

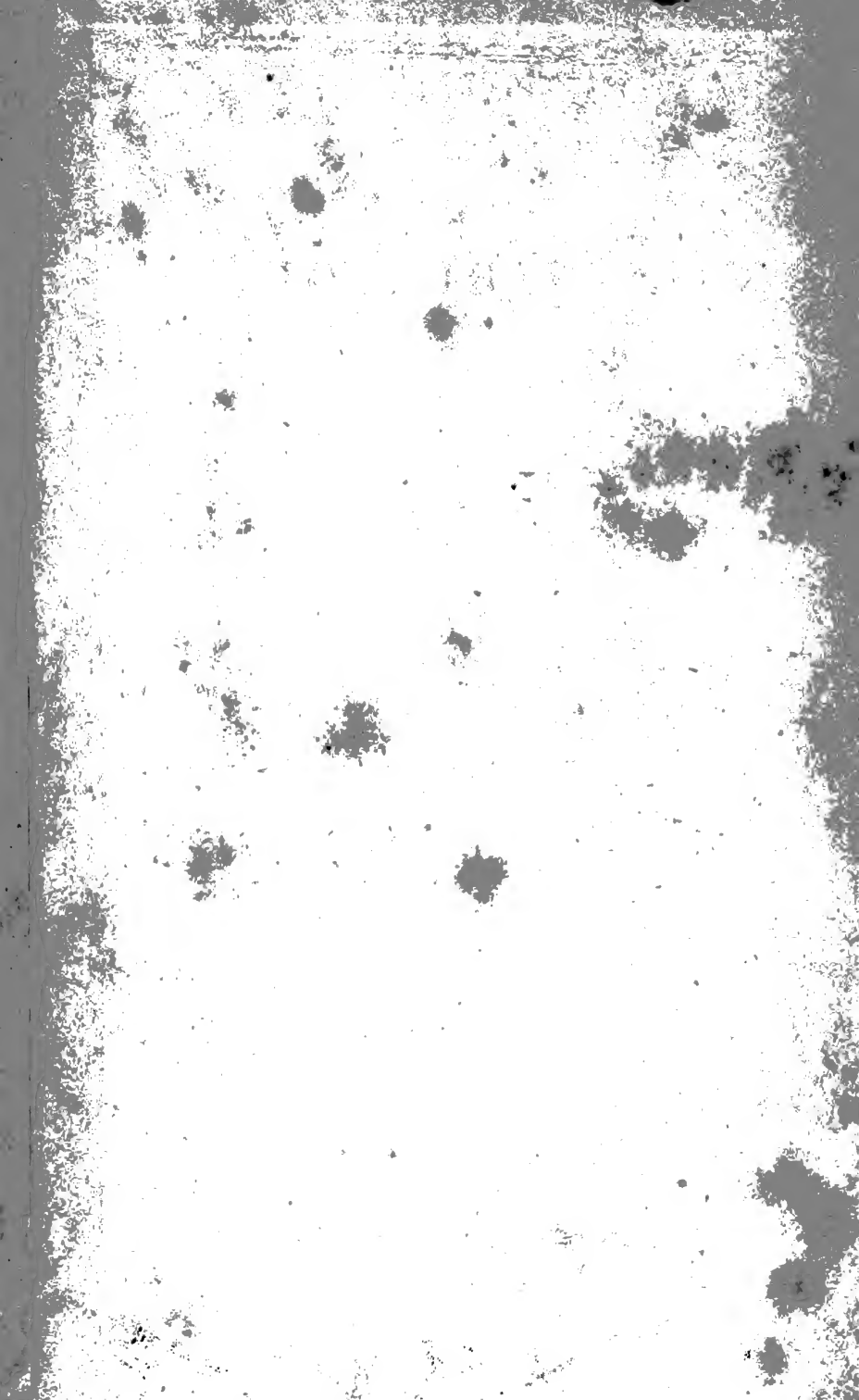
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# CONTRIBUTION

TO

## THE FLORA OF AUSTRALIA,

BY

WILLIAM WOOLLS, F.L.S.,

AUTHOR OF "MISCELLANIES IN PROSE AND VERSE," "A SHORT ACCOUNT OF  
THE CHARACTER AND LABOURS OF THE REV. SAMUEL MARSDEN,"  
ETC., ETC.

---

"Consider the Lilies of the Field, how they grow."

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SYDNEY: F. WHITE, WILLIAM STREET;  
PARRAMATTA: J. FERGUSON, CHURCH STREET;  
MELBOURNE: G. ROBERTSON, 69, ELIZABETH STREET.

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To

FERDINAND MUELLER, PH.D., M.D., F.R.S., &c., &c., &c.

GOVERNMENT BOTANIST FOR THE COLONY OF VICTORIA.

MY DEAR SIR,

In presenting to the public my humble contribution to the Flora of Australia, I feel deeply indebted to your kind consideration for permitting me to dedicate the volume to you; and more especially do I appreciate the association of your name with my occasional papers, inasmuch as most of them have been perused by you, and received your favourable notice. But independently of the friendly sentiments you have manifested towards me, and the invaluable assistance I have received from your correspondence for the last eleven years, there are other considerations which induce me to bring your name prominently forward on the present occasion.

Since the days of the illustrious ROBERT BROWN, no botanist has devoted himself more assiduously to the elucidation of Australian Botany than yourself, and certainly none has more richly merited the title "PRINCE OF AUSTRALIAN BOTANISTS," bestowed upon you by the eminent author of *Species Filicum*.

When I contemplate the extensive information, profound research, and philosophical discrimination, displayed in the voluminous works published by you, by which you have gained an imperishable reputation, and contributed materially to the advancement of science throughout the civilized world, I may well feel honoured by the friendship of such a man as yourself, and pray that you may long continue to adorn these colonies.

Should it please Divine Providence to spare a life devoted to the calm and unobtrusive pursuits of science and the development of the vegetable productions of this vast continent, you will render incalculable service, not merely to Victoria, but to the whole of the Australian colonies, and future generations will contemplate with wonder the indefatigable labour and untiring zeal of one so highly favoured. If, however, like a distinguished historian who was struck down in the midst of his literary labours, your sun should set, ere the great works designed by you shall have been fully accomplished, it may truly be said of you as it was of a renowned general of antiquity: "*Et ipse quidem quamquam medio in spatio integræ ætatis ereptus, quantum ad gloriam, longissimum ævum peregit.*"

I am, my dear Sir,

Your faithful and obliged friend,

WILLIAM WOOLLS,

Parramatta,

December 1867.

## P R E F A C E .

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THE present volume is composed of papers on occasional subjects, connected with the Botany of Australia, and designed to lay before the public in a popular form some particulars respecting the Vegetable Kingdom of that vast continent. The information thus conveyed is partly the result of personal observation in the colony of New South Wales, and partly a careful review and selection of such facts as have appeared from time to time in works not always accessible to the general reader. For my article on Ferns, I am deeply indebted to the five volumes of the late Sir William Hooker's "*Species Filicum*," and to the fifth volume of Dr. F. Mueller's "*Fragmenta Phytographiæ Australiæ*." Whilst endeavouring to place on record any matters of interest relative to Australian Ferns, which I have noticed in my rambles, I have enumerated all the species mentioned by those eminent writers, and arranged the various genera according to the system indicated in the *Species Filicum*. Being aware that Sir William's great work has had a very limited circulation in the colony, and that Dr. F. Mueller's review of Australian Ferns was composed in Latin and intended for the learned in all parts of the world, I was impressed with the idea that a popular article on our ferns might be acceptable to many persons in these colonies. My impressions were not without foundation, for after my papers on the subject had appeared in the *Sydney Morning Herald*, I was requested to publish them over again with sundry alterations and additions in the *Horticultural Magazine*. To these papers, I have now added a systematic list of our Australian Ferns, which I trust will assist collectors in arranging their specimens according to an approved method of classification, and will induce many pteridophyllists in different parts of Australia to add to the number of

species already known and described. In the paper on Orchids, I have given the result of my own observations in the neighbourhood of Parramatta, as well as the more elaborate review of the order by Dr. F. Mueller, who by his own exertions in the field, and by his descriptions of specimens forwarded to him from different parts of Australia, has added many species to those previously described by the illustrious author of the *Prodromus Floræ Novæ-Hollandiæ*. As I have been incessantly occupied for many years past in arduous duties limited to the district of Parramatta, I have enjoyed but few opportunities of proceeding far into the interior, and, therefore, most of my papers are confined to the illustration of the Flora existing in the neighbourhood of the town in which I have been engaged. With the exception of my personal observations on the Blue Mountains, Mittagong, and Ash Island, of which I have given a brief outline, my attention has been directed principally to the Flora of the Parramatta District, and on different occasions, I have published more than thirty letters on that subject. It was my first intention, when I was requested by Dr. F. Mueller, and other friends, to collect my papers and publish them in a connected form, to take a careful review of all those letters, and add to them such species of plants as had previously escaped my notice; but upon reflection, I found that such a work would not merely occupy more time than I could spare for the purpose, but that it would lead to the publication of a larger volume than I considered advisable. Moved by such considerations, therefore, I have selected a paper, which was read before a society in Sydney, giving an outline of the vegetable productions indigenous in the district, and to that I have added special papers on "the Woods," "the Medicinal Plants," and "Ornamental Shrubs" of the neighbourhood. My paper on "Introduced Plants," of which we may now number more than a hundred species that have appeared accidentally amongst us, opens for consideration topics of an interesting and practical nature, for whilst it leads to speculations as to the probable causes of such importations, it also serves to indicate from the character of the plants thus introduced, the adaptation of similar species to the soil and climate of the colony. With respect to those papers founded upon the consideration of specimens forwarded to me from the interior, I have availed myself of

such information for their elucidation as I could glean from Brown's *Prodromus*, Lindley's descriptions in Mitchell's works, Dr. Mueller's *Fragmenta*, and his other valuable publications, and lastly, the three volumes of the *Flora Australiensis* already published. I have felt some hesitation in associating the papers on Sea-weeds and Lichens with the rest of those selected, because I am sensible that it requires much more leisure than I could command, to enter satisfactorily upon the consideration of cryptogamic specimens, which need not merely long continued observation, but also microscopic research. For the further study of these interesting branches of botany, I must refer my readers to Harvey's *Phycologia Australica*, and Lindsay's elaborate papers, in the hope that some of our youthful Australians may be induced to devote themselves to the study of those subjects, connected with the Vegetable Kingdom in Australia, which as yet have not been adequately explored. The Mosses, Lichens, and Fungi, of Australia, though probably the vast majority of them may be cosmopolitan, have never received the attention which is necessary for attaining a correct estimate of their numbers, or for determining what species differ materially from those of the Northern Hemisphere. Some time since, I attempted to furnish a list of the mosses found in the Parramatta District, and was surprised to find that the species amounted to nearly fifty. In some seasons when the weather is damp, a great many may be collected, and even in the driest time, there are always some to be found on the banks of the creeks, although in parts of tropical Australia they do not exist at all. Fungi also are very numerous, under circumstances favourable for their development, but with the exception of *Aseroe* and *Mylitta*, the ordinary forms of *Agaricus*, *Polyporus*, *Boletus*, etc., appear similar to the European ones. However, the Mosses, Lichens, and Fungi, afford a wide field for investigation, and I feel sorry that my engagements have prevented me from going so deeply into the study of them as I could wish. My only motive, therefore, in inserting my papers on Sea-weeds and Lichens, is the hope that the hints which I have thrown out respecting those orders may be useful to any persons commencing the study of our cryptogamic botany. The concluding article on the genus *Eucalyptus* was drawn up at the suggestion of Dr. F. Mueller, and although I am aware of its numerous im-

perfections, I trust that it may be useful in assisting practical men to determine the limits and characters of many species in Eastern Australia, and to fix with some degree of certainty the scientific names of the common *Eucalypti* around us. It is a matter of regret to me that I am unable to illustrate my papers with suitable engravings. They would undoubtedly be a great ornament to the work, and afford to the general reader the means of recognising some of the plants to which I have referred. The expense, however, of such illustrations is very considerable, and moreover, Dr. Mueller's "Lithograms of Victorian Plants," as well as the beautiful figures accompanying his *Fragmenta Phytographiæ Australiæ*," have already made known to many of my readers some of the most remarkable Australian Flowers.

W.W.

Parramatta,  
December, 1867.

## REMARKS

ON THE

### BOTANY OF THE PARRAMATTA DISTRICT :

*A paper read before the Australian Horticultural and Agricultural Society, (1859.)*

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IN the district of Parramatta there are between seven and eight hundred species of plants, more than one half of which are exogenous. The Thalamifloræ and the Monochlamydeæ are nearly equal in number, being together about half as many as the Calycifloræ and Corollifloræ, whilst the Endogenous plants constitute rather more than a fourth of the Flora. The Cryptogamous plants, exclusive of Fungi and Algæ, amount in number to about half of the Endogens.

(1.) The first great division of Exogens, viz, the Thalamifloræ, presents to notice the representatives of twenty-five natural families, and although not comprising any of the larger trees of the district, it includes many shrubs which are well known to the horticulturist. Perhaps as a family, the *Rutaceæ* afford some of the most elegant shrubs in this division of the vegetable kingdom, especially the genera *Boronia*, *Phebalium*, and *Eriostemon*. Many species of *Boronia* and *Eriostemon* have been cultivated, but there are few species of *Phebalium* to be met with in gardens, although there are three in the district which are decidedly ornamental. *Achronychia lævis* is a larger shrub and claims attention as being the nearest representative of the *Aurantiaceæ*. Of the *Dilleniaceæ*, there are several showy species, and *Hibbertia*

*dentata* which abounds on the creeks to the north of Parramatta is an elegant twining plant. The cruciferæ are neither numerous nor important, but *Arabis gigantea* (which Dr. F. Mueller has proved to be identical with *Cardamine stylosa*) occurs here as well as in Tasmania. On the creek beyond Pye's orchard, *Synoum glandulosum* is found growing amongst the rocks, and nearer to the water a species of *Drimys*, *D. dipetala*, remarkable for its pungent seeds. Both of these shrubs are worthy of cultivation, and they claim the notice of the observer as being the only species in the district belonging to the splendid orders of *Magnoliaceæ* and *Meliaceæ*. Of the *Pittosporaceæ* and *Sapindaceæ*, the district affords ten species—three of which are well adapted for a shrubbery. *Elæocarpus cyaneus*, also of the *Tiliacæ*, is much admired for its pretty white flowers and olive-like fruit, and of the three species of *Vitis* (*Vitaceæ*) there is one (*V. hypoglauca*) that affords an edible grape of an agreeable acid flavour. Of the *Polygalaceæ*, *Polygala japonica* has a diminutive but interesting purple flower, and of the genus *Comesperma*, there is one little and almost leafless plant, which Dr. F. Mueller has recognised as *C. sphærocarpa*, remarkable for its round sessile capsule. This species does not appear to be well known in Europe, for although Bauer discovered it at Port Jackson in 1803-5, and his specimen is yet to be seen in the Vienna collection, a distinguished writer who described the plant in 1846, was unable to state from what part of Australia it came. The flower is of a dark blue colour and occurs in several parts of the district.

(2.) The Calycifloræ of the district have about the same number of families as the Thalamifloræ, but the species are much more numerous, and reckon amongst them some of the most useful and important trees of the colony, as well as many beautiful shrubs. The Leguminosæ, comprehending the Mimoseæ and the Papilionaceæ, amount to seventy species. Of the genus *Acacia* there are nearly twenty species, some of which are esteemed for the beauty and fragrance of their flowers, whilst others are valued for the medicinal properties of their bark and gum. In cases of dysentery, when medical aid cannot be procured, a decoction prepared from the bark of *A. decurrens* proves sometimes very efficacious. None of the Papilionaceæ, with the exception of *Jacksonia scoparia*, assume a tree-like appearance, most of them



being small shrubs and herbs ; and although the species are nearly fifty in number, only one of them has any scent ! In the months of September and October, the species of *Pultenæa*, *Dillwynia*, *Podolobium*, and *Platylobium*, enliven the banks of the creeks by the brilliance of their flowers ; but their showy appearance is too transient in its character to produce anything more than a temporary effect on the landscape. This is not the case with the important family of the *Myrtaceæ*, which, though not containing quite so many species as that of the Leguminosæ, gives a tone and character to the bush on all sides ; and at certain seasons of the year, not merely the banks of the creeks, but the sombre forest itself is ornamented by myrtaceous blossoms. The gayest of the *Myrtaceæ* are the different species of *Callistemon* ; but the genera *Eugenia*, *Backhousia*, *Myrtus*, *Leptospermum*, *Bæckia*, *Kunzea*, and *Melaleuca*, present many beauties to the admirers of nature. There is one species of *Melaleuca* (better known by the name of tea-tree) which attains a height of thirty feet and upwards ; and the wood, although generally despised as almost useless, seems adapted for little boxes and fancy articles, as it is of a purplish colour and prettily marked. Amongst the larger trees, two species of *Angophora*, and one of *Syncarpia*, might be mentioned as affording timber for rough buildings and firewood, but the *Eucalyptus* far surpasses them in importance. Of this genus, there are upwards of twenty well-defined species, which, under the various names of iron bark, stringy bark, mahogany, woolly-but, bloodwood, spotted gum, blackbut, blue gum, and so on, afford the principal material for fencing, flooring boards, scantling, and slabs. Some of the species, such as iron bark, (*E. resinifera*), mahogany (*E. robusta*), and blue gum (*E. rostrata*), are exceedingly durable, but others soon perish when much exposed to the influence of the weather. The classification of the species has long been a matter of difficulty with botanists, and doubt is entertained as to the expediency of working by the operculum. According to the plan hitherto adopted, they have been classified by the comparative length of the operculum, but this system is open to the serious objection of separating species which are nearly allied to each other. For instance, iron barks, which closely resemble each other in their general characteristics, are placed, some in the first division, and some in the second, simply because

they do not correspond in the length of the operculum. The same also may be said of the species called mahogany, one of which must be referred to each division of the genus under the present arrangement, whereas common sense would lead us to keep them in the same group. Dr. F. Mueller has suggested a new division of the species which he denominates "the Cortical System," because it is founded upon the difference of the barks, and he proposes to divide all the species into the following groups: (1) *Leiophloia*, or those having the bark smooth all over: (2) *Hemiphloia*, which have the bark partially persistent, but never on the branches; (3) *Rhytiphloia*, with the bark persistent on the branches and stems, and rather solid; (4) *Schizophloia*, with the bark persistent and deeply furrowed; (5) *Pachyphloia*, with the bark fibrous and persistent; and (6) *Lepidophloia* with the bark quite lamellar, resembling mica schist. Much might be said in favour of this arrangement, as it is one which commends itself even to the casual observer: and if in connexion with it, due attention were paid to the shape of the seed vessel, it seems highly probable that many of the anomalies of the present system would be obviated. In some of the species described even in standard works, the seed vessels are scarcely noticed, and the descriptions are, in other respects, so defective and unsatisfactory, that it is almost impossible to ascertain the exact species indicated. The seed vessels are generally turbinate, hemispherical, or approaching campanulate; and hence, when taken in connexion with the cortical system, they offer a good mark of distinction for classification. There is reason to believe that in some instances, an unnecessary multiplication of species has occurred from placing too much reliance on apparent specific differences in dried specimens, without an examination of that which differs the least in the same species, viz., the shape and divisions of the seed vessel. In this genus little reliance can be placed on the size and shape of the leaves, for in some species they may be found of various forms on the same tree. Beyond indeed indicating the prevalent shape, texture, and veining of the leaves, it seems almost useless to dwell on matters which afford no certain guide for the distinction of species. The common grey gum or hybrid box is a remarkable instance of the variation to which leaves in the same species are subject, for on it they may be found of all shapes from narrow lanceolate to broad ovate.

Amongst the Calycifloræ there is a numerous family of composite plants, probably forty species, but with the exception of *Humea elegans*, *Ozothamnus diosmifolius*, and two species of *Cassinia*, there are few which would interest the general observer. The Epacridaceæ, on the contrary, are generally admired, and occupy the same place in this part of the world which the heaths do at the Cape. In this district there are about twenty species, some diffused very widely, and others being found only in particular parts of the creeks to the north. *Styphelia viridis*, or the "five corner," and *Astroloma humifusum*, or the "ground berry," are well known as having edible drupes, and there are three species of *Leucopogon* which have an agreeable fruit, but too small for the purposes of man. *Styphelia tubiflora*, which is distinguished by its beautiful crimson flowers, is rather rare in the Parramatta district, and two much admired species, viz., *Trochocarpa laurina*, and *Dracophyllum secundum*, are found but seldom. Amongst the calycifloræ plants, there are many which might be cultivated as ornamental shrubs, particularly *Elæodendrum integrifolium*, remarkable for its bright scarlet berries, *Callicoma serratafolia*, *Ceratopetalum gummiferum*, or the Christmas bush, *C. apetalum*, and *Glochidion Australe*. I have not noticed *Aphanopetalum resinosum* near Parramatta, but it occurs at a place called the Native Vineyard, near the Rev. T. Hassall's at the Cowpastures, and is a graceful climbing shrub. Amongst the edible plants there are three species of *Rubus*, or native raspberry, which, though in their wild state producing an insipid fruit, might doubtless be improved by care and attention. *R. parviflorus* is the commonest in the immediate neighbourhood, but *R. moluccanus*, and *R. rosæfolius*, grow in the creeks near Kissing Point. The plant called native carrot is an umbelliferous and edible species (*Didiscus albiflorus*), and *Tetragonia expansa*, or New Zealand spinach, is relished by many persons. With regard to the common purslane (*Portulaca oleracea*), which at one time was cultivated by our forefathers, it may be looked upon as a wholesome vegetable, though, as a garden plant, it has long fallen into disuse. In the interior of the colony however, where edible plants are scarce, purslane is by no means despised, as will appear from the following passage in Dr. F. Mueller's Botanical Report on the North Australian expedition: "We had almost daily occasion

to praise the value of the purslane, which not only occurred in every part of the country explored, but also principally in the neighbourhood of rivers, often in the greatest abundance. We found it in sandy and grassy localities, so agreeably acidulous, as to use it for food without any preparation; and I have reason to attribute the continuance of our health, partially to the constant use of this valuable plant. The absence of other antiscorbutic herbs in the north, and the facility with which it may be gathered, entitle it to particular notice." In addition to those already mentioned, I have not observed any edible calyciflorals, with the exception of a small parsley (*Helosciadium leptophyllum*), and the Lilly Pilly of our colonial youths, which is the fruit of *Eugenia*.

