii* is one of the discoveries of the late Mr. R. H. Matthews, of Kaitaia, who during a residence of many years in the extreme north of the Dominion paid special attention to the *Orchidaceæ*, and who added several species to the flora. *C. Matthewsii* was first gathered in the vicinity of Kaitaia in 1898; but it has since been found by Mr. H. Carse at Fairburn, between Kaitaia and Mongonui, where it is not uncommon on shaded mossy slopes. It has also been collected by Mr. A. Thompson at Aponga, inland from Whangarei. No doubt it will be found in other localities, for it is not easy to exhaust the orchid-flora of any district, particularly as regards the smaller terrestrial species. Their period of bloom, during which alone they can be positively recognized, is but short; and their habitats are often of a recluse and sequestered nature.

*C. Matthewsii* is much more closely allied to *C. oblonga* than any other species, but can be at once distinguished by the rather larger flowers; by the much smaller lateral sepals and petals, which are never more than half the length of the upper sepal, whereas in *C. oblonga* they are more than twice as long; and by the margin of the lip being either quite smooth or very obscurely denticulated, while the disc is furnished with a thickened patch of close-set deflexed hairs. *C. Carsei*, a species which I have lately described from the same district, is also allied; but its flower is longer and often conspicuously deflexed, the dorsal sepal is narrower, and the lip has a curious projecting lamina at its tip.

According to Sir J. D. Hooker, *Corysanthes oblonga* was originally discovered by Allan Cunningham; but, if so, it is curious that it was not included in his "Precursor." It was, however, collected at nearly the same time by Mr. Edgerley in some locality in the North Island, by Mr. Colenso at the Bay of Islands, and by Colonel Haultain in the vicinity of Auckland. Subsequent research has proved that it extends throughout the whole length of the Dominion, from the North Cape district southwards to Stewart Island and the Auckland Islands. It is usually found on moist mossy declivities in shaded forests, and although common at sea-level it ascends as high as 2,500 ft. I have already pointed out the differences between it and its nearest ally, *C. Matthewsii*.

The genus *Corysanthes* contains about thirty-five species. It attains its southern limit in New Zealand, where eight species are now known. It stretches northwards through Australia to New Guinea, the Himalaya Mountains, and the Philippine Islands; and eastwards as far as Tahiti. It has, therefore, the characteristic distribution of most of the genera of the New Zealand *Orchidaceæ*.

Orchidaceæ. From Illustrations of the New Zealand  
Phaenerogams and Ferns that have appeared  
prior to the Publication of this Work. In  
*Illustrations of the New Zealand Flora*.  
Wellington, Government Printer, 1914. Volume  
II, p xvi.

ORCHIDACEÆ.