(3.) The Corollifloræ of the district comprehend twenty families and the number of species is rather more than fifty. Most of the plants connected with this division are small and uninteresting, so far as the Parramatta district is concerned, and offer but few beauties to the practical gardener. If we except *Ehretia acuminata*, which indeed scarcely belongs to the district, the only interesting shrubs to be noticed are *Tecoma Australis*, or the Australian Bignonia, *Logania floribunda* (which forms an exception to the generality of native plants in having an agreeable scent), *Myoporum ellipticum*, *Notelæa ovata*, or the native olive, *Duboisia Myoporoides* and *Clerodendrum tomentosum*. There is also an elder which I believe to be identical with that described in Sir. T. Mitchell's Travels, under the name of *Tripetalus Australasicus*. "Soon after we passed 'Billabugan,' a cattle station on the river, where the dry branch joined it; and at three miles further we traversed the southern skirts of a plain, and finally made a bend of the Lachlan, on which we encamped in latitude 33°24' 28" south. In the course of this day's journey, we discovered a bush resembling the European dwarf elder, but with yellow flowers, and fruit with scarcely any pulp." This plant differs from the genus *Sambucus* in having three sepals, three petals, and three stamens only, whereas the European elder is pentandrous. There are two trees belonging to the Corollifloræ which abound on the banks of the Parramatta River, and are generally called "mangroves." The true mangrove is a tropical tree, and one of those to which I refer is *Ægiceras fragrans*, with white sweet-scented flowers, and the other, *Avicennia tomentosa*, with inconspicuous

yellow flowers. Near these may sometimes be seen *Myrsine variabilis*, a shrub rightly named, "variable," for the stunted variety growing near the salt water differs so much in its appearance from that found on the banks of the freshwater creeks, that at first sight one would suppose them to be distinct species. Of the Asclepias family, *Marsdenia suaveolens* is another plant which must be noticed, on account of its agreeable scent. There are two others nearly allied to it, but not in any way remarkable. Turning to the smaller, or herbaceous plants of this division, we find some esteemed for their medicinal properties. *Erythraea Australis* is a pretty pink flower, and possesses all the essential properties of gentian. It has been much used in rustic pharmacy, and more than one medical man in this neighbourhood has prescribed it as a tonic. *Sebæa ovata* is a still more diminutive plant, with yellow flowers, very similar in character to the last. *Verbena officinalis* has had its reputation as a medicine, and it was employed by the ancients in a very superstitious manner. Some have thought that the poet alludes to this plant in the following passage :

Effer aquam et molli cinge hæc altaria vitta :  
*Verbenasque* adole pingues —

The Lamiaceæ are not very numerous, but they offer to our notice two or three interesting plants, such, for instance, as *Prunella vulgaris*, *Mentha satureoides*, and *Marrubium vulgare*, all of which are used as cheap and efficacious remedies by country people. *Scutellaria humilis* is found here as well as in Europe, but *S. mollis*, which occurs sparingly on the Toongabbie Creek, is somewhat rarer. *Veronica plebeia* is medicinal in its properties, and is nearly allied to those species which Withering informs us have been recommended as a substitute for tea. This little plant belongs to the *Scrophulariaceæ*, and with it may also be mentioned *Gratiola pedunculata*, which has a very powerful scent, and I think it should be used with caution, as it closely resembles *G. officinalis*, which Lindley characterises as "cathartic, diuretic, emetic, and poisonous." The species of the Solanaceæ are very limited in this district, and, with the exception of *Datura stramonium*, which has been introduced, and is a deadly poison, I have never heard of any ill effects arising from them.

(4.) The Monochlamydeæ have fifteen families in the district, including the *Proteaceæ*, and a few very useful trees, such as four

species of *Casuarina*, which afford wood for shingles, furniture, and handles, and two trees generally called "Sassafras" by workmen, the one of which (*Cryptocarya glaucescens*) occurs on one part of the Toongabbie Creek, and the other (*Doryphora sassafras*) in the remote part of the district. To this division, belong also the far-famed native cherry (*Exocarpus cupressiformis*), and two species of *Leptomeria*, one of which, under the name of "native currant," is well-known in the Sydney market. Allied to these is a small species of *Santalum* (*S. obtusifolium*), which has drupes of a dark blue colour, about the size of a small marble. It is a rare plant, and I believe the flower is hitherto but imperfectly described. The Proteaceous family has nearly thirty species in this neighbourhood, including the genera of *Isopogon*, *Conospermum*, *Persoonia*, *Petrophila*, *Stenocarpus*, *Grevillea*, *Telopea*, *Banksia*, *Lambertia*, *Xylomelum*, *Lomatia*, and *Hakea*. In reference to this group, Lindley justly remarks: "They are handsome evergreen shrubs, much prized by gardeners for the neatness of their appearance, and the beauty or singularity of their flowers," . . . "but upon the whole, the order must be regarded as one of the most useless to man." The fruit of *Persoonia* is edible, and *Telopea speciosissima* is certainly the most conspicuous flower on the banks of our creeks; but, with the exception of *Banksia serrata*, the wood of which has been used for the knees of boats and gun-stocks, I am not aware that any of our species are of much importance to man. Before I pass from the Monochlamydeæ, I may remark that the nuts of *Macrozamia spiralis* are much relished by the aboriginal natives, and *Chenopodium Australe*, which is found in sandy places near the salt water, is a tolerable substitute for samphire.

(5.) The next great division of plants to which we must refer is that of the Endogens or Monocotyledons, including twenty distinct families, and not less than a hundred and eighty species. The first of these which I shall notice, is *Smilax glycyphylla*, a very useful plant, placed by Lindley in a separate class with a few others called by him "Dictyogens," which that eminent writer regards as a transition class between Endogens and Exogens. *S. glycyphylla*, well known by the name of "Sweet Tea," is now introduced into the Pharmacopœia, and recommended as a tonic and anti-scorbutic. An infusion of the leaves is prepared

by some persons as a wholesome and agreeable beverage, and is also employed as a substitute for the imported sarsaparilla. Some years since a considerable quantity of *Smilax* was imported into England from Australia, and its quality was pronounced excellent. It would be impossible in a limited paper to convey an adequate idea of the great importance of the Endogens in this district, inasmuch as the species of some families are very numerous. Three of the most extensive are the *Liliaceæ*, *Orchidaceæ*, and *Graminaceæ*. Of the first, the species of *Dianella*, *Xanthorrhæa*, and *Thysanotus*, are the most interesting. The orchids number forty-five species, and amongst them there are several very beautiful flowers, particularly *Dendrobium speciosum*, *Dipodium punctatum*, *Lyperanthus suaveolens*, and *L. nigricans*, *Prasophyllum patens*, and *Thelymitra ixioides*. Amongst the smaller orchids also there are many points of interest, some of them being of the most fantastic shapes, whilst others are remarkable for the irritable properties which they possess. *Acianthus caudatus*, which occurs on Pye's Creek, is, I believe, one of the rarest orchids in Australia, and *Cymbidium reflexum* is far from being so common in other parts of the colony, as it is at the North Rocks. Of the *Graminaceæ*, it is difficult to overrate the importance, seeing that they contribute so much to the support of the animal kingdom, and afford so pleasing a relief to the eye by the beautiful verdure which they spread over our fields. It might be supposed that the native grasses had disappeared from the district, and had been superseded by European or Indian grasses. This, however, is not the case, and in localities which still retain something of their original condition, I have been able to collect nearly fifty species of indigenous grasses. Some of these (such as *Pennisetum glaucum*, *Imperata arundinacea*, *Hemarthria compressa*, *Zoysia pungens*, *Poa polymorpha*, *Panicum crus-galli*, and *Paspalum orbiculare*) are exceedingly interesting as objects of scientific inquiry, but they do not occur in sufficient quantities to satisfy the wants of the grazier. Perhaps of all the bush grasses *Anthistiria Australis* is the most valued by cattle, but if we may rely on the testimony of the older colonists, this is not so productive as in the early days of the colony, and it is rapidly giving way to the couch (*Cynodon dactylon*). In enclosed places, where the grasses are allowed to seed, it is pleasing to see the native grasses springing

up as abundantly as ever. I have remarked, for instance, in the Roman Catholic Burying-ground at Parramatta, a plentiful crop of *Anisopogon avenaceus*, which in the spring of the year has a pretty and oatlike appearance. This is a grass which grows to the height of three feet and upwards, and it may easily be recognised by its triply bearded perianth. Connected with this division, there are several aquatic plants which at certain seasons relieve the sameness of our creeks and stagnant waters. Of these *Dama-sonium ovalifolium*, and *Philydrum lanuginosum*, are the most conspicuous. *Patersonia sericea*, with dark purple flowers, and *Com-melyna cyanea*, with its lighter tints, are much admired by all who examine them, nor is the *Arum* of the district (*A. orixense*) devoid of attraction, though the corms are generally regarded as injurious.

(6.) The Cryptogamous plants are well worthy of examination, for amongst them will be found some of the most admired ferns and mosses in the colony. Of the former we have about forty species, and of the latter, probably more. The tree fern (*Alsophila Australis*) is becoming rare in the immediate neighbourhood, but there is one still to be found within a mile and a-half of the Water Works, and many of the rocks in moist and shady places are covered with the spreading *Polypodium rupestre*, and the graceful little fern *Hymenophyllum Tunbridgense*, whilst in certain spots, two species of *Schizæa* occur. Of the Marsilaceæ, I have noticed the curious little floating plant *Azolla pinnata*, and of the Lycopodiaceæ, four species; but scarcely any of the cryptogamous plants have afforded me more satisfaction than the Urn Mosses. When examined microscopically, they display the most striking instances of skill and beauty. The delicacy and regularity of the little teeth surrounding the peristome, which when present, are always four or a multiple of four, and the wonderful striated leaves which when magnified by a high power, present to view cells composed of spiral fibres, are convincing proofs of the wisdom and providential care of the Creator, and cause the reflecting mind to think with the Psalmist, that "the works of the Lord are great, sought out of all them that have pleasure therein." When contemplating these striking instances of design, one cannot wonder that the sight of the diminutive moss *Dicranum bryoides*, (which by the way, is found on the banks of our creek not far from Parramatta) cheered the drooping spirits of the



enterprising African traveller, and forced him to exclaim, "Can that Being who planted, watered, and brought to perfection in this obscure part of the world, a thing which appears of so small importance, look with unconcern upon the situation and sufferings of creatures formed after his own image?"—(Park's Travels, Chap. 18.) The Lichens are not very numerous, being confined to few species, and these seem identical with the European ones. One of the most familiar is *Usnea barbata*, which by Shakspeare and other poets is so frequently referred to as "Beardmoss," "Tree-moss," and "Idle-moss." This Lichen may be seen on old trees and fences, and as if sheltering itself from the hot winds of the north, almost invariably choosing a southerly aspect. The beautiful little *Cladonia*, *C. bellidiflora*, is very frequently seen on the stumps of dead trees, and I think that it is to this Lichen Mrs. Hemans refers in the following lines:—

Oh! green is the turf where my brothers play  
Through the long bright hours of the summer day,  
They find the *red cup moss* where they climb,  
And they chase the bee o'er the scented thyme.

It is highly probable that our *Cladoniæ*, of which we have also the elegant *C. retipora*, contain a certain quantity of gummy and starchy matter, and hence they might be used in hooping cough and other complaints of the lungs, but it would be difficult to procure them in any quantity.

Of the fungi, I have not made any estimate, as with very few exceptions, they appear to be similar to the European species. Some of the *Polypori*, especially *P. sanguineus*, which is seen so frequently on dead tea trees, are pretty objects, and there is a large underground fungus, *Mylitta Australis*, sometimes dug up in new ground in the neighbourhood, that has attracted some attention. The largest I have seen is about the size of a child's head, and it answers nearly to Endlicher's description of the genus *Balsamia*, but a much larger one was dug up at Melbourne some months ago. I may add also that the curious fungus, *Aseroe pentactina*, of which there is an excellent figure in Lindley's Vegetable Kingdom, is of frequent occurrence here, and seems to be identical with the species found in New Zealand and Ceylon. The receptacle of this fungus is generally five parted with bifid segments, of a red colour and of an odour most abominable, being probably similar in properties to *Phallus impudicus*, to which it is nearly

allied. *Clathrus* is represented here by a species that does not possess the same disagreeable properties as the European *C. cancellatus* or the Latticed Stinkhorn. *Morchella esculenta*, I have seen only once in this colony.

In concluding this rapid outline of the plants found in the Parramatta District, I feel that the subject is too extensive for a limited paper. Having made a humble attempt, however, I trust that it may be the means of throwing some little light on the natural beauties of the district, and of inducing others to see the vast importance of devoting some portion of their time to the study of nature. What Cicero remarked of the liberal arts, "that they are nearly allied to each other, and have, as it were, one common bond of union," may be extended to science in general, and the observer of the phenomena in the vegetable kingdom will often acknowledge with pleasure the intimate connexion that exists between his favourite pursuit and other branches of science, and perceive how beautifully and harmoniously one department of knowledge illustrates and confirms the deductions of another. We have already noticed in this brief sketch the *commune vinculum* between botany on the one hand, and medicine, horticulture, and even the sublime study of natural theology on the other; and if, with the geologist, we were to dive into the bowels of the earth, and gaze with wonder on a flora long extinct, the very district that we have been considering, would assist us in investigating the shadowy forms which are imprinted on the rocks.

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## AUSTRALIAN ORCHIDS.

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SOME time since, when I was engaged in collecting the orchids of the Parramatta district, I calculated that we had forty-five species of that interesting order, all of which, with one exception, are described in Brown's Prodrômus. Having reviewed my list during the present season, (1866) and compared my conclusions

with the views of my eminent friend Dr. F. Mueller, as set forth in the 35th number, vol. 5, of his *Fragmenta Phytographiæ Australiae*, I am happy to find that the Parramatta district is not only rich in orchids, but that the doctor has made especial reference to several species found here. In a few instances Dr. F. Mueller proposes to unite some of the generally received species (such for example as *Thelymitra nuda* and *T. pauciflora*, *Acianthus exsertus* and *A. fornicatus*, *Calochilus campestris* and *C. paludosus*, and *Microtis rara* and *M. parviflora*), but after making allowance for these alterations, it seems that we have upwards of forty species in this district, some of which are regarded as rare and interesting plants. The list, as amended, will now comprise the following species:—

<i>Thelymitra</i> ...	3	<i>Acianthus</i> ...	2	<i>Corysanthes</i> ...	1
<i>Diuris</i> ...	3	<i>Cyrtostylis</i> ...	1	<i>Caleana</i> ...	2
<i>Orthoceras</i> ...	1	<i>Chiloglottis</i> ...	1	<i>Dipodium</i> ...	1
<i>Cryptostylis</i> ...	1	<i>Eriochilus</i> ...	1	<i>Cymbidium</i> ...	2
<i>Prasophyllum</i>	4	<i>Caladenia</i> ...	4	<i>Dendrobium</i> ...	5
<i>Spiranthes</i> ...	1	<i>Lyperanthus</i> ...	2		—
<i>Calochilus</i> ...	1	<i>Glossodia</i> ...	2		45
<i>Microtis</i> ...	1	<i>Pterostylis</i> ...	6		—

(1.) *Thelymitra ixioides* is one of our most admired orchids, and has a very wide range, being found in many places between Port Jackson and Port Phillip. It is abundant in the spring, and, with its showy spike of bluish flowers, has the appearance of a cultivated plant. *T. nuda* is a smaller flower, and generally the spike of the flowers is very diminutive when compared with the preceding species. *T. carnea* is of a dark pink colour, and on examination it will be found that the structure of the flower differs from the other species of this district in not having any of the segments terminated with a little tuft of hairs. Dr. F. Mueller has described some new species (*T. Macmillani*, *T. pardalina*, and *T. porphyrosticta*), and he also mentions (in addition to Brown's *T. media*, *T. caniculata*, *T. angustifolia*, *T. venosa*, *T. tigrina*, and *T. fusco-læta*), the species *T. antennifera*, *T. flexuosa*, *T. aristata*, *T. spiralis*, *T. variegata*; but it seems highly probable that the number is somewhat over-rated, and that hereafter some of the so-called species will be united.

(2.) The genus *Diuris* has three species in this neighbourhood, *D. maculata*, or the spotted one, *D. aurea* which is generally larger

and of a yellow colour, and *D. elongata* which is of a purplish colour. If we take the extreme variations of *D. maculata* and *D. aurea*, they appear perfectly distinct and probably are so; but sometimes intermediate varieties occur which are somewhat perplexing. During the last spring, I examined some scores of these orchids, and not unfrequently met with individuals that scarcely agreed with either of Brown's descriptions. Brown also described *D. emarginata*, *D. setacea*, *D. pedunculata*, *D. sulphurea*, *D. pauciflora*, *D. alba*, and *D. longifolia*, to which Dr. F. Mueller now adds *D. filifolia*, *D. porrifolia*, *D. palustris*, and *D. corymbosa*.

(3.) *Orthoceras strictum* comes very near to the preceding genus. With us it is a rare plant, but Dr. F. Mueller mentions it amongst those orchids which occur frequently in Victoria.

(4.) *Cryptostylis longifolia* belongs to this district, and flowers late in the season. *C. erecta* is found on the Blue Mountains; and, according to Dr. F. Mueller *C. ovata* has been collected in the district of Plantagenet and Stirling's Range.

(5.) The species of *Prasophyllum* most common here are *P. patens*, *P. elatum*, *P. fimbriatum*, and *P. rufum*; but Dr. F. Mueller recognises amongst the specimens which I have forwarded to him, *P. brachystachyum*, from the neighbourhood of Sydney (Brown's *Genoplesium Baueri*), and also another from the Blue Mountains, which he has named *P. Woollsi*. The remaining species enumerated by Brown are:—*P. Australe*, *P. macrostachyum*, *P. flavum*, *P. alpinum*, *P. nigricans*, and *P. fimbriatum*, to which we may add the doctor's list *P. Archeri*, *P. despectans*, *P. parvifolium*, and *P. brevilabre*; but it seems highly probable that, as the species are brought under cultivation, the number will be reduced. *P. elatum* is one of our largest orchids, being sometimes three or four feet high.

(6.) *Spiranthes Australis* (probably the same as Brown's *Neottia Australis*), is a small plant with pinkish flowers in twisted spikes, and common on some of the creeks to the north of Parramatta; but it is one of those which easily escape the notice of the casual observer. It occurs in various parts of Victoria.

(7.) *Calochilus Australianus*, under which name Dr. F. Mueller includes the two varieties of this plant, is very abundant in this district in the month of October. The long, dark-coloured beard is well defined; but the species is subject to considerable variation,

both as regards its size and the number of flowers on the same stem. According to the doctor, it has a wide range in these colonies, and extends to Tasmania.

(8.) *Microtis* has *M. parviflora* and *M. rara* in this district; but Dr. Mueller combines these and several others under *M. viridis*. In addition to *M. alba* and *M. pulchella*, he mentions *M. atrata*, from Western Australia and Victoria. This genus approaches very near *Spiranthes*; but the greenish spike of flowers is not twisted.

(9.) *Acianthus fornicatus*, with which *A. exsertus* is now joined, is plentiful in many parts of the colony, and extends to Victoria; but *A. caudatus*, which in this district is a very rare species, is found here and there from the Blue Mountains to Victoria, and also in Flinders' Island and Tasmania.

(10.) *Cyrtostylis reniformis* is a minute orchid with a kidney-shaped leaf. It is plentiful on shady creeks, generally growing on moist banks, or under the shade of rocks. It extends to Victoria.

(11.) *Chiloglottis diphylla* occurs in this district, and also in the adjacent colonies, but here it may be regarded as rare. This and the preceding species generally flower in autumn. *C. Gunnii* as well as *C. diphylla* occurs in Victoria.

(12.) *Eriochilus autumnalis* is another minute orchid, and, as the specific name implies, appears in the autumn. It has a wide range, between St. Vincent's Gulf and Moreton Bay. *E. scaber* occurs at the River Murchison, and *E. multiflorus* at Kalga, &c.

(13.) *Caladenia* is a very pretty genus, and some of the species, especially *C. cærulea*, *C. alba*, *C. carnea*, and *C. testacea*, are abundant in the spring. *C. Patersoni*, I have found near the coast, but it occurs more frequently in the interior, as I have received specimens from the neighbourhood of Mudgee and also from the Murrumbidgee. Dr. Mueller proposes to unite this interesting species with *C. dilatata* and some others under *C. pulcherrima*. The other species described by Brown are *C. deformis*, *C. alata*, *C. flava*, *C. latifolia*, *C. gracilis*, *C. congesta*, *C. filamentosa*, *C. Menziesii*, and *C. macrophylla*. To these, the Doctor adds *C. gemmata*, *C. unguiculata*, *C. ochreatea*, and *C. barbata*, combining *C. alata* and *C. angustata* with *C. carnea*, and *C. mollis* with *C. latifolia*. During the last spring I paid particular attention to *C.*

*cærulea*, *C. alba*, and *C. carnea*, and although in the present state of our inquiries I think it may be prudent to regard them as distinct species, yet I should not be surprised, if hereafter they were to be considered as varieties. Colour is certainly a very doubtful note for distinguishing species, and yet the principal difference between *C. carnea* and *C. cærulea* is that one is generally pink, and the other blue; whilst *C. carnea* is only separated from *C. alba* by the vittate column and labellum, a mark of distinction which does not always hold good, for sometimes individuals are found with only the column vittate.

(14.) *Lyperanthus suaveolens* is common in the spring, and is one of our most interesting orchids. Dr. F. Mueller has furnished an accurate description of this species in his *Fragmenta* from specimens sent from Parramatta. It does not appear that this species has a wide range, for it is known to the Doctor only as coming from Tasmania and the neighbourhood of Parramatta. The specific name seems rather inappropriate, as the plant has not any scent, or at all events that variety which is now referred to *L. suaveolens* has not any. I have collected *L. nigricans* only once in the neighbourhood, and it appears that although the species extends very widely in extra-tropical Australia, it is nowhere abundant. The plant in drying becomes perfectly black, and indeed the other species here changes its colour in similar circumstances, but not to the same extent. To Brown's *L. ellipticus*, the Doctor adds *L. Burnettii* from Tasmania, and *L. serratus* from Cape Leschenault. It is somewhat remarkable that *L. suaveolens*, after passing over Victoria, should appear again in Tasmania.

(15.) *Glossodia major* and *G. minor* are plentiful in this district in the spring, and the former has a leaf which emits a delicious scent when bruised. Dr. F. Mueller had some idea of uniting these two, but I believe that he has reconsidered the matter, and now adopts Brown's view. *G. major* has a very wide range, but the other species is more limited.

(16.) *Pterostylis* according to Brown, has the following species:—*P. concinna*, *P. ophioglossa*, *P. curta*, *P. acuminata*, *P. pedunculata*, *P. cucullata*, *P. nana*, *P. nutans*, *P. obtusa*, *P. reflexa*, *P. revoluta*, *P. grandiflora*, *P. parviflora*, *P. longifolia*, *P. squamata*, *P. rufa*, *P. gibbosa*, *P. mutica*, and *P. dubia*. Of these we have

six well defined species which flower in the autumn and winter, viz., *P. concinna*, *P. nutans*, *P. mutica*, *P. rufa*, *P. grandiflora*, and *P. longifolia*. Dr. F. Mueller alludes to other species, but inclines to the opinion that they are not really distinct from those already described; and, indeed, if his views prove correct, the number of true species will be hereafter diminished. The doctor alludes to a variety of *P. curta* which was collected near Bent's Basin by the writer of this paper, and also to a varietas Wooliana of *P. grandiflora*, but it is to be doubted whether these varieties are permanent, or whether they may not be comprehended in the brief descriptions of R. Brown.

(17.) *Corysanthes fimbriata* is the most diminutive of our orchids, and flowers in the winter. The flower is helmet-shaped, and of a dark reddish brown with a solitary leaf. As it grows on the moist banks of our shady creeks, it has the appearance of some insect. This species extends to Victoria, but *C. bicalcarata* is much rarer. Dr. F. Mueller has received specimens from the Brisbane, which he refers to the latter species, and the late Mr. W. S. Macleay used to say that it had been found near Sydney. It seems probable that it may occur near us, because Brown describes it as growing at Port Jackson, but I have never been so fortunate as to meet with any living specimens of the species, nor do I think it is known to Dr. Mueller excepting from the Brisbane.

(18.) *Culeana major* and *C. minor* differ from each other principally in the bract on the stem, the latter being without any. In the spring of the year, *C. major* is common in this neighbourhood, and although possessing no particular beauty, is one of the most extraordinary orchids we have. The labellum is moveable and irritable, so that any slight external action (whether arising from the atmosphere, an insect, or a touch of the hand) causes it to shut, just as if it moved by a spring. There is an allied species at Swan River (*C. nigrita*) in which some observers have supposed that the irritability arises from a design on the part of nature to attract insects and catch them, as it has been remarked that when the lid by falling upon the lower part of the boat-shaped flower, does not catch anything, it soon opens again. I am inclined to think that this is only partially true, and that the movement is connected with the impregnation or fertilisation of

the flower, the pollen being probably shaken by the fall of the lid.

(19.) *Dipodium punctatum* is a leafless plant with a raceme of purple flowers. This is the only species known here, but Dr. Mueller alludes to two other species, *D. ensifolium* and *D. venosum*, of which latter, a straw-coloured variety occurs in New England.

(20.) The genus *Cymbidium* is now divided, so that one of our species (*C. reflexum*) is referred to *Sturmia*. Of this, Dr. Mueller remarks that it is known only to him from our Parramatta specimens. It is abundant on our creeks to the north, and I have also seen it in gullies in the county of Camden, but it does not extend to Victoria. *S. cælogynoides* grows at the Clarence, and *S. habenaria* at Rockingham Bay. *Cymbidium suave* extends from Illawarra to Moreton Bay, and *C. caniculatum*, although occurring in the northern parts of this colony, is more widely diffused through the arid regions of the tropics. The tender parts of the stem, and the base of the leaves, afford a mucilaginous food.

(21.) *Dendrobium* is a genus generally epiphytal, and comprehends many species, some of which are as yet but imperfectly known. *D. speciosum* (our Rock Lily), *D. linguæforme*, and *D. æmulum* are plentiful here, but *D. pungioforme*, *D. teretifolium*, and *D. Shepherdii* are less frequent. To Brown's *D. undulatum*, *D. caniculatum*, and *D. rigidum*, Dr. Mueller adds *D. Milligani*, *D. Mortii*, *D. Beckleri*, *D. monophyllum*, *D. tetragonum* (Allan Cunningham), *D. elongatum* (A. Cun.), *D. Brisbaneense*, *D. minutissimum*, *D. exiguum*, *D. aurantiacum*, and *D. Kingianum*. *D. Cucumerinum* was found by the late Mr. W. S. Macleay, near Brownlow Hill, growing on the swamp oak, and the Australian *D. bigibbum* has been cultivated in England. Nearly allied to this genus are the species of *Sarcochilus*, viz. *S. falcatus*, *S. Hillii*, *S. Gunnii*, and *S. calcaratus*, the first two of which occur at Tomah, and were also found near Camden by Sir William Macarthur.

The remaining Orchids mentioned by Dr. F. Mueller are the following:—*Epiblema grandiflorum* (Cape Le Grand, &c.), *Geoderu pictum* (Rockingham Bay, &c.), *Phajus grandifolius* (Queensland), *Habenaria ochroleuca* (Rockingham Bay), *Pholidota imbricata* (Rockingham Bay), *Calanthe veratrifolia* (Hastings River, &c.),



*Oberonia palmicola* (Hastings River, &c.), *Arthrochilus irritabilis* (Durando), *Gastrodia sesamoides* (Victoria, &c.), *Drakæa elastica* (Leschenault Prom, &c.), *Erythorchis aphylla* (Hastings River, &c.)

In concluding this review of Australian Orchids, so far as they are yet known, it may be seen that the study of this interesting family of plants is one of an extensive character, and opens to the inquiring mind a wide field for observation. Since the days of the celebrated Robert Brown, many species have been discovered, and it is highly probable that as the new settlements that are being formed in N.E. Australia are more carefully examined, other novelties will develop themselves. A. Cunningham and others were not neglectful of this singular order, and Dr. F. Mueller, in some late numbers of his "Fragmenta," has added materially to the species previously known. To speak of the Doctor's untiring exertions in the cause of science, and the wonderful ability which he displays in every department of the vegetable kingdom, seems almost superfluous, as probably there is no man in these colonies who has earned for himself a higher reputation, or whose labours are more generally appreciated by men of science throughout the civilised world. I cannot, however, omit the present opportunity of acknowledging the great assistance I have derived from his published works, as well as from the valuable hints which from time to time I have had the honour to receive from him in reference to Orchidaceæ and other orders of plants. If, in any humble degree, I have been enabled now and then to aid him in his unceasing efforts to develop the vegetable resources of this vast continent, I regard it as a privilege, and my only regret is that arduous duties of another kind frequently prevent me from rendering him so much assistance as I desire. So far as the orchids of Australia are concerned, to which the Doctor has devoted so much attention, it would be well for any person desirous of studying them, to compare Brown's descriptions with the 35th No. of the "Fragmenta," (Vol. 5), and he will then be able to form some idea of the labour and ability which will be required to give accurate descriptions of all the known Australian orchids. The day, no doubt, will arrive when a separate work on this subject, accompanied with suitable illustrations, will be deemed necessary, for, valuable as the descriptions of

the order in a future volume of the "Flora Australiensis" will be, it would be vain to suppose that brief notices only (which are all that can be given in a comprehensive review of our vegetable kingdom) will be sufficient to satisfy the minds of those who are anxious to investigate the protean forms and anomalous structure of our orchidaceæ. In any of the flowers of the field which it has pleased the Creator to scatter about us in wild profusion, there are beauties to be admired and mysteries to be studied; but in no order of our flora do the flowers appear so varied in colour, so fantastic in shape, or so seemingly irregular from the consolidation of the stamens and pistil into one common mass, as in orchids. Many of these elegant plants are so insignificant as almost to escape observation, and others are doomed "to blush unseen" amidst the dense shrubs that shade them; and yet, fostered by the Almighty power which called them into existence, "they toil not, neither do they spin," whilst it may truly be said, "that even Solomon in all his glory was not arrayed like one of these." They, are indeed, as the poet beautifully expresses himself, "the revelation of God's love" to His creatures.

"Bright and glorious is that revelation,  
Written all over this great world of ours;  
Making evident our own creation  
In these stars of earth—these golden flowers."

## RINGWORM, OR DODDER, ON LUCERNE.

IT appears from the statements of several settlers that the parasite called "ringworm," or "dodder" has lately prevailed to a considerable extent on lucerne cultivated in some districts of the colony. The parasite is nothing new to agriculturists, having been known in New South Wales for many years; but of late it seems to have spread more extensively than heretofore, and to have become very injurious to the lucerne crops.

This troublesome weed (*Cuscuta epithymum*) in some respects resembles mistletoe, and in others, dodder laurel (*Cassytha*); but it differs from the former in not plunging its roots into the wood and incorporating them with the tissue of plants; and it differs from the latter in being a much more thread-like parasite, the seeds of which are destitute of cotyledons. The germination of the dodder is curious. Its slender and simple radicle descends into the earth; and the plumule, equally simple and cylindrical, rises like a thread: if it finds no other living plant near it, it dies; if it finds one, it surrounds the stem, and from the points of contact proceed hollow tubercles or suckers, which plant themselves in the bark and suck the juice which has been elaborated by the plant attacked; then the root becomes obliterated and dies, and the plant lives from that time forward by its suckers only. The species of our *Cassytha* or dodder laurel (these plants being placed by botanists in the laurel family), are sometimes mistaken for dodder, but they are much coarser plants, and generally grow on shrubs or trees, sometimes forming dense and almost impenetrable masses in our scrubs. The species described by Brown are *C. pubescens*, *C. melantha*, *C. glabella*, and *C. paniculata*, two of which may frequently be seen in the neighbourhood of Sydney, and the fruit of them is well known to boys. These plants are leafless, voluble, and parasitical, and in their habit they resemble the true dodder, for after they have fixed themselves on any shrub, their root perishes, and they live by means of the small protuberances or suckers which they form on other plants. The true Australian dodders are placed by Brown in the convolvulus family, and, like the European species, are acotyledonous. That celebrated botanist describes two species, *C. Australis* and *C. carinata*, both of which he considered tropical; but since his day, they have been found in this colony, though somewhat sparingly, and generally adhering to some *Polygonum* growing near water. The species, however, which our farmers have the principal reason to dread, is *C. epithymum*, an introduced plant, now committing considerable injury amongst the lucerne at Bathurst and other parts. Lucerne (*Medicago sativa*) is not a favourite with English farmers, for although it will produce good crops for eight or ten years successively, yet from the time the farmer must wait till his crop attains its per-

fection, and from the care requisite to keep it from grass and weeds, it is not thought that lucerne will ever come into general culture in England. It has long been cultivated in France and Switzerland, and therefore we must look to the experience of the Continental farmers for the best means of eradicating the dodder now prevalent amongst it here. As a preliminary measure it may be well to sift the seed of the lucerne in a fine sieve, in order to get rid of any dodder seeds that may be adhering to it; and then, in soils which are supposed to be infested with weeds and grasses, to sow the lucerne in drills about nine inches apart, so that there may be greater facility in keeping the crops clean. This method has advantages over the broad cast sowing, as the crop may be cleared by horse-hoeing instead of harrowing, and the quantity of seed required is only from eight to twelve pounds per acre, whereas the broad-cast requires from fifteen to twenty. M. Vaucher cleared his artificial fields from dodder by perpetually breaking and dividing their stalks with a rake. Others have mowed their lucerne which has been infested with the dodder, before the dodder has had time to develop itself and produce seed. In this case the parasite has died away, and the lucerne has sprung up with renewed vigour. When, however, matters have proceeded too far, a change of crops is necessary, so that when the dodder springs up, it may not find any plant on which it can be nourished, and so perish without doing injury. The subject is one of great interest and importance to agriculturists, as well as to those who are purchasers of lucerne hay, and therefore it may be advisable to collect additional information respecting the ravages of the dodder, with a view of preventing its further progress in these colonies, or at all events of ascertaining the best means of eradicating it.

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## SUBSTITUTE FOR COTTON.

IT is not perhaps generally known that the *Zostera marina*, or sea-wrack, which Mr. Harben thinks will supersede the use of cotton, is nothing more than the common weed which is used

in this colony and in other parts of the world for stuffing mattresses. This plant is not, strictly speaking, a sea-weed, although it grows under water and has some of the characteristics of an Alga; but it is really a phanerogamous plant of the Linnæan class *monandria*, order *monogynia*, or of the natural order *Zosteraceæ*. It is partly described in Brown's *Prodromus* as indigenous in New South Wales; but it does not appear that Brown ever had an opportunity of examining the flower, so that he was not sure whether our species was really identical with the European one or not. In England, the sea-wrack is said to flower in August, but as I have recently noticed several plants in a state of fructification, I conclude that in this part of the world it flowers in the spring. In addition to this species, which abounds in our estuaries, there is another which may sometimes be noticed on the sea-shore (probably *Z. maritima*), but the flower of the one in question is very much like that of *Z. Noltii* figured in Lindley's "Vegetable Kingdom." The flowers are so minute that they can scarcely be recognised without the aid of a microscope, but they are nevertheless true flowers, notwithstanding the difficulty of accounting for the mode of fertilisation in some of the species.

Hitherto the sea-wrack, when dried, has been used for bedding, and Withering says that the lower part of the stem contains much saccharine matter, and is chewed by the Hebridians. It has also had its place in the *Pharmacopœia* as a remedy for inflammation, gout, and tumours! Mr. Harben, however, is the first person who has discovered that the fibre of the leaves may be made available for cotton spinning machinery, and he is so sanguine as to its qualities that he thinks the strength, elasticity, and silky texture of the plant will render it not merely a substitute for cotton, but that the sea-wrack will be preferred to it. In this age of discovery, it is impossible to predict how far Mr. Harben's anticipations may be realised, for not many years since, the *Isonandra*, which has afforded employment to so many persons in the manufacture of articles from *gutta percha*, was as little regarded as *Zostera* is now. Should the discovery prove successful, it is satisfactory to know that abundance of raw material may be procured on these shores, and therefore that Australia, if necessary, may render assistance to the Lancashire

weavers by affording them the means of employment in working up some portions of the *Zostera* that is now scattered on our coasts.

[The preceding remarks were written at the period, when in consequence of the American War, the supply of cotton was altogether inadequate for the British Market, and benevolent men in different parts of the world were searching after vegetable fibres, as substitutes for cotton. Mr. Harben's suggestions were not disregarded, but on investigation, it was found that the machinery used in the manufacture of cotton goods was not adapted to the *Zostera*, and further that instead of producing an article similar to cotton, this plant would have worked up into a fabric, more analogous to silk.]

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## INDIGENOUS VEGETABLES.

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I NOTICED some remarks lately in a colonial paper in reference to certain plants which may be used in seasons of scarcity as substitutes for cultivated vegetables. These plants, it is observed, are popularly termed "Pigweed," "Fat-Hen," and "New Zealand Spinach." The first of these is purslane or *Portulaca oleracea*, which was formerly cultivated as a pot-herb, the young shoots and leaves having been used in spring and autumn as ingredients in pickles and salads. It is still retained in the Pharmacopœia, as "cooling, useful in scurvy and bilious disorders: seeds vermifuge," and there can be no doubt of its deserved reputation, for in Dr. F. Mueller's botanical report on the North-Australian Expedition, he remarks, "We had almost daily occasion to praise the value of the purslane, which not only occurred in every part of the country explored, but also principally in the neighbourhood of rivers, often in the greatest abundance. We found it, in sandy and grassy localities, so agreeably acidulous, as to use it for food without any preparation; and I have reason

to attribute the continuance of our health partially to the constant use of this valuable plant. The absence of other antiscorbutic herbs in the north, and the facility with which it may be gathered, entitle it to particular notice." During the last drought, a friend of mine, without knowing the properties of the purslane, was induced to try it as a vegetable, imagining that it must be nearly allied to spinach; and she assures me that she regarded it "as a most valuable table-vegetable." It is highly important that the value of purslane should be made known, for, in many parts where the usual garden-vegetables cannot be procured, it might be employed with much advantage as an antiscorbutic. I have not found in this neighbourhood any other species of the genus, nor do I believe that any such exist here; but not long since, I collected at the North Rocks near Parramatta, a specimen of a *Calandrinia*, which my learned friend Dr. F. Mueller recognises as *C. calyptata*. The leaves of this are fleshy and succulent, but as the plant is small and of rare occurrence, it cannot be regarded as available for the same purposes as the purslane.

The "Fat Hen" alluded to is *Chenopodium erosum*, and as an esculent vegetable, it seems to be better known to the colonists than the purslane. In Europe, some plants of the allied genus *Atriplex* have been cultivated as pot-herbs, especially *A. hortensis*, which by the way, seems much better adapted to our climate than the true Spinach, (*Spinacia oleracea*.) At Ash Island, *A. patulum* and *A. cinereum* occur, and on the banks of the Darling, Sir T. Mitchell discovered *A. halimoides*. This genus is nearly allied to the "salt bush" of the colonists (*Rhagodia hastata*), of which I collected *R. Billardiera* also on Ash Island. Some of the Chenopods have been introduced here, such as *C. murale* and *C. ambrosioides*, and they are becoming troublesome weeds, but *C. Australe* (which seems to be a mere variety of *C. maritimum*), and *Salicornia indica* possess useful qualities; the former being adapted for the same purposes as purslane, and the latter containing Barilla, and also being a substitute for samphire when pickled. I have frequently used *C. Australe* for pickle, and have found it far from contemptible. The other species of the genus common here is *C. triangulare*, the utricle of which is of a reddish colour when ripe, and con-

tains one small black seed. I fancy that the leaves of this plant must contain properties similar to *Salicornia*, for after having chewed them, a person experiences an unpleasant sensation in the throat, probably occasioned by the alkali they contain.

The plant called "New Zealand Spinach," though perhaps somewhat inappropriately, is indigenous in Eastern Australia, as well as in New Zealand. It is known to botanists as *Tetragonia expansa*, and a few years since was rather a favourite with English gardeners, being regarded by them as a substitute for the true spinach, which is a diœcious plant of the Chenopod family, and rather troublesome to gardeners. Captain Cook is said to have used the New Zealand spinach and to have had it served out to the sailors every day, at breakfast and dinner. It was introduced into England by Sir Joseph Banks in 1772, and Don mentions that during the whole summer of 1821, no other spinach was used in the Earl of Essex's family at Cashiobury. This vegetable is no doubt antiscorbutic, and, therefore, it should be encouraged in all places where people are compelled to eat much salt meat. In addition to the plants enumerated by late observers, I would add some species of the *Amarantus* family, two of which (*A. Blitum* and *A. oleraceus*) have been introduced into the colony, and are sometimes regarded as troublesome weeds. The leaves of the latter have been much used in India. Both of these plants are instanced in the Pharmacopœia as "pot herbs," and I have been assured by a person who has frequently used *A. oleraceus*, that the leaves when boiled, are by no means to be despised in dry seasons. Many plants of the *Amarantus* family are described by Brown as indigenous in Australia, but in this part of the colony, I do not think that more than three occur, viz., *Deeringia celosioides* (the bitter and acrid leaves of which are used against the measles in Java); *Nyssanthes media* (a troublesome plant with spinescent bracts); and *Altenanthera denticulata*, which grows in ditches, or on the banks of creeks. None of these plants are of any utility as esculents, but in some parts of Eastern Australia there are a few cruciferous vegetables which are valuable whenever they can be procured, as the *cruciferae* generally "contain azote or nitrogen in their composition, and, therefore, easily putrefy, and furnish volatile alkali by distillation." They are decidedly antiscorbutic before they are dried,



and, therefore, one cannot but regret that they are not more abundant in Australia. I do not recollect that Sir Thomas Mitchell used any plant of this family in any of his expeditions; and Dr. F. Mueller seems to have noticed only three in North-Eastern Australia, whilst in his recent work on the Victorian plants he remarks—"Cruciferæ, with the exception of *Cardamine hirsuta*, are totally wanting in the whole botanically-known portions of tropical Australia, even in the Northern desert interior, notwithstanding their slightly augmented number in the Southern desert; otherwise they are also comparatively scarce, as well in extratropical Australia as in Tasmania and New Zealand, even in alpine situations." The cruciferous plants of New South Wales which appear to have been introduced are *Sisymbrium officinale*, a *Sinapis*, a *Raphanus*, *Capsella* or the shepherd's purse, and *Senebiera didyma*—a species of swine or wart cress which is sometimes eaten. Those which are indigenous are two species of *Lepidium*, and two of *Cardamine*, viz., *C. stylosa* and *C. tenuifolia*, the latter of which resembles the garden cress in flavour, but it is far too rare to be of any utility. *C. stylosa* is a much larger plant, and grows in wild places about the North Rocks. The water-cresses *Cardamine hirsuta* and *Nasturtium terrestre* do not occur in the immediate neighbourhood of Parramatta.

The subject at which I have glanced is one of great practical utility, for it concerns not only the systematic botanist, who is seeking everywhere for novelties to which he may give "a local habitation and a name," but it is of infinite importance to every one who may be engaged in traversing the wilds of Australia; for a competent knowledge of indigenous plants suitable for food, may not merely prevent the appearance of scurvy, but in some instances it may preserve life itself. This is a country which certainly does not abound in esculent fruits and vegetables, and there may be tracts where nothing better than the miserable nardoo (*Marsilea*) which for a time supported the unfortunate Burke and Wills, can be procured; but nevertheless there are persons who reside in the midst of plants which might be substituted for garden vegetables, and yet for the want of a little information, they never turn them to any practical account.

## POISONOUS HONEY.

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[*The following paper was intended as a reply to an article by Dr. Bell, who supposed that a boy at Borrogorang had been poisoned by eating a quantity of honey.*]

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I HAVE read with much interest the elaborate paper on "Poisonous Honey," which Dr. Bell very modestly entitles "A few words about honey," and although I am disposed to concur in many of the statements contained in that communication, yet I am scarcely prepared to believe that we have sufficient evidence before us to prove the existence of poisonous honey in Australia. The solitary case to which the doctor refers may perhaps have arisen from the fact of the boy having eaten "a considerable quantity" of honey; or probably it may have arisen from some idiosyncrasy in his constitution, as it is stated on high authority that some persons cannot eat honey, or even drink mead without experiencing serious, nay, sometimes fatal effects. Kirby and Spence particularly mention the case of a lady, upon whom honey acted "like poison," and they affirm that some persons of particular habits and constitution have died from the effects of it. Until, therefore, there has been a chemical analysis of the honey in question, and it has been clearly shown that it possesses deleterious properties, I shall be inclined to think that either the boy must have over-eaten himself, and thus brought on gastric fever, or that there is something in his constitution which predisposes him to attacks of this kind. At the same time, however, the subject is one of a very important character, and should any further cases arise from eating the honey of his neighbourhood, it will be most interesting to ascertain "the nature of the shrubs or plants from which the honey was produced." As far as I am able to discover, we have not in Australia any indigenous plants which are calculated to produce effects similar to those described by Dr. Bell. The genera *Azalea*, *Kalmia*, *Rhododendron*, and *Andromeda*, which, it is supposed, give the poisonous quality to honey in the neighbourhood of Trebizond on the

Black Sea, and other parts of the world, do not grow here, nor have we the poison-ash (*Rhus vernix*), which, in America, has sometimes occasioned the death of whole swarms of bees, simply from the circumstance of their having alighted on its branches. *Cicuta*, *Angelica*, and *Scandix* do not flourish in the wilds of Australia; and, even supposing that they did, it is very doubtful whether bees would collect honey from them, for it is a fact well known to entomologists that bees neglect certain flowers on account of the poisonous quality of their honey. This is particularly the case with the crown imperial (*Fritillaria imperialis*) and the oleander (*Nerium Oleander*), both of which are avoided by bees, though it is believed thousands of flies perish from incautiously partaking of the secretions of the latter. The natural family *Ericaceæ*, which contains the genera so injurious to honey, is almost unrepresented in Australia, whilst the place is supplied by the *Epacridaceæ*, a family of plants not possessing any noxious qualities, but affording a rich supply of honey. This family, together with many species of myrtaceous and leguminous plants, seems to be much in favour with bees, and therefore, excepting in seasons of extreme scarcity from drought or other causes, I find a difficulty in believing that any of the bees, so wise and cautious as they are known to be, would so far lose their natural instinct as to gather honey from plants which are not merely injurious to man, but probably destructive to the bees themselves. There is, indeed, one plant which has been introduced amongst us, and is spreading very much in the cultivated parts of the colony, viz., *Datura stramonium*, which is decidedly poisonous in its nature, and moreover, it is placed by Dr. Barton amongst the plants which in some parts of America are supposed to impart poisonous qualities to the honey.