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*Earina mucronata*, Lindl.—*IC. Plant.* t. 431; Hetley, *Nat. Fl. N.Z.* t. 28.  
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*Spiranthes australis*, Lindl.—*Bot. Reg.* t. 823; Fitzgerald, *Austral. Orchids.* i, pt. 2.  
*Thelymitra izioides*, Swz.—*Vet. Akad. Handl. Stockh.* (1800) t. 3; Hook. *f. Fl. Tasm.* ii, t. 103b; Fitzgerald, *Austral. Orchids.* i, pt. 3.  
*Thelymitra longifolia*, Forst.—*Char. Gen.* t. 49; A. Rich. *Fl. Nouv. Zel.* t. 25, f. 2 (*T. Forsteri*); Fitzgerald, *Austral. Orchids.* i, pt. 6; Laing & Blackw. *Pl. N.Z.* t. 30.  
*Thelymitra intermedia*, Berggr.—*Minnesk. Fisiog. Sallsk. Lund.* (1877) t. 5, f. 21-24.  
*Orthoceras strictum*, R. Br.—A. Rich. *Fl. Nouv. Zel.* t. 25, f. 1 (*Duris novz-zelandiar*); Fitzgerald, *Austral. Orchids.* i, pt. 3.  
*Microtis porrifolia*, R. Br.—Fitzgerald, *Austral. Orchids.* ii, pt. 1; Laing & Blackw. *Pl. N.Z.* t. 30.  
*Prasophyllum patens*, R. Br.—Hook. *f. Fl. Tasm.* ii, t. 111; Buch. *Trans. N.Z. Inst.* xix (1887), t. 15 (*Gastrodia Hectori*).  
*Prasophyllum rufum*, R. Br.—Fitzgerald, *Austral. Orchids.* ii, pt. 4.  
*Caleana minor*, R. Br.—Fitzgerald, *Austral. Orchids.* i, pt. 6.  
*Pterostylis Banksii*, R. Br.—*Bot. Mag.* t. 3172; Laing & Blackw. *Pl. N.Z.* t. 32.  
*Pterostylis trullifolia*, Hook. *f.*—*Cheesem. Trans. N.Z. Inst.* v, t. 20.  
*Pterostylis barbata*, Lindl.—Hook. *f. Fl. Tasm.* ii, t. 116.  
*Pterostylis mutica*, R. Br.—Hook. *f. Fl. Tasm.* ii, t. 117A; Fitzgerald, *Austral. Orchids.* i, pt. 2.  
*Calochilus campestris*, R. Br.—Fitzgerald, *Austral. Orchids.* i, pt. 4.  
*Calochilus pululosus*, R. Br.—Fitzgerald, *Austral. Orchids.* i, pt. 4.  
*Caladenia minor*, Hook. *f.*—*Fl. Nov. Zel.* i, t. 56b.  
*Chiloglottis formicifera*, Fitzgerald—*Austral. Orchids.* i, pt. 3.  
*Aleuochilus gracilis*, Hook. *f.*—*Fl. Nov. Zel.* i, 56A.  
*Corysanthes Cheesemani*, Hook. *f.*—*IC. Plant.* t. 1120.  
*Corysanthes oblonga*, Hook. *f.*—*Fl. Nov. Zel.* i, t. 57b (*Nematoceras*).  
*Corysanthes macrantha*, Hook. *f.*—*Fl. Nov. Zel.* i, t. 57A (*Nematoceras*); Laing & Blackw. *Pl. N.Z.* t. 35.  
*Gastrodia sesamoides*, R. Br.—Hook. *f. Fl. Tasm.* ii, t. 126; Fitzgerald, *Austral. Orchids.* ii, pt. 5.  
*Gastrodia Cunninghamii*, Hook. *f.*—*Petrie in Trans. N.Z. Inst.* xxv (1893), t. 20, f. 1-4.  
*Gastrodia minor*, Petrie—*Trans. N.Z. Inst.* xxv (1893), t. 20, f. 5-7.



**"M. Smith del.  
J.N. Fitch lith."**

Cheeseman chose as artist for his *Illustrations* Matilda Smith (1854-1926). She was born in India, came to England as a baby, and eventually contributed 2300 plates to Curtis's *Botanical Magazine*, and many to other publications. She was the recipient of many awards, and her work was so admired that two plants were named for her. Nevertheless Wilfrid Blunt had only faint praise for her:

"Miss Smith remained to the end a rather fumbling draughtsman (*sic*), more remembered for her 'great pains' and 'untiring efforts' than for her skill, but best of all esteemed for the charm of her personality. She was on occasion her own lithographer; but she owed much to John Fitch, who made some attractive lithographs from her rather hesitant sketches."  
30

Not so. Her original pencil drawings for the *Illustrations* are in the Auckland Museum, and they are skilful, accurate and scientific - little different from the lithographs. Fitch had added few extra touches.

John Nugent Fitch (1843-1927) was the nephew of W.H. Fitch, Kew's greatest botanical illustrator, and was second only to his uncle in industry - 2500 of his lithographs appeared in Curtis's *Botanical Magazine*, and he illustrated many other works until his career was brought to a halt by a paralysis of his hands.

The only New Zealand orchid illustrated in colour by Smith and Fitch appeared with a paper by J.D. Hooker.<sup>31</sup> It is *Caladenia carnea*, the white-flowered variety grown at Kew from an Australian specimen, and the illustration of the pink form taken from Hooker's *Flora Tasmaniae*.

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