The remarkable case of poisoning from honey, to which Dr. Bell has referred, is mentioned in the 4th book of Xenophon's *Anabasis*, chapter 8, and I will quote the passage entire:—"After the Greeks had gained the ascent, they encamped in many villages full of all sorts of provisions. Here they found nothing else worthy of their admiration; but there being great quantities of beehives in those villages, all the soldiers who ate of the honey-combs lost their senses, and were seized with a vomiting and purging, none of them being able to stand upon their legs. Those

who ate but little were like men very drunk, and those who ate much, like madmen, and some like dying persons. In this condition, great numbers lay on the ground as if there had been a defeat, and the sorrow was general. The next day, none of them died, but recovered their senses about the same hour they were seized; and the third and fourth day they got up as if they had taken physic." This is certainly an ancient case of poisoning, but we are assured on the testimony of modern travellers, that the poisonous effects of the honey on the southern shores of the Black Sea still remain, and not many years since (viz., in 1834), Keith E. Abbott, Esq., forwarded a specimen of the honey in question from Trebizond to the Zoological Society, "which honey was still found to retain its deleterious properties." The bad effects of this honey are said by the Russian traveller, Pallas, to arise from *Azalea pontica*. He says, "that the effects of the Euxine honey are like those of *Lolium temulentum*, and occur in a country where no *Rhododendron* grows. The natives are well aware of the deleterious qualities of the plant, and it is related that goats which browse on the leaves, before the pastures are green, suffer in consequence, and moreover, that cattle and sheep perish." In addition to the suspected genera of the heath family (none of which, however, are indigenous here), there are some other plants that both ancient and modern writers regard as detrimental to honey. Virgil, who in the management of bees is a great authority, sings of the *Taxus* as a tree to be avoided. Whether the poet means yew or the box (*Buxus sempervirens*), is a point not agreed upon amongst commentators, but in either case I do not see that we have anything to fear from this source in Australia, as there is no indigenous tree resembling them in properties. The nearest approach to the yew is our *Podocarpus*; but the only species of that genus with which I am acquainted is perfectly innocent, the berries being eatable, though somewhat insipid. By modern botanists the leaves of the yew are said to be poisonous to horses and cows, whilst Cæsar assures us that King Cativolus killed himself by the *Taxus*. The berries, however, are not poisonous, and turkeys, peacocks, and other poultry and birds eat both the leaves and the fruit. A few of the berries are not deleterious to the human species, but the leaves are fatal. If by the *Taxus*, the box is intended, there can be no doubt re-

specting the injurious effects of that plant, as none of our animals appear to browse on it; and many writers regard it as the cause of the bad qualities attributed to the Corsican honey. To the *Taxus*, the *Cicuta* is also added; but whether that term indicates the cowbane (*C. virosa*) of modern times, it is difficult to determine. Whilst the ancients condemn the honey of some countries as being of an inferior kind, they extol that of others with the highest praise, particularly of Hymettus in Attica, a place still famous for the excellence of its honey, and Hybla, a mountain in Sicily. Of the latter place, Hogg, in his learned account of classical plants in Sicily, makes especial mention under the family called Labiates. Bees, he says, delight in these species, and to them may be attributed the celebrity of the Hyblean honey. Even at the present day, sages, thymes, germanders, mints, and other aromatic herbs cover the calcareous range of Mount Hybla; and from their flowers, the wild buzzing bee still extracts most delicious honey, as in the time of Theocritus, and honey is exported from Syracuse. The Labiate family\* is not a very numerous one in New South Wales, and with the exception of the wild pennyroyal, or *Mentha*, I do not know of any indigenous plant which can be regarded as representing in any degree the sweet scented Labiates of Mount Hybla. This little plant, when bruised, is very fragrant, and possesses medicinal properties, being used by country people as a tonic.

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\* The Labiates of this part are not numerous nor important. With the exception of two which have been introduced, viz., *Stachys arvensis* and *Marubium vulgare* I have noticed only the following:—*Lycopus Australis*, *Westringia rosmarinifolia* (near the coast), *Westringia longifolia* (George's River), *Hemigenia purpurea* (near the coast), *Ajuga Australis*, *Teucrium corymbosum* (rare), *Mentha saturoides*, *Plectranthus Australis*, *Prunella vulgaris*, *Scutellaria humilis*, *Scutellaria mollis* (rare), *Prostanthera marifolia* (near the coast).

It would be advisable for persons keeping bees to cultivate somewhat extensively the Labiates, which are found so beneficial to honey in Europe, nor should they despise the species of our Tea-trees (*Melaleuca*, *Leptospermum*, *Callistemon*, &c.) for great quantities of honey may be procured from them at certain seasons. Let such persons, however, beware of the showy species of heathworts, and not cultivate many near their hives; and, I may add, let them destroy the thorn-apple (*Datura stramonium*) and *Nicandra physaloides* (a plant sometimes mistaken for the Cape gooseberry), wherever they spring up. Amongst the bush flowers which, perhaps, may be suspected, there are probably some species of *Gompholobium* and *Gastrolobium*, but hitherto, as far as the experience of the colonists has extended, the injurious effects of these plants are confined to Western and North Eastern Australia.

I think, from the facts already adverted to, that some places are much more favourable for the propagation of bees than others, and that the good or bad qualities of the honey are to be attributed to the flora of the country where it is procured. The natural family of the Labiates presents us with some of the species best adapted for bees, but as I have before observed, New South Wales affords many plants suitable for the same purpose, though not so fragrant as the flora of Mount Hybla; and it may be remarked that whilst in many parts of Europe there is not a flower to be seen during the dreary months of winter, this colony is never without its flowering shrubs. Nor, indeed, can I believe that there are many native shrubs injurious to bees, or calculated to impart a poisonous quality to their honey. And it is this consideration which induces me to hesitate in receiving too credulously the statement respecting the honey of Borrogorang. Further investigation may lead me to alter my opinion, especially if it should appear that other cases, similar to the one reported by Dr. Bell, have occurred; but for the present, I am inclined to believe that a flora singularly deficient as ours is in the genera which are supposed to have done so much mischief in other parts of the world, is not likely to impregnate the honey of the colony with any poisonous qualities.

Besides Corsica and the southern shores of the Black Sea, some parts of America are instanced as producing deleterious honey. A remarkable proof of this is given by Dr. Barton, in the fifth volume of "The American Philosophical Transactions." In the autumn and winter of the year 1790, an extensive mortality was produced amongst those who had partaken of the honey collected in the neighbourhood of Philadelphia. The attention of the American Government was excited by the general distress; a minute inquiry into the cause of the mortality ensued, and it was satisfactorily ascertained that the honey had been chiefly extracted from the flowers of *Kalmia latifolia* of the family Ericaceæ. With respect to the honey found in a wild state by the hunters in South Carolina, Georgia, and the two Floridas, but more especially East Florida, it has been generally considered that it is sometimes rendered noxious by two species of *Kalmia* and *Andromeda moriana*, but it appears that even in the parts where these flowers are most abundant, the honey is only par-

tially affected. Its poisonous character cannot be ascertained either by the appearance of the honey or by its taste, and it is experience only that determines the point. The hunters, we are told, first use it in small quantities, and if no unfavourable symptoms occur, they eat it as they would any other honey. Dr. Mason Good, in referring to that which is deleterious, says that at first it occasions a dimness of sight or vertigo, succeeded by a delirium, which is sometimes mild and pleasant, and sometimes ferocious; ebriety, pain in the stomach and intestines, convulsions, profuse perspiration, foaming at the mouth, vomiting and purging, and in a few instances death. In some persons a vomiting is the first effect. Sometimes the honey has been observed to produce a temporary palsy of the limbs, an effect which we have remarked in animals that have eaten of one of those very vegetables from whose flowers the bees obtain a pernicious honey. It is, however, very seldom fatal, the disorders it occasions generally working their own cure, either by occasioning vomiting, purging, or profuse perspiration, the two former of which relieve the pain in the intestines, and the latter, the fever.

In comparing the account furnished by American writers with the short but graphic description given by Xenophon in his *Anabasis*, it would seem that the honey on the shores of the Black Sea is very similar to that occasionally found in America. And it is somewhat remarkable that the evil appears the result of the same cause, viz., the prevalence of flowers belonging to certain genera of the same natural family. While, therefore, some natural families are decidedly favourable, as we have seen in the influence exerted by the labiates in Mount Hybla, and I might add Narbonne, where Rosemary (*Rosmarinus officinalis*) is said to impart a delicious flavour to the honey, there are others which contain species that render honey not only unpalatable, but poisonous. Virgil, we have seen, denounces the *Taxus*, but I can scarcely think the Yew can be intended, as in many parts of England where Yew trees abound, poisonous honey is unknown.

Before I conclude these brief, and I fear unsatisfactory remarks, I must express my thanks to Dr. Bell for having called my attention to a very interesting subject, and I trust that his instructive papers may be the means of inducing many persons to study more attentively than hitherto the habits of bees, and

the influence which certain species of flowers exercise upon them. With his concluding remarks I perfectly agree, and it is to be hoped that future poets may be able to say of the Australian honey what Horace does of that found near his beloved Galesus,

“ Ille terrarum mihi præter omnes  
 “ Angulus ridet; ubi non *Hymetto*  
 “ *Mella decedunt* &c.

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[*The paper of which the following outline appeared in the Gardener's Chronicle, contained a popular account of the plants flourishing in the neighbourhood of Sydney. I regret that I am unable to publish it in full, as owing to some negligence on the part of a friend in London, the paper was mislaid or lost.*]

## THE BOTANY OF NEW SOUTH WALES.

(*Gardeners' Chronicle, March 16th. 1860*)

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**L**INNEAN: February 21.—Professor Bell, president, in the chair. Certain alterations of the by-laws proposed by the Council were put to the vote, and confirmed by the fellows at large in the terms of the charter. A. W. Crichton, Esq., H. T. Knowles Kempton, Esq., Captain A. F. Lendy, D. Moore, Esq., and C. K. Ord, Esq., M.D., were elected fellows, and Mr. W. Laughrin, an associate of the Society. The following papers were read:—1. Extracts from letters addressed to Sir W. J. Hooker, by Mr. Gustave Mann, describing his second ascent of Clarence Peak, Fernando Po. 2. “Glance at the Botany of the North Shore near Sydney,” by William Woolls, Esq., communicated by the librarian. This was a popular sketch of the native vegetation of the neighbourhood of Sydney. Among other striking plants, the author mentioned *Boronia serrulata*, or native rose, as the most admired species of the family, and remarked that there were spots between the North Shore and Manly Beach, which at certain seasons of the year were so en-



livened by the profusion of these plants, as to suggest the idea of a cultivated garden rather than a wild bush, while little inferior to this, were the species *B. pinnata*, *ledifolia*, and *polygalifolia*, which by their pink and red flowers relieve the sombre appearance of the dark evergreens around them. On the creeks to the north of Parramatta, *Eriostemon salicifolius* was stated to occur abundantly, and on the banks of the Nepean, *E. myoporoides* to grow plentifully; this last having so powerful a scent as to be almost overpowering in a room. The species of *Corræa* found were *alba*, *virens*, and *speciosa*, the two last, from some resemblance of aspect, being sometimes called native fuchsias. The Epacridaceæ were mentioned as being very numerous, and of peculiar interest as being members of an order almost exclusively Australian or Polynesian. The crimson nodding flowers of *Styphelia tubiflora*, and the scarlet and white ones of *Epacris grandiflora*, are very attractive; nor must the *Leucopogon Richei* be forgotten, for its berries are said to have preserved the life of the French naturalist Riche, who was lost for three days on the south coast of New Holland. About twenty species of *Acacia*, a genus common in Australia, occur in this locality. The bark of these plants is astringent, and a great quantity of it is used in tanning; it is also sometimes employed medicinally as a remedy for dysentery, whilst the wood of *A. melanoxylon* is much esteemed by the cabinet maker, being hard, dark in colour and finely veined. The most important order in the colony was said to be the *Myrtaceæ*; nearly all the trees of the forest belonging to it, and also many beautiful shrubs. Some of the *Leptospermums* have very much the appearance of the English hawthorn. After thus sketching the various groups of phænogamous plants and ferns, Mr. Woolls referred to the unfavorable conditions of the climate for the growth of mosses, "but even here," he observes "under certain conditions they are sure to spring up. Whenever a tree in the bush has been burned, *Funaria hygrometrica* is sure to appear if there is sufficient moisture in the soil; and wherever in damp and shady places cow manure has begun to decay, *Splachnum angustatum* almost invariably appears. Again on the cindery path, the minute *Bryum argenteum* delights to grow, whilst the same moss in company with another of diminutive size, *Gymnosotomum ovatum*, may be noticed on the bark or shingles of cottages

in large patches. In the same manner, on the top of walls or between the bricks of houses when the mortar is getting somewhat decomposed, *Tortula muralis* sends forth its hair-tipped leaves. *Dicranum flexuosum* comes up in low wet ground, and as it dies away before the approaching summer, leaves dark and discoloured patches here and there between the grasses; and *D. bryoides*, which cheered the celebrated African traveller in his despondency, comes on the moist dripping banks of our creeks." 3. "Catalogue of the Dipterous Insects collected by Mr. R. Wallace, at Gilolo, Ternate and Ceram," by F. Walker, Esq. 4. "Description of a (supposed) new Annelid," by Dr. Hart Vinen.

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## AUSTRALIAN FERNS.

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PERHAPS there is no order of the vegetable kingdom which has more attractions for the general observer than that of Ferns. The extreme elegance and extraordinary diversity of their forms, as well as the facility with which many species can be procured and dried, tend to make the study of Ferns highly popular, and to induce even persons who have but little idea of classification, to collect specimens for amusement. As these plants are found in various localities, sometimes for instance on the banks of our creeks or on the margins of marshes, and sometimes in the dense forest or on the Alpine height, there is scarcely any part of our coast in which some species do not occur. The wide geographical distribution of Ferns, therefore, is well calculated to promote the study of this interesting order, for although some of the rare species have a very limited range, and are found only by those who search diligently for them, yet many of the common forms around us present interesting subjects for inquiry, and gradually lead to the elucidation of species less known. But whilst alluding to what may be deemed "common forms," it must be recollected that species which are plentiful in one place,

are probably rare or unknown in another; so that persons residing in different parts of the Australian colonies may derive much information by exchanging the specimens of one district for those of another. By comparing such specimens they will be induced to take an extended view of the order, and avoid some of the errors into which they might fall from a limited consideration of the subject, particularly the unnecessary multiplication of species, and inaccuracy arising from inattention to local peculiarities. Sir William Hooker remarks, "that there is perhaps no family of plants where more false species have been made than among Ferns"; and hence that distinguished writer has rendered incalculable service to the cause of science by proving the identity of many so-called species found in portions of the globe remote from each other, and by reducing the number of genera wherever practicable. In reviewing the descriptions of our Australian Ferns, as given in the *Species Filicum*, it is highly probable that many of our pteridophilists may be disposed to question the conclusions of the venerable author, especially in the consideration of those species with which he seemed but imperfectly acquainted; but whether the views of Sir William are received or not, it must be admitted that he possessed more favourable opportunities for comparing specimens from all parts of the world, and of ascertaining the distribution of species, than perhaps any botanist now living. If the comparison of specimens from different districts in the same country is calculated to prevent mistakes, and to show the identity of species previously supposed to be distinct, the advantages arising from the examination of Ferns from all parts of the world, are manifestly of still greater importance. We have seen, in the volumes of the *Flora Australiensis*, already published, the great utility of comparing specimens from all parts of the same continent, for by so doing, the learned authors have not merely demonstrated the identity of many so-called species, but they have shown the probability of even more extensive amalgamation, by finding, as it were, the connecting links between forms apparently of different origin. Sir William Hooker has rendered a similar service to cryptogamic botany, and he remarks that the further his investigation proceeded, the more he was convinced, that the system of curtailment ought to be, and will be, carried to a still greater length. The great difficulty in the

systematic arrangement of Ferns according to their species, arises principally from their highly varied forms ; so that in many instances, it is almost impossible to determine a true species from a mere variety. In some of our genera, for instance such as *Doodia*, *Blechnum*, and *Lomaria*, it seems highly probable that, when the vast amount of variation to which species are liable is better understood, the principles laid down by Sir William Hooker will lead to further innovations. Many years ago, the celebrated Robert Brown called especial attention to the position of the sori, or the collections of sporangia, on the veins of Ferns, and this subject was subsequently followed up by J. Smith, A.L.S., in some able papers read before the Linnean Society, in 1840, in which it was shown that the different forms of venation afford, in conjunction with the position of the sori, very important characters for arranging extensive genera. Smith applied his principles in the first instance to the genus *Polypodium*, and although Hooker regards him as one of those botanists who has addicted himself too much to the multiplication of genera, yet he (Sir William) gratefully acknowledges the benefits which have resulted from these close and accurate investigations ; and in his arrangement of the genus referred to, he adopts the very natural system of grouping the species according to their venation. Thus, for instance, instead of regarding our *Polypodium rupestre*, and *P. tenellum*, as species of two different genera (*Niphobolus rupestre*, and *Arthropteris tenella*), he simply places them in sections according to the character of their veins. The system of making large genera with appropriate subdivisions is, as Dr. F. Mueller has remarked, not merely philosophical, but also highly useful to the memory. Nor, indeed, is it without its importance in reference to the variation of species, for when it is found that forms somewhat different in appearance, agree exactly in the ramifications of the veins and the position of the sori, there may be reason to believe that the multiplication of species in such cases is unnecessary. The attentive consideration of the venation also may be useful when we are not so fortunate as to meet with specimens of some Ferns in a state of fructification ; for there are different plants closely resembling each other in habit and outline, which are widely separated by the shape of the veins, some probably having them forked, and others, reticulated. Under any circum-

stances, we should pay attention to the venation, for not merely barren fronds but sometimes those which have been in a state of fructification and lost their indusium, are difficult to determine. The absence of an indusium being one of the principal characters of the genus *Polypodium*, it sometimes happens that species are referred to that genus simply from the want of an organ which has disappeared. Sir William Hooker felt peculiar difficulty in dealing with the species *P. rugosulum*, and perhaps he may have included some species of *Cheilanthes* or *Hypolepis* under that name from the impossibility of discovering any trace of an involucre in certain stages of the plant's growth. Again, in describing the Fern which he refers to *Polypodium* (*P. Beckleri*), a doubt is expressed as to the possibility of some mistake in the genus, for from the specimens forwarded to Europe, it was uncertain whether the species had any indusium or not. (This Fern is now referred by Dr. Mueller to *Aspidium oblitteratum*). In the various forms also which are grouped together under *Nephrodium decompositum*, (which according to Sir W. Hooker, comprises *N. microsorum*, of Norfolk Island, *Lastrea acuminata*, *N. glabellum*, (All. Cunn.), and I suppose Brown's *N. tenerum*), a similar doubt may arise, unless due attention be paid to the position of the sori on the veinlets, and the existence of an indusium, which, in the specimens from some localities, it is difficult to find. Dr. Hooker has remarked that *N. decompositum* is a very variable species, and, as far as my limited observation has extended, I should fully concur in the opinion, for I have frequently collected fronds on which no trace of an indusium appeared, and which differed very much from the type of the species in the texture of the frond and the comparative size of the sori. The venation, however, is much more uniform, and this circumstance probably led to the conclusion that many varying forms might conveniently be referred to the same species. In a new country, in which many parts remain to be explored, there may exist forms which hereafter will unite some species now deemed distinct; and, on the other hand, reasons may arise for separating Ferns which are now placed together. It has been remarked by a late writer on British Ferns—"In some few cases, even among our British Ferns, it is hardly possible to decide whether a plant should be regarded as a species or a variety, while their classification cannot be considered as even

yet fully settled." If this be the case with species which have been examined again and again by the most distinguished botanists, it cannot excite surprise to find that great differences of opinion exist as to the proper position of some Australian Ferns, especially as many species are yet but imperfectly known, and the great majority of them have been seen only in a dried state by European botanists. In instituting a comparison between British and Australian Ferns, one cannot fail to notice the different proportion they bear to the flowering plants in each country; for whilst in England the proportion is reckoned at one to thirty-five, and in Scotland one to thirty-one, in Australia, the proportion, according to Brown, was one in thirty-seven.\* The proportion however, is now known to be much less, yet, while the native species in England, are between forty and fifty only, an equal amount of species might be collected in the counties of Cumberland and Camden, in this colony. But the most striking difference between British and Australian Ferns is in the arborescent habit of some of the latter. In England there is scarcely any species which, in its ordinary state, attains more than six feet in height, whilst in Australia one species of *Alsophila* rises to the height of sixty feet.

Colonel Mundy, in alluding to some of our tree ferns, says,—“One might almost fancy that the tall and dense forests around it had drawn up the well-known shrub, or rather weed, of our English deer-parks into a higher order of the vegetable family. When I left England, some of my friends were fern-mad, and nursing little microscopic varieties with vast anxiety and expense. Would that I could place them for a minute beneath the patulous umbrella of this magnificent species of *Cryptogamia*!” Colonel Mundy does not appear to have seen the largest species of tree ferns; but the difference between the common English brake and even the ordinary forms of *Alsophila* or *Dicksonia*, is very striking to a traveller, and cannot but suggest to his mind the comparative insignificance of English ferns. With respect to the species common to both countries, it is interesting to notice that *Gymnogramme leptophylla*, *Hymenophyllum Tunbridgense*, *H. Wilsoni*, and *Asplenium Trichomanes*, flourish in Australia as

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\* NOTE.—Dr. Mueller computes the flowering plants at about 10,000 species and the ferns at 170.

well as in Europe; whilst Sir W. Hooker has recently demonstrated the identity of our *Pteris esculenta*, and *Aspidium proliferum*, with *Pteris aquilina*, and *Aspidium aculeatum*. It seems probable that as our knowledge progresses, and opportunities present themselves for comparing cultivated ferns from different parts of the world, we shall arrive at the conclusion that other species are identical, although in their wild state, owing to the influence of soil and climate, they assume forms so different that, in the present state of science, they must necessarily be ranged as distinct species. And this, no doubt, has been the case in the vegetable kingdom generally, and seems in a great degree to have contributed to the loose and inaccurate manner in which some persons speak of species, just as if, in a long course of time, species and even genera have become mingled together, and that the fruit tree, which was created only "to yield fruit after his kind," may so deviate from the original type as to be no longer referable to the same place in the vegetable kingdom to which it was destined by the Creator. It would certainly remove many difficulties from the philosophic mind if we could believe that the true theory had been discovered, whereby "a multitude of geological facts otherwise unaccounted for" might be satisfactorily explained; and whereby it could be demonstrated that the varieties of the human family not merely sprang from one single pair, as Revelation assures us, but that "the long-continued influence of external circumstances gave rise to peculiarities increased in many successive generations, and at length fixed them by hereditary transmission." But alas! so far as the vegetable kingdom is concerned, the hypothesis that "any species is capable of varying indefinitely from its original type," is flatly contradicted by the experience of many generations, during which no material change has been made in the characters and forms of species. Dr. Hooker, in his Introductory Essay to the Flora of Australia, "contends that species are neither visionary, nor even arbitrary creations of the naturalist, but realities, though they may not remain true for ever." He then candidly adds that "the majority of them are so far constant within the range of our experience, and their forms and characters so faithfully handed down, through thousands of generations, that they admit of being treated as if they were permanent and immutable."

Such being the case, therefore, I am led to a conclusion rather different from that which is arrived at by the eminent writers to whom I have alluded; and I cannot express my own ideas on the subject in terms more sound and philosophical than those enunciated in Dr. Mueller's elegant preface to his "Vegetation of the Chatham Islands." After stating his conviction that "the number of species has been vastly overrated," he adds, "the writer has never been led to assume that limitation of species is hopeless, or that an uninterrupted chain of gradations absolutely connects the forms of the living creation. Analytical dissections, counting by hundreds of thousands, instituted as well on living plants in the field as on the material accumulated in his museum, have never left such impressions on his mind; but, on the contrary, convinced him of the great truth that the Supreme Power to which the universe owes its existence called purposely forth those wonderful and specifically ever-unalterable structures of symmetry and perfection—structures in which a transit to other species would destroy the beautiful harmony of their organization, and would annihilate their power to perform those functions specially allotted to each in this great world from the morn of creation to the end of this epoch. But, be it understood, nature only created species, occasionally, but not permanently obliterated in their characters by hybridism. Genera and orders are merely the strongholds around which we arbitrarily array them to facilitate generalization, to ease the search, and to aid the memory. Hence the limitation of these must depend entirely on the individual view of the observer, and therefore be ever vacillating; but this should not finally be the fate of the species." I have deemed it advisable to refer to the variations of species on the present occasion, because the plants which I am about to notice belong to a family that is somewhat protean in its character, and in which species appear to have been unnecessarily increased. It has been the fault of naturalists sometimes to regard every aberration from the usual type as indicative of specific difference, without duly considering, as Dr. Mueller observes, "the various climatic or geologic circumstances to which a species can possibly be subject." In treating of ferns, this caution seems very important, for the same species sometimes assumes different forms and shapes, not merely from the influence of soil and cli-



mate, but also from the degree of light or moisture to which they are subjected. Persons who are in the habit of observing ferns in a living state, are well aware of this peculiarity, and they might in some instances collect individuals of the same species so unlike each other, that the systematic botanist in Europe, who judges simply from the specimens before him, might regard them as distinct. Brown's *Pteris falcata*, now *Pellæa falcata*, is a plant of this varying character, and probably the cognate fern *Adiantum paradoxum*, (*Pellæa paradoxa* of Hooker) is a mere variety of it, for when we can find so many intermediate forms connecting the two together, it seems almost impossible to avoid the conclusion that they should be regarded as the same species. In the course of our investigation, we shall find several parallel cases, so that it may be well to bear in mind, that although "a species comprises all the individual plants which resemble each other sufficiently to make us conclude that they are all, or *may have been* all, descended from a common parent," yet, "individuals may often differ from each other in many striking particulars."

The order of *Filices* or Ferns (which Sir W. Hooker justly observes are more easily to be recognised than described) consists of flowerless plants, furnished with fronds or leaves which bear on some part of their surface, usually the lower or under one, the spores or seeds by which they are propagated. Although ferns have no flowers, they bear great abundance of seed-like bodies, which are contained in sporangia or spore cases. These cases are generally surrounded by an elastic band or ring, which, when they have reached maturity, bursts by an irregular fissure, and the seeds or spores, in the shape of fine dust, are scattered to the winds in countless numbers. The separate masses of the seed cases are termed *sori*, and that organ which in many genera covers the *sori* in the earlier stages of growth, is called an *indusium* or *involucre*. As many ferns are destitute of this organ, the presence or absence of an indusium affords one of the means of dividing them into groups or sub-orders; whilst the shape of that organ, combined with its position as to the veins of the frond, suggests a natural method of subdividing some of the groups into genera. This is a matter of difficulty, and Botanists will differ in their system of classification, according to the relative importance which they attach to particular organs: some for instance,

making their systematic arrangement depend principally on the indusium and the ring of the sporangium; whilst others believing that in some species the indusium is very variable, and that too much attention to the obliquity of the ring must separate the closest allies, rely upon the venation and the rhizoma (or prostrate rooting stem) as the most valuable points for distinction. With regard to the latter, it is affirmed by one of the most distinguished Cryptogamic Botanists of the day, that "venation though evidently of great importance, from its close connection with the fruit, is too subject to variation to afford incontestable general characters, however valuable it may be in particular instances;" and further, with respect to the different forms of Rhizoma, he "doubts very much whether any particular type of formation attends the rejection or retention of the stipes." When reading such opinions as these, one is almost inclined to join in the humble wish of Cicero, "*Utinam tam facile possem vera invenire, quam falsa convincere;*" but the fact is, that although no arrangement of sub-orders or genera can as yet be devised, which is not exposed to objection, yet as our knowledge advances, many points which are now deemed obscure will be cleared up, and a more extended range of observation will reveal the exact amount of importance which should be attached to each organ.

The splendid work of Sir William Hooker, when compared with those of previous cryptogamic writers, is a wonderful evidence of the progress of science, and displays not merely an immense knowledge of species existing in all parts of the globe, but also a profound attention to the characters by which any sound philosophical classification must be regulated. Following in the steps of the illustrious Robert Brown, to whom the work was originally dedicated (1846), and of whom he says:—"Had he given his master-mind to the complete development of this subject, little would have remained to his successor but to tread closely in his steps," the distinguished author has furnished a systematic arrangement which will not only assist in the classification of Australian ferns, but those of the whole world. Taking a wise and middle course "between the highly multiplied distinctions of Dr. Presl and Mr. John Smith, and the meagre enumerations of Willdenow, Sprengel, Link, Kunze, and others,"

he distributed the species, so far as they have been ascertained, under the following sub-orders, viz.,:—(1.) *Gleicheniaceæ*; (2.) *Polypodiaceæ*; (3.) *Davalliæ*; (4.) *Pteridæ*; (5.) *Lomariæ*; (6.) *Aspleniceæ*; (7.) *Scolopendriæ*; (8.) *Aspidiaceæ*; (9.) *Polypodieæ*; (10.) *Osmundaceæ*; and (11.) *Ophioglosseæ*. With the exception of one sub-order (*Scolopendriæ*), which does not appear to be represented by any species in this part of the world, our Australian genera of ferns may be conveniently arranged under the sub-orders enumerated, whilst many additions may be made to the species from the discoveries of recent explorers, the most remarkable of which have lately been noticed by the indefatigable Dr. F. Mueller, in his excellent "Fragmenta Phytographiæ Australiæ."

SUB-ORDER 1.—*Gleicheniaceæ*.

In this sub-order the fructification consists of sori, nearly globular in form either concealed by the revolute margins of the fronds, or lying on the under surface without any indusium. The two genera, *Platyzoma* and *Gleichenia*, are retained by Sir W. Hooker, as well as by Endlicher, but as the former suggests the propriety of uniting them, Dr. F. Mueller, in his work on the Vegetation of the Chatham Islands, reduces Brown's *P. microphyllum* to *G. Platyzoma*. According to this view, therefore, the sub-order will contain only one genus, of which there are four species in Australia, viz., *G. Platyzoma*, *G. microphylla*, (of which *G. rupestris*, and *G. spelunçæ*, are to be regarded as varieties), *G. flabellata* and *G. Hermannii*. (Veg. Chatham Is., p. 63.) *Platyzoma* is found in Queensland, and in tropical New Holland, and differs from the others in having simple unbranched fronds. The sori are very few, and concealed by the margins of the pinnæ, whilst the roots are creeping and throw up a number of crowded, erect, linear fronds. The so-called species *Gleichenia spelunçæ* and *G. rupestris* are common in the neighbourhood of Sydney and other parts of New South Wales, but as they seem to pass into each other, and finally to attain their complete development in *G. microphylla*, it seems reasonable to regard them as mere varieties of that species. If we were to form our opinion from dried specimens without any reference to the living plants, we might feel disposed to retain many species of this genus which are now united; but, on the other hand, if we take into consideration the

surrounding influences of soil, light, and moisture, we may be led to conclude that the same plant assumes a different appearance when growing amongst the hard rocks, in the sheltered cave, or on the alluvial bank of some creek. *G. microphylla* when attaining the height of two feet or more, and spreading its divided fronds in wild profusion in spots favoured by nature with a rich soil and abundant moisture, is one of our most elegant and graceful ferns. It loses much of its beauty when dry, but it may be kept verdant for a long time in a vase, if water be applied to it occasionally; or when tied in bundles and suspended from the ceiling, it may be usefully employed as a resting place for flies. The extreme variableness of this species has been noticed when under cultivation in Europe, and Berkeley remarks, "I have seen at Kew, the minute pinnules of a *Gleichenia* expanded to three times their normal length and breadth, and the margin at the same time unfolded, when placed in a hot damp atmosphere." (Int. to Crypt. Bot., p. 516.) *G. flabellata* is an ornamental species, differing from the preceding in having the segments of the fronds linear, and the sori near the middle or the forking of the veinlets: it is also a larger plant, the fronds being divided two or three times, and assuming a somewhat arborescent or palm-like appearance. *G. Hermannii* (Brown) or *G. dichotoma* is chiefly a tropical species, still more divided than the last, the ultimate branches bearing simply forked pinnae, and the segments never decurrent. The last two species are separated from *Gleichenia* by some authors, and placed in the genus *Mertensia* (so named in honor of the French botanist, F. C. Mertens), but Hooker retains Brown's arrangement, and refers these species to the sub-genera of *Gleichenia*. This genus was so called in commemoration of Baron P. F. Von Gleichen, a German botanist, and the species to which I have referred have long been under cultivation in England, not only at Kew, but in private nurseries.

In the very valuable list of Australian ferns, lately published by Dr. F. Mueller, in the 37th number of his *Fragmenta Phytographiæ Australiæ*, vol. 5, that learned writer extends our *Gleicheniæ* to six species, uniting *G. microphylla*, *G. spelunca*, *G. rupestris*, *G. semivestita*, and *G. hecistophylla*, under the name of *G. circinata*. In the neighbourhood of Lane Cove, I have found several forms of *G. microphylla*, and *G. flabellata*, which lead me

to think that some of the so called species cannot be retained. When growing near the water and in the shade, *G. microphylla*, looks green and fresh, but as the observer ascends the rocky banks, the same fern becomes more coriaceous and diminutive, whilst the under surface of the frond assumes a white or glaucous appearance. The same may be said of *G. flabellata*; but Dr. F. Mueller differs from the opinion that this species gradually passes into *G. Hermannii*, as the latter is somewhat rigid, the capsules are more numerous than in the preceding species, and the under surface of the frond is glaucous. Dr. Mueller reports that *G. dicarpa*, has lately been found at Rockingham Bay.

SUB-ORDER 2.—*Polypodiaceæ*.

This is a much larger division than the preceding, and is characterised by dorsal sori, placed generally near the margin, various in form, and sometimes constituting a uniform linear or spreading mass, either naked or furnished with an indusium. The capsules are one-celled, with a longitudinal or oblique elastic ring. The genera to be considered in this suborder are *Alsophila*, *Dicksonia*, *Hymenophyllum*, and *Trichomanes*, and they comprise species of very variable size, some being minute ferns of a moss-like appearance, whilst others are gigantic tree-ferns rising to the height of fifty or sixty feet. The genus *Alsophila* was probably so named by Brown, because many of the species abound principally in shady and sheltered woods (from *alsos*, a wood and *phileo*, to love), and it comprises some of our noblest tree-ferns. The sori are of a globular form, and strictly speaking, they have no indusium, whilst the veins are pinnated—more or less forked. The only species of *Alsophila* from this country, described by Sir W. Hooker, is *A. Australis*, but since the publication of the first volume of the "Species Filicum," other species have been discovered, so that in all probability we have five or six well-defined species. *A. Australis* is mentioned as "probably a rare species," but this is not altogether correct, for it has a very wide range in Australia, being found in moist and shady places nearly all along the eastern coast. This species is still found in the neighbourhood of Sydney, but it is diminutive when compared with tree-ferns of the same kind growing on the Blue Mountains, and in Gipps Land. It has bipinnate fronds, pinnules linear-lanceolate, acuminate, paler or glaucous beneath, and the rachis is of a light-

ish brown or tawny colour, somewhat rough to the touch. The other species found in this part of the colony, as well as in many localities near the eastern coast, differs principally from the preceding in having a more slender caudex, very dark-coloured rachis, and segments of fronds serrulate in the upper part. It has been doubted whether this is specifically distinct from *A. Australis*, but persons who have closely examined both plants in a living state, regard them as distinct in habit and appearance, although it is said that, in some of the younger plants, it is exceedingly difficult to determine whether they differ from *A. Australis* or not. This species used to be marked *A. affinis*, but when Sir William Macarthur took home some living plants for the garden at Kew, Sir W. Hooker named the species *A. Macarthuri*, in honour of that distinguished colonist who has laboured for so many years to develop the natural resources of the colony, and to make them known not only in England, but on the continent of Europe. In addition to these, a third *Alsophila* has received the name of *A. Cooperi*, from Sir Daniel Cooper, formerly Speaker of our Legislative Assembly; and my learned friend Dr. F. Mueller, has recently described two new species from Rockingham Bay (*A. Rebecca* and *A. Robertsiana*), which, though much smaller than those previously noticed, are characterised as tree-ferns of remarkable beauty, and well worthy of cultivation. The largest of the genus in this part of the world is *A. excelsa*, of Norfolk Island, which sometimes attains the height of eighty feet. Whether this is really distinct from some of our species, remains yet to be proved. Dr. F. Mueller seems to think that it is not, as it differs from *A. Australis* only in the chaffy scales of the rachis; whilst in the indentations on the caudex, occasioned by the annual falling off of the fronds, it is said to resemble *A. Cooperi*.

The next genus of the sub-order is *Dicksonia*, which derives its name from the late Mr. James Dickson, a celebrated British cryptogamic botanist. The sori of this genus are situated at the margin of the frond, and always at the apex of a vein. It differs also from *Alsophila* in having an indusium, or rather a two-fold one, formed in part of a more or less changed lobule of the frond, and in part of a more or less united indusium, generally re-curved, two-valved, or entire. The most remarkable species in Australia

is *D. antarctica*, a noble tree fern, first noticed on the summit of Mount Tomah, by Allan Cunningham, and found to measure between thirty and forty feet. Since the days of Cunningham it has been found in other parts of Australia, and Mr. Backhouse, in his "Narrative of a Visit to the Australian Colonies," gives a good representation of one in the plate of a "Fern Valley" in Tasmania. An allied species, *D. fibrosa*, is also indigenous in New Zealand, where the fibrous coat of the trunk is sliced by the natives and used in constructing houses. In proportion to the size of the caudex, the pinnules of the frond seem very small. *Dicksonia dubia* (Brown's *Davallia dubia*) is one of our commonest ferns, and abounds on the banks of our creeks. It seems somewhat uncertain as to which genus it belongs, but Hooker thinks, "from analogy, and especially its close affinity with *D. straminea*, it must be regarded as a *Dicksonia*." When the plant is fully developed, and the reflection of the lobule is not very evident, there may be a reasonable doubt as to the propriety of removing it from *Davallia*; but a close examination of a young frond in which a two-valved indusium may sometimes be traced, seems to settle the question. *D. davallioides* resembles the last in some respects, but the texture of the frond is more membranaceous, and, as far as I have observed, never attains so large a size. I found an abundance of this species near Tomah, and the late Mr. Macgillivray sent me some beautiful specimens of it from Clarence River. The remaining *Dicksonia* is one found by C. Moore, Esq., Director of our Botanical Garden, and named by him *D. Youngii*, as a compliment to His Excellency the Governor.

The genus *Hymenophyllum* (from *hymen*, a membrane, and *phyl-  
lon*, a leaf, in allusion to the tenuity of the foliage), consists of minute species, sometimes found on moist rocks, and sometimes on the caudices of tree ferns. The sori are marginal, and the involucre of one leaf, more or less deeply two-valved; but, in some cases there is a great difficulty in distinguishing between this genus and the next to be considered, for "the receptacle is not always included in *Hymenophyllum*, nor always exerted in *Trichomanes*. Again, in the latter genus, there is an approach to a two-lipped involucre, and in the former, it can sometimes be scarcely called two-valved." Dr. F. Mueller is of opinion that Australia possesses only two real species of *Hymenophyllum*, which I suppose are.

Hooker's *H. marginatum*, a very minute species, growing amongst mosses, and *H. flabellatum*, with which *H. nitens* is now united, "as the winged rachis and stipes afford no positive mark for specific determination." To these must be added the cosmopolitan *H. Tunbridgense*, and its variety *H. Wilsoni*, for although in Europe they seem distinct species, "yet (Sir William Hooker remarks) it often becomes difficult accurately to distinguish exotic ones." These pretty little ferns are very plentiful on the moist rocks of our creeks; but the other species (*H. flabellatum*) is generally found on the stems of our tree ferns, on which it forms an exceedingly pretty object.

The genus *Trichomanes* (from *thrix*, *trichos*, "hair," and *mania*, "excess") differs from the preceding genus in generally having a long hair-like receptacle much exceeding the involucre, but this is by no means a certain mark in all species: the involucres are of one leaf, mostly entire, and of a cylindrical or urceolate shape. The most common species in Australia is *T. venosum*, which grows on the stems of tree ferns, and seldom exceeds a few inches in length. Somewhat larger than this is *T. angustatum*, which was found at the Richmond River, by Mr. C. Moore, and by Mrs. K. Parker, at the Kurradjong. It is said to be similar to that found in the Feejee Islands.

Dr. F. Mueller makes only four species of *Alsophila*, and that one which we have hitherto known as *A. Macarthuri*, he refers to *A. Leichardtiana*, as Dr. Leichardt is said to have been the first person who remarked that it was specifically distinct from *A. Australis*. Dr. Mueller gives only one species of *Dicksonia*, (*D. antarctica*), referring *D. dubia* to *Davallia*, and probably regarding *D. Youngii* as a coarser form of the first species; but he states that *Cyathea medullaris*, a tree fern of some fifty feet in height, has been found in the neighbourhood of Cape Otway, and also *C. Lindsayana*, at Rockingham Bay. Whether the former splendid fern is identical with that occurring in New Zealand and Norfolk Island, remains to be proved. The genus *Cyathea* is nearly allied to *Alsophila*, but it differs in having an involucre, "which is globose, inferior, membranaceous or somewhat horny, at first entire and covering the whole sorus, afterwards bursting from the top with a nearly circular opening, becoming cup-shaped, more or less entire or lobed." To this alliance the Doctor also



adds *Deparia Macraei*, (sometimes united with *Dicksonia*), which it seems has been found at Illawarra. In this genus, the sori are marginal at the apices of the segments, on short teeth, pointing forwards, always from the apex of a vein. Sir William Hooker gives an elegant figure of the allied species *D. Mathewsii*, and probably it may have been seen under cultivation in Sydney by some of my readers. According to the latest opinion expressed by Dr. Mueller, *Hymenophyllum flabellatum*, *H. nitens* and *H. crispatum*, should be regarded as varieties of *H. demissum*, and *H. Wilsoni*, must be united with *H. Tunbridgensis*. *Trichomanes rigidum* (under which *T. setiloba* with the divisions of the pinnules separated into setaceous segments is included) has been recently found at Rockingham Bay, and Mr. Oldfield has reported the occurrence of *T. reniforme* in some part of Queensland. *T. venosum*, which is usually found on the caudices of tree ferns, was collected by the writer in the crevice of a rock at Manly Beach, but not in a state of fructification.

#### SUB-ORDER 3.—*Davallieæ*.

The genus *Davallia* (from M. Davall, a Swiss Botanist), has dorsal sori, near, or at the margin of the frond, terminal upon a vein. The involucre is somewhat oval, and attached to the under side of the sori. This genus is represented in Australia by four species—*D. elegans*, *D. pyxidata*, *D. polypodioides* or *D. flaccida*, and *D. pedata*, lately found at Rockingham Bay. Our *D. pyxidata* comes near to *D. Canariensis* or the Hare's foot fern, and is figured by Hooker as an interesting species, but he remarks that it sometimes differs so much even in the same frond that one portion of it approaches some of the narrow states of *D. solida*, whilst another resembles *D. Canariensis*. My notice of this sub-order ends with the genus *Lindsæa* (so named by Dryander in honour of Lindsay), which has linear sori, parallel to the margin, and generally near to it, the involucre arising from the apex of a vein. Brown's species are four, *L. linearis*, *L. lanceolata*, *L. media*, and *L. microphylla*. The first and last of these are small ferns very common in Eastern Australia—the former growing generally in a scattered manner under the shade of a tree or shrub, and the latter from the crevices of rocks in moist places. *L. lanceolata* is united with *L. ensifolia* by Sir W. Hooker, but *L. pentaphylla* (collected in New Holland by Mr. Bynoe), is re-

tained as a distinct species, though further inquiry may lead to the conclusion that it is a mere variety of the preceding. *L. lanuginosa* (see *Fragmenta*, vol. 4, p. 166), a species previously found on trees in Singapore and Penang, as well as in New Guinea, has lately been discovered at Rockingham Bay; and *L. flabellulata*, a fern common to China, Sumatra, Java, &c., occurs at Port Essington. According to Hooker, many authors unite this suborder with *Dicksoniæ*, with which, indeed, it seems closely allied, but until botanists can settle the many differences of opinion which they entertain as to the limit of the group and the genera which compose it, the present arrangement seems the most convenient.

Dr. F. Mueller considers that *Dicksonia davallioides* is a mere variety of *Davallia flaccida*. This opinion is formed from a comparison of specimens from Norfolk Island, the Blue Mountains, and the Macleay, Hastings, and Clarence Rivers. It does not appear that *Cystopteris fragilis*, though frequent in New Zealand, and in the alpine regions of Tasmania, has yet been found in Australia. In addition to the species of *Lindsæa* already enumerated, Dr. Mueller states that he has received specimens of *L. Fraseri* from Stadbrooke Island, Cleveland, and Moreton Bay; and of *L. trichomanoides* from Illawarra, and Rockingham Bay; but he adds that until further investigations have taken place, it is impossible to determine whether some of the species can be maintained. *L. cultrata* and *L. concinna* have lately been found at Rockingham Bay.

#### SUB-ORDER 4.—*Pteridæ*

In this suborder are included several genera common in Australia, characterised by orbicular sori, oblong or linear often continuous, marginal, situated at the apices of the veins with an involucre formed of the replicate margin. This, of course, is a mere general character of a most extensive group, varying very much in appearance and habit, but as the genera of which it is composed pass almost imperceptibly into each other, they cannot be satisfactorily placed in separate sections. The genera with which we are more immediately concerned in Australia are *Adiantum*, *Hypolepis*, *Cheilanthes*, *Pellæa*, *Pteris*, and *Ceratopteris*. In the first of these, *A. hispidulum*, *A. formosum* and *A. assimile*, are very abundant in Eastern Australia. At first sight, the last

of these graceful ferns resembles the well-known "Maiden Hair Fern" of other countries, and from that circumstance probably derives its specific name; but Hooker inclines to the opinion that it is identical with *A. Æthiopicum*, the species next to the Maiden Hair. When my brother (The Rev. C. Woolls, M.A. of Pembroke College, Oxford), was travelling sometime since in Italy, he collected for me amongst the ruins of Capua, some specimens of the true "Maiden Hair," closely resembling Brown's *A. assimile*, but the pinnules are more cuneate. *A. hispidulum* is very widely distributed in this part of the world, and somewhat variable in shape, but it may generally be recognised by its fan-like divided fronds. *A. formosum*, of which it seems Sir William Hooker had very few specimens, is still more variable in its appearance. The genus *Adiantum* is so called from the dry character of many species (*adiantos*, dry); and Pliny says, "in vain you plunge *Adiantum* in water: it always remains dry."

A good collection of Australian species with their numerous varieties might be made within a few miles of Sydney. The genus *Hypolepis* has not any involucre distinct from the frond of the fern, but that organ consists of the more or less changed and reflected margin; hence the name arises from the scale-like appearance which that portion of the frond assumes (*hypo*, under, and *lepis*, a scale). In the northern part of the colony, there is a fern very similar to *Polypodium rugosulum*, which I am inclined to think must be the *H. Dicksonioides* of some authors. In some specimens that I have seen, the margin of the frond is scarcely reflected at all, whilst in others it is so clearly seen covering the sori, that the fern cannot with any degree of propriety be referred to *Polypodium*. Hooker inclines to the opinion that this fern is not *H. tenuifolia*, although in an old state some of the fronds resemble it, as "the teeth or lobules of the pinnules may be seen to form an arch over the sori without altering the texture." *H. Dicksonioides* is undoubtedly a Norfolk Island species, and Kunze mentions it as a native of New Holland. This is probably the case, but *H. amaurorachis* seems to be a mere variety with a darker rachis, but little known.

*Cheilanthes* is a genus nearly allied to the last, but differing principally in having the involucre confluent and continuous near the margin (*cheilos*, the margin, and *anthos*, a flower). *C.*

*tenuifolia* is a very common species in Australia, varying considerably in size and appearance according to the degree of moisture to which it is subjected, being sometimes only two or three inches high, and sometimes more than a foot. *C. Sieberi* seems to be a mere variety of a more rigid habit, whilst *C. caudata*, which is not well-known, has an affinity to it, but has very elongated terminated pinnules, both at the main apex of the frond and on the branches. Whether *C. Pressiana* from Swan River is a distinct species, or whether all our known species of *Cheilanthes* are to be regarded as mere varieties of one common type, remains to be shown.

Brown's *Pteris falcata* and *Adiantum paradoxum* are now referred to the genus *Pellæa*, so called from *pellos*, "of a dark colour," because the genus comprises plants with brown or black stipes. *P. paradoxa* has been rather a perplexing one to collectors on account of the great variation to which it is subject, and it seems highly probable that hereafter it will be regarded as a mere variety of *P. falcata*, with which also *P. rotundifolia* of New Zealand will be associated. Sir W. Hooker, judging from dried specimens placed in his hands, could see no difference between *P. paradoxa* and *P. falcata*, "except the usually taller, but narrower and more numerous pinnated fronds, with narrower pinnæ, and stipes and rachis squamuloso-hirsute." The identity of the so-called species, however, is more evident from seeing the variations in a living state, and noticing how gradually they pass into each other. If, indeed, we were to take the extreme varieties of these ferns, we might imagine them to be distinct species, as many botanists have done who had no opportunity of examining living specimens; but when we can find so many connecting links between them, we must be led to a different conclusion—unless, indeed, we regard every deviation from the original type as an indication of a new species, and then we may make as many species as there are varying forms.

The next genus to be considered is *Pteris*, which differs from the preceding in having "sori arising from a longitudinal continuous receptacle in the axis of the involucre," whereas in *Pellæa* the sori are in reality separate in the first instance, although eventually they become confluent. There are some species of a doubtful character, vacillating as it were between the two genera,

but in these cases there is a difference of habit which seems to determine their proper place in the suborder. With regard to *P. nudiuscula* (Brown's *Pteris nudiuscula*), so little is known, that Hooker hesitated whether to refer it to *Pellaea* or *Nothochlæna*. It seems probable that it belongs to the latter genus, for in many respects it resembles the forms of *Nothochlæna*, to which we shall have occasion to refer by and by. As *Pteris* is a large genus, and, generally speaking, easy to be recognised, it may be useful to state that any ferns which have the fructification marginal, linear and continuous, with a narrow involucre somewhat membranaceous, may be referred to the same group. The veins are generally very distinct, but varying in shape, being sometimes reticulated, so that the species may be conveniently arranged in separate sections according to the venation. The species best known in Australia are *P. umbrosa*, *P. tremula*, *P. aquilina*, (formerly *P. esculenta*), and *P. incisa* (formerly *P. vespertilionis*, or the bat's wing). *P. aquilina* is one of our commonest ferns, and according to Hooker, is a mere variety of the European species, or rather of that widely distributed fern, which in one or other of its forms is found in both hemispheres, in almost all the tropical and temperate parts of the world. Our fern is of a rigid or coriaceous texture, and it was originally called "esculent," because it was regarded as identical with the edible fern of the South Sea Islanders. Dr. Clarke, F.L.S. has lately brought to light the esculent properties of the European variety, and thereby has afforded another proof of its intimate alliance with that of the south. *P. umbrosa*, *P. tremula*, and *P. incisa*, are very graceful and ornamental ferns. *P. pedata* is a small plant common to Tropical Australia and many parts of the West Indies, as well as South America.

*Ceratopteris thalictroides* is an interesting aquatic fern, floating or attached to soil in shallow waters. It was found by Cunningham in Goulburn Islands, and also by Dr. F. Mueller, in North-West Australia, &c. Hooker remarks that it is entirely *sui generis*, as it differs from all others in so many respects that botanists cannot agree to the exact place it should occupy.

Having reviewed the Australian *Pterideæ*, as known to Sir W. Hooker, I shall now turn to the same order as recently investigated by Dr. F. Mueller, that some idea may be formed of the

progress which has been made in our cryptogamic botany within the last two or three years. *Adiantum lunulatum* has lately been collected at Rockingham Bay. With *A. Æthiopicum*, *A. assimile* and *A. trigonum* are unhesitatingly joined; whilst *A. trapeziforme* and *A. setulosum* are connected with *A. affine*, and *A. Cunninghami* with *A. formosum*. Our varying forms of *Hypolepis* are referred to *Polypodium rugosulum*, but some of the specimens collected by Mr. Macgillivray, at the Clarence and Richmond Rivers, are looked upon as exindusiate forms of *Nephrodium*. The doctor unites *Cheilanthes* with *Nothochlæna*, under the species *C. tenuifolia*, *C. distans*, *C. vellea*, *C. hirsuta*, and *C. fragillima*. He also refers the variable *Pellæa fulcata*, to the old genus *Pteris*, and furnishes us with the following species, as occurring in different parts of this continent: *P. geranifolia*, *P. Feliciennæ*, *P. incisa*, *P. comans*, *P. tripartita*, *P. quadriaurita*, *P. crenata*, *P. longifolia*, *P. umbrosa*, *P. arguta*, and *P. aquilina*. The graceful species *P. comans*, until very lately, had been collected only at Apollo Bay, but Miss Atkinson has found it plentifully in some of the gullies in the southern part of the county of Camden. Our plant belongs to the variety generally named *P. Endlicheriana*, as described in Endlicher's work on the Botany of Norfolk Island. Rockingham Bay and Port Denison have supplied several species of *Pteris* similar to those indigenous in India and the Islands of the Pacific, and there is reason to believe that as North Eastern Australia is more carefully examined, other species will be discovered. Whilst objects of a pastoral and commercial character are gradually revealing the capabilities of this vast continent, it is pleasing to find that the claims of science are not overlooked, and that each expedition, as it opens the vegetable resources of the country, adds some contribution to our cryptogamic botany.

#### SUB-ORDER 5.—*Lomariææ*.

UNDER this sub-order, we have to consider the genera of *Lomaria*, *Blechnum*, and *Doodia*, two of which are characterised by linear and continuous sori, whilst the last differs from them not only in the position of the sori, but also in the venation. It may be convenient to class these ferns together, but, as Sir William Hooker remarks, the limits of the group are not easily defined, and several species of *Lomaria*, "gradually depart from

the pteroid character, and completely merge into *Blechnum*." *Lomaria*, which is the same as Brown's *Stegania*, is so called from *loma*, an edge, on account of the apparently marginal position of the indusia. The fertile and sterile fronds differ very much from each other in appearance, as the fertile ones are greatly contracted, and the sori seem to occupy the whole of the under surface. The involucre is formed by the revolution of the margin of the frond, and the veins are simple or forked. *L. Patersoni*, *L. discolor* (Brown's *Stegania falcata*), *L. lanceolata*, *L. fluviatilis*, and *L. procera*, are the species with which we are more immediately concerned, although perhaps *L. discolor* and *L. lanceolata*, are merely varieties of one species. *L. Patersoni*, has simple or sometimes pinnatifid fronds, and Hooker mentions it as "one of the rarest of the genus;" but this opinion was probably formed from the limited number of specimens forwarded to him from these colonies, as the species may be found within a few miles of Sydney, in several of the gullies in the county of Camden, on the Blue Mountains, the Mittagong Range, &c. Berkeley (Int. to Crypt. Bot., p. 516), mentions "that *L. Patersoni*, which is cultivated at Kew, produced for years simple fronds, but at length became divided." Miss Atkinson collected some fronds at the Kurrajong with well-defined pinnatifid segments, and I found some similar ones not far from Bent's Basin; whilst at the Fox Ground near Lane Cove, I collected specimens in three different states, simple, pinnatifid, and pinnatipartite, all growing from the same rhizome! The difficulty of determining species from a mere inspection of dried specimens, is shown by the remark of Sir William Hooker, "The fact of *L. Patersoni*, bearing partially pinnatifid fronds in cultivation, might throw some doubt on the validity of the species, at least upon the correctness of considering the simple frond as the normal state of the plant." The truth is, that not merely in a state of cultivation, but also in its natural condition, this fern appears in three different forms, although the simple form occurs the most frequently.

*L. lanceolata*, which seems to pass insensibly into some forms of *L. attenuata* and *L. discolor*, occurs in many creeks not far from Sydney, but it varies very much in size and appearance, ranging from a few inches to more than two feet in height.\* Some of the

\* Mr. Parcel has lately collected at the Fox Ground, near Lane Cove, a

larger variety may be found near Manly Beach, and the smaller on the creeks to the north of Parramatta. The largest species of this genus is *L. procera*, which has a very wide geographical range, being found in many parts of the southern hemisphere.

The next genus *Blechnum* (so called from *blechnon* one of the Greek names of the fern) may easily be confounded with the preceding; but generally speaking, the indusium in *Lomaria* is formed from the altered margin of the frond, whilst that of *Blechnum* is distinct. This may be useful to guide us in determining our Australian species, but the rule does not seem to hold in every case, so that some botanists propose to unite the genera. Three species, *B. cartilagineum*, *B. striatum*, and *B. lævigatum* are very common in New South Wales, but, like some of the species of *Lomaria*, they are subject to considerable variation. "*B. lævigatum*," Hooker remarks, "is a very distinct species, and appears to be confined to one locality, being remarkable for the two forms of frond, the one with broad, sterile pinnæ, the other, narrow, fertile ones." It is common on the banks of some creeks near Sydney, and generally prefers a moist situation under a rock. Some of the fronds, springing up in favourable localities, are so large that they resemble *Lomaria procera*, but they may easily be distinguished by the fructification.

Dr. F. Mueller reports that *B. orientale*, which is identical with the East Indian species, has recently been found in North-Eastern Australia. All the species of *Lomaria* and *Blechnum* may be dried and pressed without difficulty, but the spores of the fertile fronds are so numerous that they frequently disfigure the papers on which they are placed.

The genus *Doodia*, which derives its name from Samuel Doody, a London apothecary, who was almost the first investigator of British Cryptogamic Botany, comprises a few species of small, rough, and erect ferns, with oblong sori, arranged transversely, with the veins forming areolæ, or little spaces. The Australian species enumerated by Hooker, are *D. aspera*, *D. blechnoides*, *D. media*, and *D. caudata*, but if we follow up the principles laid down

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curious variety of *L. discolor*. Whilst presenting the usual characteristics of the species, the segments of the frond are pinnatipartite half way down from the apex of each segment, giving the fern a remarkable and elegant appearance. As some young plants were secured, Mr. Parcel will be able to determine whether the variety is likely to be permanent.



by that eminent writer, not more than two of the species can be retained. Indeed Sir William seems to suggest that *D. blechnoides* may prove a mere variety of *D. aspera*, and that *D. media* and *D. caudata* are probably the same species. The late William Sharp Macleay, Esq., F.L.S., used to take a pleasure in speaking of a *Doodia* found at the Kurrajong by Miss Atkinson, as *D. Atkinsonia*; but Dr. F. Mueller, to whom I have submitted specimens of this remarkable variety, refers it to *D. caudata*. Some sterile forms of this resemble *Lomaria Patersoni*, but of course the venation is very different. *Doodia* is very common in E. Australia.

As some of my readers may feel an interest in the opinions recently expressed by Dr. F. Mueller in reference to the order *Lomariæ*, I shall subjoin a brief account of the species, as arranged by that learned writer. *L. procera* is referred to *L. capensis*, and it is said to extend from St. Vincent's Gulf to Rockingham Bay, and to occur even on the tops of mountains. *L. discolor* or *L. falcata*, which is the commonest form on our Parramatta creeks, is also very widely diffused; and at the source of Bunip Bunip Creek, the Doctor found a bipinnatifid variety of the same species, whilst Mr. Boyle collected on the Dandenong mountains some fronds with pinnatifid and pinnatipartite pinnæ. *L. Vulcanica* has not yet been found on the Australian continent, although occurring in many parts of Tasmania; but *L. lanceolata* has been collected in several places in Victoria. *L. alpina* grows near water on the Australian Alps, and *L. fluviatilis* in South Australia, Delatite, and Upper Mitta Mitta. Brown's specimens were procured in Tasmania, but whether this species is really distinct from the New Zealand *L. membranacea*, remains to be seen. Dr. Mueller alludes to the three forms of *L. Patersoni*, and states that it has a wide geographical range, being found on various parts of the coast from Victoria to Rockingham Bay, and also in New Zealand, the islands in the Oriental Archipelago, and Continental India. *L. eximia* is a new species, allied to *L. capensis*, and occurring near Rockingham Bay. *L. articulata* is also new, and is accurately described in the fifth volume of Dr. Mueller's *Fragmenta*, p.187. This fern was found at the source of the Mackay River, and it is distinguished from other species by the pinnæ being articulated to the rachis, and from *L. capensis*

in particular by the absence of scales from the rachis and the pinnæ, by the bases of the pinnæ not being truncate and somewhat rounded, by the teeth of the pinnæ being more obtuse, and the veins less approximate.

The genus *Blechnum*, which the Doctor places before *Lomaria*, is at present limited to four species in Australia. *B. orientale* was found on the Adelaide River, by Stuart and Waterhouse, and near Rockingham Bay by Dallachy. *B. striatum* has a wider range, and is regarded as the *B. stramineum* and *B. squamulosum* of some authors. *B. cartilagineum* occurs in many parts of Australia, but as yet no observer has noticed it in Tasmania. *B. lævigatum*, (*B. ambiguum* of Sieber,) is one of the commonest ferns on the banks of creeks, and as I have before remarked, the sterile fronds closely resemble those of *Lomaria capensis* or *pro-cera*. According to Dr. Mueller, the stipes seems always more sharply angled, the scales at its base of a lighter colour and more transparent, the pinnæ often more clear and punctate, and the veining less copious.

*Doodia* is placed after *Polypodium*, and the species reduced to two. *D. caudata* is a very variable fern, and has been noticed from Cape Otway to Rockingham Bay. Dr. Mueller particularly alludes to a three-lobed variety, and also to some abnormal forms of the same species transmitted to him by Miss Atkinson and the writer of this paper, some resembling an *Asplenium*, and others, a *Lomaria*. *D. aspera* includes *D. media* and *D. blechnoides*, but whether *D. maxima* of Fraser and Cunningham can be reduced to the same species, demands further inquiry.

#### SUB-ORDER 6.—*Aspleniæ*.

This is a sub-order comprising very numerous species, which some botanists have distributed amongst many genera, but according to the views of Sir W. Hooker, the majority of such genera are incorporated in one great genus, viz., that of *Asplenium*, a word derived from *a*, privative, and *spleen*, as this genus was formerly held to be a sovereign remedy for all diseases of the spleen, and even to destroy it, if employed in excess. The sori have linear or oblong indusia, more or less oblique, and sometimes opposite to each other. One of our most admired ferns, the bird's nest fern, belongs to this genus. In Brown's *Pro-dromus*, it is *Asplenium nidus* (the same as Smith's *Neottopteris*

*Australasica*), but according to the recent arrangement, the species now is *A. Australasicum*, although Hooker was inclined to include this fern, and also *A. musæfolium*, with *A. nidus*. The fronds of this species are two or three feet long, and six or seven inches wide, and from the peculiar manner in which they form a centre similar to a nest, this plant has acquired the specific name, *Nidus*. It occurs in many parts of New South Wales, and I may mention, as a caution to fern-gatherers, that sometimes a species of black snake coils itself up in the centre. There are many beautiful species of *Asplenium* in Australia, but perhaps none is so much admired as *A. dimorphum* (Endlicher's *A. diversifolium*) which, I believe, has not been found in any place excepting Norfolk Island. The sterile and fertile pinnae are generally on the same frond, and being very different in form, they give a strange and elegant appearance to the plant. The species best known in this part of Australia are *A. attenuatum*, *A. flabellifolium*, *A. falcatum*, *A. flaccidum* (Brown's *A. odontites*), and *A. Australe* (Brown's *Allantodia*). The first of these is fond of shady woods, and has linear acuminate fronds, which are proliferous at the apex (that is, which root at the extremity of the fronds, and throw up new ones). *A. flabellifolium* is a common and much admired species, abundant in most parts of Australia, being well distinguished by its fan-like pinnae, and procumbent fronds, which sometimes root at the apex, in a manner similar to the last mentioned species. When growing in moist shady places, the fronds are more than six inches in length and have a bright green and delicate appearance, being sometimes bipinnate. *A. falcatum* is a larger and more coriaceous fern than the fan-like species, and is probably the fully developed form of *A. furcatum* or *A. præmorsum*. This opinion could scarcely be formed from the examination of dried specimens, but a careful investigation of living plants, springing up under various surrounding circumstances, will probably lead to the conclusion. Varying fronds of this species may be found in gullies on the Blue Mountains, and also an abundance of *A. flaccidum* (Brown's *A. odontites*), which, like the preceding, seems subject to much variation. Dr. Hooker says "it would take many pages to enumerate half its protean forms," and he connects with it several of the generally received species. This amalgamation is the result of comparing several

New Zealand varieties with those of this country, for in Australia the forms in question are less liable to run into each other. *A. Australe* (which used to be called *Allantodia* from the sausage-like shape of the sori) is a very delicate and membranaceous fern, common in some of the eastern parts of Australia, as well as in Tasmania, New Zealand, Norfolk Island, and India. I have seen it at the Fox Ground growing near *Alsophila Australis*, and *A. Macarthuri*, and it occurs on the Blue Mountains. Brown made two species of this fern, but Hooker unites both forms, and Dr. Hooker remarks, "I am disposed to consider all the East Indian *Allantoid* group known to me, except *A. fimbriatum*, identical with *A. Australe*." The little *A. Trichomanes*, or common spleenwort, which occurs not only in Great Britain and throughout Europe, but also in each of the other divisions of the globe, has been found in several parts of Australia. Cunningham reported many years ago that he had collected it at Bathurst and Parramatta, but I think, as it has never been seen anywhere near the latter by subsequent observers, that there is some little inaccuracy in the habitat given by Hooker. As Cunningham forwarded from Parramatta many specimens which he had collected in different parts of the colony, it seems probable that the little fern in question was placed by mistake amongst some specimens collected in the immediate neighbourhood of that place. Mrs. Selkirk and Miss Atkinson have recently collected this fern in the neighbourhood of Berrima. *A. paleaceum*, which derives its specific name from the copious scales on the caudex, is described by Brown as a tropical fern, and M. Thozet has found it near Rockhampton. It bears some resemblance to *A. flabellifolium*, in the form of the pinnae, and in the proliferous apices of the fronds, but it differs in being much harsher in texture, and in having scales with long fringed margins. Sir W. Hooker remarks that few, if any, ferns are less known than this, and that he was indebted to Mr. Macgillivray for specimens of it, collected on Frankland Isles, on the N. E. coast of Australia. *A. caudatum* was found in N. W. Australia by Dr. F. Mueller, and according to the opinion of some botanists, it is to be regarded as a variety of *A. falcatum*. One of the most interesting of the genus is *A. bulbiferum* (so called on account of the primary pinnae being frequently proliferous), which in numerous varieties is found in

New Zealand, Tasmania, Victoria (Dr. F. Mueller), Northern India, Mexico, and very recently in the vicinity of Mittagong. Dr. Brown considered the form *A. laxum* as a separate species, as he had never seen it proliferous; but Hooker unites not only that variety but also several others, with *A. bulbiferum*, as he does not regard the proliferous pinnæ as indicating specific difference. Dr. Hooker thought that this species was very closely allied to *A. flaccidum* (*A. odontites*, R. Brown), and that it sometimes passes into *A. Hookerianum*, but Sir William expresses a different opinion. *A. obtusatum* and *A. difforme*, which Brown regarded as distinct, are now placed together, as they "exhibit almost a gradual transition from the one to the other." Some specimens which Mr. Macgillivray forwarded to me from Clarence River confirm this view, for the pinnæ vary considerably in shape and appearance. In addition to the species of *Asplenium* enumerated, I may mention *A. simplicifrons* (Fragmenta, vol. 5, p. 74) from Rockingham Bay, which has recently been described by Dr. Mueller, and also *A. polypodioides*, *A. cuneatum*, and *A. sylvaticum*, which have been determined by the same indefatigable author to be identical with the Indian species. Perhaps on the whole, this genus is the most interesting in Australia, not merely on account of the numerous species, but for the great dissimilarity of the fronds. It will appear, however, that the species are very limited in the neighbourhood of Sydney, only two being found there, and those so different in their form and character, that the casual observer would never suppose them to be allied. With regard to the species themselves, there is some obscurity, for the most distinguished botanists are by no means agreed as to what are true species and what are mere varieties. As an instance of this, it may be seen that Hooker regards *A. bulbiferum* as perfectly distinct from *A. flaccidum*, whilst Dr. F. Mueller assures us, that "in the fern-tree ravines of Victoria, he had frequent occasion to trace *A. bulbiferum* and *A. flaccidum* into each other," both being varieties of *A. marinum*. And probably this latter opinion is correct, and it affords another illustration of the advantage of studying plants as they grow in various localities, and are influenced by surrounding circumstances. But, after all, we must bear in mind the philosophic caution of Berkeley, "that in these matters we are not to look

for mathematical precision or for characters which can, without failure, include every form in groups." Sub-order (7) *Scolopendriæ* is not represented in this part of the world, and the described species do not exceed eight.

The species of this order, according to Dr. F. Mueller, are arranged in the following manner: *Asplenium nidus*; *A. simplicifrons*; *A. attenuatum*; *A. paleaceum*; *A. falcatum*; *A. furcatum*; *A. cuneatum* including *A. laserpitiifolium*; *A. flabellifolium*, with a remarkable variety *A. dissectum*, collected by the Rev. R. L. King, of Parramatta: *A. trichomanes*; *A. marinum*, with the varieties, *obtusatum*, *bulbiferum*, and *flaccidum*; *A. umbrosum*; *A. polypodioides*; and *A. sylvaticum*. The second of these is a new species, described in the *Fragmenta*, vol. 5, p. 74. This was discovered near Rockingham Bay, associated with several species of *Acrostichum*, and has long, narrow, lanceolate fronds. Some beautiful specimens of *A. sylvaticum* (*Diplazium*) were collected at the Richmond River by the late Mr. Macgillivray. This is a very elegant fern, with a short erect caudex, a stipes about a foot long, and fronds sometimes two feet and upwards in length. It is remarkable on account of its double involucre, and for the fact that the same species occurs in the Mauritius, Ceylon, Malacca, Java &c. *A. marinum* was lately found by J. R. Young, Esq., of the Glebe, in its form of *obtusatum*, not many miles from Sydney, growing close to the salt water. It would be interesting to those who wish to arrange ferns systematically, to ascertain if the various forms of this species could be developed by cultivation, for notwithstanding the views of Sir William Hooker and Dr. F. Mueller, whose opinions are indeed entitled to the greatest consideration, I am not aware that the varieties in question have ever been raised from the same spores by any artificial means. Until the amount of variation under cultivation can be distinctly shown, it seems impossible to determine whether *A. flaccidum* is indeed one of the forms of the well known *A. marinum*.

#### SUB-ORDER 8.—*Aspidiaceæ*.

This sub-order is distinguished by dorsal sori of a roundish shape, with an involucre either peltate and fixed by the centre, or reniform and fixed by the sinus (that is the recess formed by the lobe), whilst the veins vary considerably in the species. In this group we are to consider *Aspidium*, *Nephrodium*, and *Nephro-*

*lepis*, of which the species, though not numerous in this colony, are nevertheless highly interesting. The first of these has peltate or buckler-shaped involucre or indusia, fixed by the centre; and in Australia, it is represented by two species—*A. aculeatum*, and *A. coriaceum*. Sir W. Hooker has united a great many varieties from all parts of the world under the first of these species, and amongst them Brown's *A. proliferum*, as he does not regard the proliferous fronds as the character of a distinct species. He remarks that "in Australia it is known only on the south-eastern portion from Sydney to the Hunter River," but this seems scarcely correct, as it occurs plentifully on the banks of creeks in the counties of Cumberland and Camden, and also on the Blue Mountains, the Mittagong Range, &c., &c. The fronds vary in size, and the pinnæ are sometimes more divided and aculeate than at others; but from the rusty scales, the harsh texture of the frond, and the buckler-shaped indusium, the species is sufficiently indicated. *A. coriaceum* is not a common species in Australia, and I am not aware whether any botanist had collected it on this continent before it was found by Dr. Mueller near Cape Otway. Hooker remarks that this species varies extremely in size, but that it is scarcely likely to be confounded with any other as its texture is so leathery. The word *Aspidium* is derived from *aspis*, a shield or little buckler, from the form of the indusia; and the next genus, *Nephrodium*, is so called, from *nephros* a kidney, because the same organs are of a reniform shape. To this genus belongs the well known and widely distributed species *N. Filix-mas*, which has been found in the Sandwich Islands, but nowhere else in the Polynesian Islands, nor in any part of Australia. The "Male Fern," as it is termed, is common in Europe in shady places and woods, and the root, which consists of many matted fibres, forming a turfy or cespitose head, caused it to be regarded as one of the ferns "detested by the crooked plough." (Virgil's Georgics, b. 2, line 189.) The species of *Nephrodium*, known in Australia, are those described by Brown under the names of *N. molle*, *N. propinquum*, *N. unitum*, and *N. decompositum*, but Hooker unites the second and third of these as mere varieties of one species, whilst he places a fern collected by Frazer at the Teviot River, under the *N. unitum* of Sieber. Mr. Macgillivray has recently collected some interesting specimens of these ferns,

and at first, I felt some difficulty in distinguishing a variety of *N. propinquum*, which is reported to have proliferous fronds, from another fern, also gathered by Mr. Macgillivray (*Polypodium proliferum*), to which we shall allude hereafter. At first sight, there is a great resemblance between the two ferns, both in the shape of the fronds and in the veining, but the position of the sori, as well as the absence of an indusium, must cause them to be placed under different genera. Mr. Macgillivray, who was a very accurate observer, called my attention to these particulars, and I felt much obliged to him for enabling me to form a satisfactory opinion as to the specific difference of these ferns.

I believe that *N. molle* is the only one of the three *Nephrodia*, which seem so intimately connected with each other, that is found near Sydney, but this fern has a very wide range, as Mrs. Forde has recently collected it on the cliffs of the Murray near Blanch Town. With respect to *N. decompositum*, the frond of which is much more divided than any of the preceding, I confess that I feel considerable difficulty, as Hooker has united so many forms that are generally regarded as distinct, amongst which are *N. microsorum*, *N. glabellum*, *Lastrea acuminata*, and *N. tenerum*. It would be difficult for any one, who has not had an opportunity of examining all the intermediate forms of this variable fern, to arrive at the same conclusion as the venerable Hooker. In the opinion of several intelligent observers, who have forwarded to me specimens representing the most marked varieties of the species, there seems so wide a difference between the type of the species and *Lastrea acuminata*, that such a variation is regarded as something more than an accidental deviation. I have seen specimens of this fern from the neighbourhood of Parramatta, the gullies of the county of Camden, the Blue Mountains, the Macleay, and the Clarence; and unless I had the authority of botanists so distinguished as Sir W. Hooker and Dr. F. Mueller for believing that the varying forms belong to one and the same species, I should be inclined to an opposite opinion. As, however, I have had occasion to remark previously, in reference to another species, there may be so gradual a transition from one form to another, that we must either adopt the views of these eminent men, and make one species, or consider every variety a distinct species, which, I suppose, few who have studied the sub-



ject, would be disposed to do. *Nephrolepis* (from *nephros*, a kidney, and *lepis*, a scale, in allusion to the scale-like kidney-shaped indusium), is a genus separated from *Nephrodium*, from which it differs principally in habit, creeping caudex, and articulated pinnæ, although it must be confessed that these characters are by no means uniform. *N. tuberosa* was collected near the Brisbane River by Dr. F. Mueller, and near the Teviot by Frazer, and it is remarkable for its large oval scaly tubers, as well as its elongated and pendulous fronds in the variety *N. pendula*. *N. exaltata* is thought by some authors to be closely allied to the preceding, and it is one of the genus frequently cultivated. It is found principally in tropical Australia, and is common in many parts of the East and West Indies. *N. obliterated* is a very interesting species, "climbing on trees and adhering to them like ivy," and it derives its specific name from the fugitive character of its indusium. The caudex is very long and filiform, with fronds from three to fourteen inches long, and pinnated. This species was found originally in Australia by Sir Joseph Banks, and subsequently by Cunningham and Dr. Mueller. Sir William Macarthur, when collecting specimens for the Exhibition, obtained some plants of it in the Illawarra district, and I have seen specimens of the same species from the Richmond River and also from the Bulli Mountain, the latter of which were collected by Miss Scott. This is regarded as a well marked species, "which though varying in the size and somewhat in the form of the pinules, is yet easily recognised." In the long creeping caudex and scattered stipites, it is peculiar in the genus, and the pinnæ are not distinctly articulated. *N. acuta* was found by Cunningham in tropical Australia, and it seems to be a species widely distributed throughout the warmer parts of the world. In this review, it will be seen that several of the species now referred to *Nephrolepis*, were formerly regarded as species of *Nephrodium*; and indeed if we consider the articulation of the stipites with the rhizoma as the principal mark of distinction between the two genera, there may be some ground for uniting them again. The fact is that the separation arises more from the general opinion of botanists, than from any well marked technical characters; and Hooker seems to retain the genus more in deference to the majority of fern authors than from any well-grounded conviction

of his own. Berkeley has well remarked, that if the articulation of the stipites with the rhizoma be regarded as a good mark for division (as suggested by Smith), some species of *Nephrodium* and *Nephrolepis* will be placed in one group, and some in another. Until, therefore, botanists can agree to adopt some better arrangement, it seems most judicious to follow the division suggested by Hooker, and pay deference to "habit" rather than "technical character."

When Sir William Hooker was engaged in studying the order now under consideration, he seems to have entertained some doubt as to the propriety of separating *Nephrodium* and *Nephrolepis* from the old genus *Aspidium*, because he found some difficulty in maintaining under three distinct genera, species which closely resemble each other in the venation, and in the form of the indusium. Sir William, however, followed the views of Richard in Michaux, Brown, and Desvaux, merely remarking "Entire dependence is not to be placed either on the exact uniformity of the venation, nor even on the shape of the involucre. These latter do occasionally vary, sometimes orbicular, sometimes cordate on the same species, and sometimes the form and the point of insertion, seem to be intermediate between the two." Dr. F. Mueller, in arranging the species of the order, places *Nephrodium* and *Nephrolepis* in the genus *Aspidium*, as follows: *A. melanocaulon*, found by Dallachy in Dalrymple's Gap; *A. tenericaule* collected in several parts of Eastern Australia, especially at Clarence River by Mr. Macgillivray; *A. hispidum*, occurring near Cape Otway; *A. aculeatum*, common in many parts of Australia; *A. aristatum*, a plant resembling the preceding, and growing at the Hastings, Illawarra, and Rockingham Bay; *A. coriaceum*, apparently somewhat rare, from Cape Howe to Hopkins's River; *A. molle* (*Nephrodium*), having a very wide range; *A. unitum* (*Nephrodium*), collected at Clarence River by Mr. Macgillivray &c., &c; *A. extensum* (*Nephrodium*) discovered by Mr. C. Moore at Duck Creek, Richmond River; *A. oblitteratum* (*Nephrolepis*), collected at Illawarra by Sir William Macarthur, at Berrima by Mr. C. Moore, at the Macleay by Dr. Beckler, at the Richmond by Mr. C. Moore, and at Rockingham Bay by Mr. Dallachy. *A. exaltatum* (*Nephrolepis*) gathered at Dunk Island by Mr. Macgillivray, at Teviot River by Frazer, &c., &c; *A*

*tuberosum* (*Nephrolepis*), found at the Teviot, Brisbane, Clarence and Macleay Rivers; and *A. decompositum* (*Nephrodium*) ranging from Cape Otway to Rockingham Bay, and collected at Penola by the Rev. J. E. Woods.

The last mentioned species is a very variable one, and sometimes occurring without indusia. Dr. F. Mueller mentions two leading varieties, *A. marginans* and *A. tenerum*. The specimens of *A. tenericaule* (*Nephrodium*) forwarded to me by Mr. Macgillivray resemble some forms of *Hypolepis* or *Polypodium*, as they appear without indusium (for which Mr. Macgillivray assures me he searched in vain), but there can be no hesitation in saying that the plant in question is the same as that figured in the fourth volume of the *Species Filicum*, the involucre or indusium there being represented as obsolete. Hooker, however, states that sometimes it has a very small indusium of a cordate reniform shape and membranaceous. This fact should lead pteridophilists to be cautious in determining species without comparing specimens from different localities, for it really seems in this instance, that the fern which in some places looks like a *Hypolepis* or *Polypodium*, occurs in others as a true *Nephrodium*. Much difficulty respecting the varieties of *Polypodium rugosulum* and *Hypolepis dicksonioides*, has arisen from want of properly estimating the ex-indusiate forms of *Nephrodium*.

#### SUB-ORDER 9.—*Polypodiæ*.

This extensive suborder includes those ferns which have not any involucre or indusium, but naked sori of a round or oblong shape. The genus *Polypodium* is so called because some of the species have a multitude of roots which form close entangled patches, the word being a compound of *poly* "many," and *pous, podos*, "a foot." According to Sir W. Hooker, *Polypodium* comprises *Campyloneuron*, *Grammitis*, *Arthropteris*, and some other so called genera, as that distinguished author preferred arranging them in separate sections under one great genus, rather than maintaining as independent genera several groups of plants which have "no tangible character." In the genus *Polypodium* the veins are either free or netted, and the species differ very much in size, structure, and habit. Without dwelling upon the various subdivisions of the genus, it may be sufficient for my present purpose to remark, that the Australian species may be con-

viently placed in two sections, the one comprising the *Polypodia*, which have free veins, and the other, those which have veins more or less anastomosing or netted. It is true that this arrangement appears to separate some ferns agreeing in habit and appearance (such for instance as *.tenellum*, and *.Billardieri*); but on the whole it will be found most convenient for the study of the genus. In the first section the species are very limited, viz., *P. Australe*, *P. tenellum*, *P. grammitidis*, and *P. rugosulum*. The first of these is Brown's *Grammitis Australis*, a small fern, with simple or undivided fronds of a linear lanceolate shape, seldom exceeding two or three inches in length, and growing in dense patches on the sides of moist rocks. It is common in many parts of Australia, and is widely distributed in other parts of the world. *P. tenellum* is a very elegant fern with a climbing habit, pinnate fronds, and the stipites jointed above the base. This is the *Arthropteris tenella* of Smith, the pinnæ being articulated to the rachis; and it is mentioned by Berkeley as "a most observable point," that the New Zealand species has no indusium; "a striking proof," he remarks, "of the comparatively small value of the indusium." This remark was made on the supposition that the genus *Arthropteris* could be maintained, and that *A. tenella* and *A. albo-punctata* were very nearly allied; but Sir William takes a different view of the species, and whilst he retains the one without an indusium in the genus *Polypodium*, he refers the other with the reniform sori, to *Nephrodium*. I have alluded in my introductory remarks to the difficulty of making any systematic arrangement of ferns which is not open to objection, and certainly the case before us furnishes an instance; for it must be admitted that the ferns in question resemble each other in the climbing caudex, and jointed stipites, whilst in other respects they differ so materially as to render it necessary to place them in different genera. *P. tenellum* is frequently found adhering to the caudices of tree ferns, as well as on *Quintinia Sieberi*, *Polysma Cunninghamsi*, and other trees which are usually seen in the dark moist forests where the trap formation prevails. This species occurs not only in Australia, but also in New Zealand and many islands of the Pacific. *P. grammitidis* is generally described as a Tasmanian or New Zealand plant, but Dr. Mueller has found it on the South-eastern parts of Australia, and he

mentions it also as one of the ferns in the Chatham Islands. The fronds vary in form, being sometimes linear and sometimes pin-natisected. *P. rugosulum* is much more divided than the preceding species, and it has a rough and somewhat wrinkled appearance. The fronds vary in size from a few inches to three or four feet in length, and are tripinnate. Dr. Mueller has justly remarked that some of the varieties bear great resemblance to the exindusiate form of *Nephrodium velutinum*, and others to *Hypolepis tenuifolia*. Mr. Macgillivray has lately collected some specimens at the Clarence, which at first sight I was disposed to consider as varieties of *P. rugosulum*; but subsequent examination, and the opinion expressed by Dr. Mueller in reference to one of these forms, induce me to think that one of the specimens is *Hypolepis*, and the other a *Nephrodium* (*N. tenerum*?) from which the indusia have fallen. Some time since I met with a great quantity of *N. decompositum* in a similar state, and it was not until I had examined numerous fronds, that I succeeded in finding a young plant with the indusia visible on it. In some varieties of *Nephrodium*, the indusium is of a very fugitive character, and hence the possibility of referring to *Polypodium*, species which do not properly belong to that genus. *P. rugosulum*, in different varieties, is widely distributed not only in Australia, New Zealand, and the islands of the Pacific, but also in India, South America, &c. Sir William Hooker includes the Norfolk Island *Cheilanthes Dicksonioides* or *Hypolepis Dicksonioides* amongst the varieties of this species. In the second section of the genus the veins are more or less anastomosing or netted, and by some botanists the species are referred to eight different genera. The first Australian species is *P. paecilophlebium* (so called from the varying veins on the same frond), which was collected on Dunk Island, north-east coast of Australia, by Mr. Macgillivray. Whether this is really a *Polypodium* or not seems rather uncertain, but as far as can be determined from the venation, the species is correctly placed. Near this fern must be considered the *Campyloneuron* which Dr. Mueller discovered on the north-west coast of this continent (see "Botanical Report on the North Australian Expedition under the command of A. C. Gregory, Esq"). The genus *Campyloneuron* was established from the peculiarity of the venation, the primary veins being pinnate, parallel, and connected

by curved or transverse veins; but Hooker, not regarding this character as sufficient for generic distinction, includes the so-called genus amongst the species of *Polypodium*. Dr. Mueller's discovery will, doubtless, prove interesting, as the allied species are principally American and West Indian plants. The species next in order are by some authors referred to *Niphobolus*, on account of the stellated hairs or tomentum with which the fronds are clothed on the under surface; but this character is too artificial to render such a division necessary, and therefore *P. angustatum*, *P. acrostichoides*, *P. rupestre*, and *P. confluens*, are retained as species of *Polypodium*. The first two of these occur principally in the north-eastern part of this continent, and the second is remarkable for having the longest and narrowest fronds, in proportion to their length, of any of the group, some being three feet long. There is some difficulty respecting *P. rupestre* and *P. confluens*, and probably they are mere varieties of one species, although in the disposition of the sori and the size of the fronds they seem distinct. The first form is very common on moist shady rocks in creeks, and is widely distributed in Eastern Australia. It has fronds of two shapes, the sterile one being obovate or roundish, and the fertile, linear-lanceolate, gradually tapering into the stalk. In the barren fronds, the veins unite in a net-like manner, but somewhat irregular, whilst some of the veinlets are free in the areoles. As the fronds become elongated and fertile, a midrib is partially developed, and the areoles increase in length. The venation resembles that of *P. Billardieri*, but it is sunk in the frond, and scarcely perceptible in a dried specimen. The fronds which I have collected seldom exceed three or four inches in length, and not a quarter of an inch in width, whilst the fructification is very copious and closely packed together on the upper half of the frond. In the variety of this fern which occurs plentifully on Ash Island, and for specimens of which I am indebted to the kindness of Miss Scott, the fertile fronds are sometimes more than a foot in length, and half an inch in width, being more glabrous than the preceding, and having the fructification confluent near the apex. Before I had read Sir William Hooker's descriptions of these ferns, I thought that the Ash Island variety was Brown's *P. confluens*, for many of the specimens procured by that illustrious author came from Hunter's

River; but this opinion can scarcely be reconciled with the views of Hooker, who appears to have founded his remarks on certain specimens collected by Cunningham on the Brisbane, and Dr. Mueller, in Northern Australia. As the venation and habit of the Ash Island variety are very similar to the *P. rupestre* and *P. confluens* of Hooker, it seems to me highly probable that all of these ferns are merely forms of one species, varying according to the soil, heat, and moisture of the place in which they occur. Thus, for instance, the quantity of stellated hairs and tomentum, as well as the size of the fronds, may be considered as influenced by surrounding circumstances; whilst probably the increased length of the fronds may lead to the diminution of the fructification. *P. attenuatum* has very smooth fronds of a linear-lanceolate shape, with a well defined midrib and the veins scarcely perceptible, whilst the sori are large, of a globular shape, and arranged in a single row on each side of the midrib. The texture of this fern is coriaceous and the petiole somewhat compressed and marginate, whilst the full sized frond is generally about two feet in length. Nearly allied to this, is *P. Cunninghamsi*, a New Zealand species frequently associated with the preceding, but, according to Hooker distinct from it. *P. irioides*, as well as the preceding, is found principally in North-Eastern Australia, and it seems scarcely to differ from *P. musæfolium* of the Oriental Archipelago. The specific name suggests the resemblance which the fronds bear to the leaves of the iris. These are sometimes three feet long, of a firm, fleshy texture, very smooth, and of an elongated lanceolate shape. M. Thozet, of Rockhampton, has cultivated this fern with success, but the plants which he kindly sent to the writer of this article, did not seem adapted to the climate of Parramatta, for they perished in the cold weather. The long climbing ferns generally referred to *P. pustulatum*, *P. membranifolium*, *P. diversifolium*, and *P. Billardieri*, are now united by Dr. Mueller in one species, viz., *P. scandens*, a name which he justly remarks is "exquisitely appropriate." In one form or other this species is widely distributed in Australia, and flourishes most luxuriantly in dark, moist woods. It is not so much admired as *P. tenellum*, but as it climbs up the huge trees of the forest, it is an interesting object. It may be found within a few miles of Sydney, but the finest plants of the species occur on

the Blue Mountains, and other places not too much exposed to the salt air. Mr. Macgillivray has recently noticed some forms of these plants on the Richmond, and he evidently regarded them as distinct species, the one being uniformly a more coriaceous plant than the other. Hooker's *P. quercifolium* is a tropical species, and distinguished by having the sterile fronds variously lobed often half-way to the midrib. The fertile frond is pinnatifid with the segments oblong acuminate, and the sori are small and numerous. The allied species *P. diversifolium* of the same author was collected on the Blue Mountains by Miss Atkinson, and in tropical Australia by others. Sir W. Hooker regards Willdenow's plant as a variety of *P. scandens*, but Brown does not intimate that his *P. diversifolium* is allied to the scandent species. As the country to the north becomes opened up, and favourable localities are carefully examined by intelligent observers, these ferns will be better known, and we shall be able to form a correct opinion as to the protean appearances of the climbing *Polypodia*. Dr. F. Mueller has recently expressed an opinion that many of the forms, formerly regarded as distinct species, may be more properly considered mere varieties; and if Sir William Hooker had been spared to complete his great work, he had intended to publish a "Synopsis Filicum," with a view of omitting all dubious ferns, and of checking what he considered "the unnecessary multiplication of species." *P. proliferum*, which has sometimes been referred to *Nephrodium*, has recently been found at the Richmond River by Mr. Macgillivray. The fronds are glabrous, somewhat coriaceous, and pinnated, being repeatedly proliferous at the apices and axils of the pinnæ, and they are generally about two feet long, with pinnæ from three to six inches long. The veins sometimes connive and form a continued vein or costule, as in *Nephrodium unitum*. *P. verrucosum* has also been found at Rockingham Bay, and seems to be identical with the species occurring at Penang, Singapore, &c. It is a distinct and handsome species.

#### SUB-ORDER 10.—*Grammitideæ*.

Next to the genus *Polypodium*, Sir William Hooker describes the suborder *Grammitideæ*, which includes several genera with sori more or less oblong or linear, and destitute of any involucre. "The *Grammitideæ* are distinguished by the generally very elong-



ated narrow naked sori, simple or branched or variously anastomosing, arising from the veins or extending to the parenchyme." (Hooker). Those genera with which we are more immediately concerned are (1.) *Nothochlæna*; (2.) *Gymnogramme*; (3.) *Meniscium*; (4.) *Antrophyum*; (5.) *Vittaria*. The first was so called from *nothos*, spurious, and *chlæna*, a cloak, because the sori are not enclosed in a genuine indusium, being for the most part covered by the paleæ of the frond. Four species (*N. distans*, *N. nudiuscula*, *N. lanuginosa*, and *N. pumilio*) are enumerated, but it seems very doubtful whether two of these can be retained. Indeed it is difficult to define the limits of the genus itself, for some of the species have the habit and sori of *Cheilanthes*, whilst others press closely upon *Gymnogramme*. *N. distans* is one of our smallest ferns, and very widely distributed throughout Australia. The fronds are hairy above, and paleaceous beneath, seldom exceeding six to eight inches in length, with the lower pinnæ distant from each other. *N. lanuginosa* is a species common to Spain and the warmer regions of the Mediterranean, as well as to several parts of Australia. The whole of this plant is densely clothed with soft white or rusty wool. *Gymnogramme* (from *gymnos*, naked; and *gramme* a line) derives its name from the linear arrangement of the naked sori on the forked veins of the frond. *G. leptophylla* is found in Europe, Asia, Africa, and America, as well as in Australia, Tasmania, and New Zealand. Its northern limit is said to be Jersey, the only locality in the British Isles. Dr. Mueller found it in Victoria, and Mr. Oldfield, in Western Australia, but this little fern, so interesting from its association with other regions, is by no means common in Australia. *G. rutæfolia* is also a diminutive species, very general in some parts of this country, but not occurring, I believe, on the sandstone formation. The form of the frond resembles the leaves of the common rue, and it is clothed with hairs on all sides, being in no way specifically distinct from the Spanish variety. The next species *G. papaverifolia*, some specimens of which Sir T. Mitchell collected in Tropical Australia, may be united with the preceding, as there are intermediate specimens connecting the two. One of the most remarkable species of the genus is *G. Muellerei* from Fort Cooper, North-eastern Australia, which was collected by Edward M. Bowman, Esq., and subsequently cultivated by M. Thozet, of

Rockhampton. Sir W. Hooker, in his remarks on this fern, says, "It would be idle to speak of the great acquirements and the unbounded liberality of the prince of Australian botanists, Dr. Mueller, F.R.S., of London, and Government botanist of Melbourne, who must ever rank with the noble-hearted Dr. Wallich amongst botanists. To Dr. Mueller I owe the only specimens of this very remarkable fern that have yet been detected." *G. Muelleri* does not exceed six or eight inches in length, and has pinnae alternate and rather distant, of an inch long and somewhat ovate in shape, clothed on the upper side with dense white scales, and on the lower with rusty ones. There is an excellent figure of this fern in the Species Filicum, and if it be compared with that of *Ceterach*, which has sometimes been referred to *Gymnogramme*, but latterly to *Asplenium*, many points of resemblance may be traced between the two ferns, especially in the thick fleshy fronds, the dense scales, and immersed forked veins. *G. Muelleri* has no indusium, unless the membranous ridge which exists on the receptacles just behind the sori be regarded as one. *Ceterach* is also destitute of that organ; but Sir W. Hooker, reasoning from analogy, contends that the latter fern is allied to *Asplenium alternans*, and therefore cannot be placed in the genus *Gymnogramme*. It was not known to the illustrious author that any species of *Meniscium* was indigenous in Australia, as it is not long since that at Rockingham Bay, a new species of it was discovered, a description of which may be seen in the 4th vol. of Dr. Mueller's Fragmenta, p. 165. This fern is named *M. Kennedyi*, in honour of Mr. Kennedy, and it is reported to be a superb plant, allied to *M. proliferum*, which is now referred to a section of *Polypodium*. To the genus *Meniscium* belong several species remarkable for their crescent-shaped sori, which are somewhat parallel and placed across the spaces between the veins of the frond. Some of these ferns approach so near to Hooker's section *Goniopteris*, that it is not easy to distinguish between them, and indeed with the exception of shape in the sori, they agree in all respects with *Polypodium*. The word *Meniscium* is said to be derived from *mene*, the moon, in allusion to the shape of the sori. *Antrophyum* (from *antron*, a cavern, and *phyo*, to grow, in reference to its native place of habitation), has latterly found two representatives in Australia in the species *A. plantagineum* and *A. semicostatatum*,

which Dr. F. Mueller reports have been collected near Rockingham Bay. This fern is a foot or more in length, of a linear-lanceolate shape, with sori immersed, and anastomosing (that is causing an angular or netted formation from the union of the veins), and occupying the whole of the frond. The genus *Vittaria*, of which one species occurs in Australia, viz., *V. rigida*, is so called on account of the narrow ribbon-like appearance of the fronds which resemble simple-leaved grass-like plants. *V. elongata*, which is a mere variety of *V. rigida*, was known to Robert Brown as a tropical fern, and it was also collected by the late Allan Cunningham and Mr. C. Moore, on our tropical Eastern coast.

SUB-ORDER 11.—*Acrosticheæ*.

In this suborder, the sori have not any involucre, are on the surface, and apparently cover the whole under side of the frond, or segments with a reniform stratum of capsules. The veins vary considerably, and the fronds are simple or compound, frequently of two forms. The first genus for consideration is *Acrostichum*, a word derived from *acros* and *stichos*, "the commencement of a verse," because the reverse of the fronds indicated traces of lines, resembling the beginning of lines of poetry. As this character, however, does not apply to all the species, it is better to regard *Acrostichum* as a genus distinguished by a uniform mass of sori, clothing nearly the whole under side of the fronds, and having simple or compound veins uniting in various ways. *A. conforme*, *A. repandum*, *A. aureum*, *A. pteroides*. and *A. spicatum*, have been found by Dr. F. Mueller and others, principally in Tropical Australia, but *A. pteroides* (of which only a solitary specimen was known to Sir W. Hooker) is regarded as a doubtful species. In the next genus, *Platyserium* (from *platys*, broad, and *ceras*, a horn, in allusion to the shape of the frond) differs from the preceding chiefly in having only a portion of the under side of the frond covered with sori. The fronds are also large, and of two shapes, the new annual fronds being as it were imposed upon the old withered and dead ones. *P. alcorni* is a very common fern in Australia, and generally grows on rocks or trees, being well known under the popular name "Staghorn." *P. grande*, which occurs in the northern parts of the colony, and in the north-eastern coast of Australia, has fronds sometimes five or six feet long, and seems identical with the species found at Singapore.

The *Acrosticheæ* are generally of a coarser nature than other ferns, and they differ from them in having the spore cases not merely on the veins, but also occupying the parenchymal interstices themselves. The thick spongy fronds of *Platyserium* have been compared to the horns of elks, and the veins of the fertile fronds run down to a stem-like base, differing from anything in the suborder. This genus occurs frequently in New South Wales, from Illawarra to the Burnett, but *Acrostichum* belongs to the North and North-eastern parts of Australia. Rockingham Bay seems a very favourable locality for some of the species. *A. aureum* is widely dispersed throughout the world, being found in most tropical and sub-tropical countries, but varying considerably in shape. At Aneiteum, some of the pinnae are reported to be a foot and a half long, and three inches broad. Brown's *A. fraxinifolium* is now referred to this species, as well as several others formerly regarded as distinct. With regard to *A. pteroides*, which does not appear to have come under the notice of Dr. Mueller, the species is certainly remarkable, and it is to be hoped that travellers in Tropical Australia may fall in with it, as probably it may belong to another genus.

SUB-ORDER 12.—*Schizæaceæ*.

Having followed the arrangement of Sir W. Hooker, through the preceding suborders, I now proceed to consider the Sub-orders (12) *Schizæaceæ*, (13) *Osmundaceæ*, (14) *Danæaceæ* and (15) *Ophioglossaceæ*, which that eminent Botanist was not permitted to review. In the conclusion to the 5th vol., of the "*Species Filicum*," he remarked that it had been his intention to include *Osmundaceæ* and *Ophioglossaceæ* in that volume, but that he found the material too bulky, and then he adds, with becoming humility, "the author is preparing, if his life and health be spared to accomplish it, a volume to be entitled "*Synopsis Filicum*," and to add to it all needful corrections and alterations, and additional species that had come into his possession during the twenty years his work had been in progress." Sir William did not live to complete the work he had designed, and therefore, I must now turn with feelings of deep regret, to other authors for the classification of the remaining suborders. Before doing so, however, I am sure it will not be deemed irrelevant, to pause for a moment and acknowledge the services, which that distinguished botanist

rendered to the cause of science. Having passed the term of years usually allotted to man, he enjoyed a reputation to which few can hope to attain. He was indeed highly favoured by Divine Providence; whilst the whole course of his life, even to within a few days of its termination, was an illustration of the great results which can be accomplished by the steady pursuit of any branch of science. Not long since, the late Sir Benjamin Brodie exhibited a remarkable instance of this truth, for by pursuing his favourite studies without suffering himself to be diverted from what he deemed the main object of his life, he rose by degrees to be the most eminent surgeon of the day, and for a number of years maintained the high character he had acquired. In like manner, Sir William Hooker became most illustrious in another branch of science, and for upwards of half a century rendered the most important services to his fellow-creatures by developing the resources of the vegetable kingdom in a series of volumes which will long continue as monuments of his indomitable perseverance, sound judgment, and surpassing talent. Without referring to his works in general, I feel it a duty to mention two matters in particular in which Sir William Hooker has latterly advanced the cause of science in this colony, viz., in the first place, by laying the foundation of the *Flora Australiensis*, now in course of publication under the auspices of Mr. Bentham and Dr. F. Mueller, and arranging systematically in his *Species Filicum*, all the species of Australian ferns which were known at the time of the publication of that great work.

The *Schizæaceæ* comprise a group of ferns, differing very widely in appearance and character from others, and they are distinguished by their spore cases being oval or oblong, seldom globose, and sessile, opening vertically on their outside. They have a striated apex, analogous to a transverse ring, produced on contracted marginal lobules, or special appendices, in the form of either simple, racemose, or paniculate contracted fronds or spikelets. In this suborder, we have to consider only two genera *Schizæa* and *Lygodium*. *Schizæa* (from *schizo*, to divide) is so called, because the spore-cases are arranged on the linear segments at the apex of the fronds, and *Lygodium* (from *lygodes*, flexible), because the species have a twining habit. In the latter genus, the sori are on marginal appendices, forming numerous

linear spikelets. The fronds sometimes twine from twenty to forty feet, and the pinnæ are usually conjugate, lobed, palmate, pinnatifid, pinnate or bipinnate. The species of *Schizæa* are amongst the most singular looking ferns known. The fertile appendices are terminal, and form a pinnate crest of linear segments, and in their appearance, they may be compared to dried leaves on the top of simple or forked stems. Four species of *Schizæa* were described by Brown, viz., *S. rupestris*, *S. fistulosa*, *S. bifida* and *S. dichotoma*, but Dr. F. Mueller regards the last two as mere varieties of one species. *S. rupestris* is a very diminutive plant, generally growing on the caudices of *Todea barbara*, or amongst mosses on some moist rock by the side of a creek. It seems to be known only at present as occurring at Port Jackson, Parramatta, and the Blue Mountains, but as the species is very small, and very unlike other ferns, it is probable that collectors in other parts may have passed it by without notice. *S. bifida* is more common and more widely diffused. It is a singular looking plant, with its fructification at the extremity of leafless stems, and has so little resemblance to ordinary ferns, that persons unaccustomed to the examination of such plants, might easily pass it by as if were a tuft of some grassy plant in a decaying state. *S. fistulosa* is marked by Brown as a Tasmanian species, but Dr. F. Mueller has recently found it between Wilson's Promontory, and Western Port. *Lygodium* occurs in the East Indies and America, as well as Australia, and on this continent appears to be limited to two species, both of which are tropical, viz., *L. microphyllum*, and *L. semi-bipinnatum*. Whether these species are really distinct from those found in other parts of the world, is not altogether clear. It may be remarked that the genus is now divided, the plants with netted veins being referred to *Lygodictyon*. *L. articulatum* is from New Zealand, and *L. flexuosum* and *L. scandens* (*microphyllum*?) from the East Indies and China.

SUB-ORDER 13.—*Osmundaceæ*.

This suborder is now limited to two or three genera, differing in habit and appearance, but having spore-cases, somewhat globose, *pedicellate*, reticulated, unilocular, bivalved, with an oblique apex, and destitute of a ring. Brown's *Osmunda*, which is now *Todea barbara*, is a large fern common on creeks near Sydney, and sometimes assuming the appearance of a dwarf tree fern.

The fronds are glabrous, lanceolate, sub-bipinnate, sometimes exceeding three feet in length, and dilated at the base, where is formed an erect caudiciform rhizome. The sori, which are pedicelled or stalked, are confined to the inferior pinnules of the frond. This genus was named in honour of Henry Julius Tode, of Mecklenburg, an experienced mycologist. Nearly allied to *Todea*, is the beautiful species now called *Leptopteris Fraseri*, in which the spore-cases are placed upon the veins without forming distinct sori, and the fronds are beautifully translucent. This is one of our most admired ferns, and the fronds, which are very delicate and membranous, sometimes measure three feet. The term *Leptopteris* is derived from *leptos*, slender, and *pterus*, a fern, and the specific name is in honour of the late Mr. Fraser. Miss Atkinson found some fine plants of this species at the Kurradjong. *L. hymenophylloides* is a native of New Zealand, and differs but little from an allied plant recently collected at Aneiteum.

SUB-ORDER 14.—*Danæaceæ*,

This is a small group, and the few genera of it are so well marked, that they may be recognised in almost every stage of their growth. The fructification consists of large sessile or pedicellate spore-cases, which are either horny, opaque, distinct and unilocular, or laterally and oppositely connate, so becoming multilocular. *Marattia elegans*, or *M. salicina* of this suborder, is an ornamental plant with glabrous fronds, bi-tripinnate, six to nine feet high and darkish green. This species was supposed to be peculiar to Norfolk Island and New Zealand, but it was subsequently found at the Island of Ascension, and now within the last year, it has been discovered on the North-east coast of Australia. *M. cicutaefolia* is from Brazil, and *M. alata* from Jamaica. It is said that "if a bulb of *M. alata* be examined, the base will be found composed of two or more imbricating concave scales, within which the first frond is more or less completely enclosed by two lobes arising on each side at the base. These are never circinate, and cannot be regarded as inferior pinnæ, but rather as appendages of the rhizoma, as they grow beneath the point at which the stem disarticulates. In *M. cristata*, the edge at length becomes green, foliaceous, and variously lobed and crisped." (Berkeley's Cryptogamic Botany, p. 523). The large rhizoma of *M. salicina* is prepared and eaten as food by the New Zealanders. *Angiopteris*

*evecta*, which has lately been found at Rockingham Bay, has sori linear, continuous, compound and sub-marginal. The spore-cases are obovate, sessile, emarginate and laterally confluent, being arranged in two opposite series. This is an ornamental fern, with tripinnate fronds from six to ten feet high, of a deep olive green, and a native of the East Indies, the Mauritius, Bourbon, &c. Lindley remarks that the fragrant leaves of *A. evecta*, are said to be employed in the Sandwich Islands to perfume the cocoa-nut oil.

#### SUB-ORDER 15.—*Ophioglossaceæ*.

The suborder *Ophioglossaceæ* or Adder's Tongues, are technically termed "Filical Acrogens, with ringless, distinct two-valved spore-cases, formed on the margin of a contracted leaf." Of this suborder, two minute species formerly existed in the immediate neighbourhood of Sydney, but they are now seldom seen there. These are *O. gramineum*, and *O. costatum*, small delicate plants, the one with grassy nerveless leaves, and the other with oblong-lanceolate one-nerved fronds. *O. pendulum*, Dr. Mueller kindly informs me, is also a native of Eastern Australia, usually parasitical on *Platyserium*. It occurs in Queensland and occasionally farther south. *Botrychium* belongs to the same order, and derives its name from *Botrys*, a bunch, on account of the bunch-like form of its fructification. *B. Australe* occurs sparingly in Eastern Australia, and seems scarcely to differ from *B. virginicum*, the largest of the North American species. In New Zealand *Botrychium* is used as a pot-herb, and sheep are said to be so fond of it, that it is difficult to procure specimens where they have access. *Helminthostachys* (from *Helminthos*, of an earth worm, and *stachys*, a spike, in allusion to the worm-like disposition of the sporangia) is similar in habit to the last genus, and has whorls of spore-cases, opening vertically and surmounted by a crested appendage. The species *H. Zeylanica* has recently been found near Rockingham Bay. (Frag. vol. 4, p. 166.)

In Dr. F. Mueller's list of Australian ferns, *O. gramineum* and *O. costatum* are referred to *O. vulgatum*. *Botrychium australe*, or *B. virginicum* is united with *B. ternatum*, and it is stated that *B. lunaria* has been found on the Australian Alps. *Ophioglossum vulgatum* is becoming very rare in New South Wales, but there can be no doubt that it will be seen every now and then in places



not accessible to sheep. Miss Atkinson recently found some on a hill near Berrima, and Mrs. Selkirk noticed it, in considerable quantities, in the Episcopal Churchyard at Richmond.

From a review of the ferns of Australia, so far as they are hitherto known, it appears that the species described are about 160, being more than those indigenous in New Zealand. According to a recent estimate, those islands are said to present by far the richest assemblage of ferns in the south temperate zone, nearly 120 species, besides many marked varieties. The ferns of Tasmania are, with few exceptions, identical with those of New Zealand; and in Australia there are more species common to both countries than was formerly supposed, as the variations of some forms are not now regarded as distinct species. About twenty of our ferns occur in Norfolk Island, and eleven are similar to European ones, of which last number "the occurrence of the rather common Australian and New Zealand *Gymnogramme rutæfolia* in the Pyrenees, where it is extremely scarce, and no where else in the whole world, so far as is known, is one of the most remarkable facts in the distribution of plants that has ever been made known." Recent discoveries in North-Eastern Australia have revealed to us some widely distributed species identical with the East Indian ferns, and those of the Oriental Archipelago, amongst which *Diplazium polypodioides* (collected by Mr. Dallachy, at Rockingham Bay, and lately by Mr. Macgillivray, on the Richmond River) is one of the most interesting. Within the last few years, great progress has been made in ascertaining the geographical distribution of species, and the probable identity of plants formerly regarded as distinct, but from the materials before us, abundant as they are when compared with former researches, it is evident that much remains to be elucidated before any comparative tables of the ferns common to different countries can be implicitly relied on. The first great step towards the investigation of Australian ferns was the publication of Robert Brown's "*Prodromus Floræ Novæ-Hollandiæ*;" and it is astonishing, after the lapse of half a century, to find that recent explorers have not added to the descriptions of that illustrious botanist more well-marked species than they have done. In comparing the species known to Brown with those enumerated in the late work of Sir William Hooker, the reflecting mind is led to appreciate more

tully the wonderful labours manifested in the "*Prodromus*," and to admire the profound talents and unwearied industry of its distinguished author, so "that the universal consent of botanists recognises most justly the title conferred on him by his illustrious friend, Alexander Von Humboldt, of "*Botanicorum facile Princeps*." No person was more capable of forming an opinion of Brown's merits as a writer on ferns than the late Sir William Hooker, and that learned author, in the Preface to the "*Species Filicum*," says "had he given his master-mind to the complete development of the subject, little would have remained to his successor, but to tread closely in his steps." The mantle indeed fell upon Hooker, but that eminent and venerable writer was not permitted to accomplish the great work of which five volumes have already been made known to the world; for having lived beyond the ordinary period of human existence, he has left for others to fill up the details of that extensive plan which he had so ably devised.

Before I close this paper, I must also express the obligation I feel to Dr. F. Mueller for the list of Australian ferns published in the Botanical Report on the North Australian Expedition, and also for the description of some new species in his *Fragmenta Phytographiæ Australiæ*, as well as the valuable information furnished by him respecting interesting ferns supposed to be identical with those in other parts of the world. It is the ardent wish of the writer that Dr. Mueller's life may be spared to accomplish the works on which he is engaged, for perhaps there is no botanist now living who is so well acquainted with Australian ferns, or who, from extensive investigations and well exercised philosophical habits, is so well qualified to clear away the difficulties of the subject. In his valuable sketch of the vegetation of the Chatham Islands, the doctor has already made some very judicious remarks on the ferns of this part of the world, and his main object has lately been to give a short account of what is really known to the present day of our Australian species. As his work is published in Latin, and circulated amongst the learned in all parts of the world, it will afford the means of making our ferns extensively known, and at the same time it will enable those who are preparing popular articles, (such as that in which I have lately been engaged), to correct any inaccuracies into which they may

have fallen. A man so intensely occupied in scientific pursuits as the doctor is, and who from fondness for elucidating the mysteries of the vegetable kingdom, scarcely allows himself an occasional hour for relaxation, should recollect that there is a limit for human exertions, and that no constitution how strong soever it may be, can long endure almost incessant demands made upon it. This fact appears to have been well understood by an eminent octogenarian recently removed from an exalted sphere of usefulness, and it would be well if Dr. F. Mueller, resting for a while on the world-wide reputation he has acquired, would take the advice of the poet and mingle a little innocent recreation with his graver studies.

Misce stultitiam consilis brevem.

Dulce est desipere in loco.

By so doing, he might by the blessing of Providence prolong an existence not only invaluable to these colonies, but also extensively useful to the human race by the important discoveries he is continually making. Whilst engaged in those studies which tend to promote the glory of God, and the moral and practical benefit of mankind, Dr. F. Mueller's labours cannot be too highly appreciated. The beautiful and delicate structures which by the aid of the microscope he is gradually revealing to us, and the peculiar adaptation of their organs to the circumstances in which they are placed, exhibit innumerable illustrations of the wisdom and goodness of the Creator. Nor should it be forgotten that the silent progress of that science in which he is occupied, is intimately connected with the advancement of the useful arts, for as the properties of plants become known and their practical applications ascertained, it will be found that the discoveries of the scientific inquirer exercise a direct and powerful influence on the comfort and material prosperity of mankind.

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\* The ferns now supposed to be identical with the European ones are :—  
 1. *Gymnogramme rutafolia*, 2. *G. leptophylla*, 3. *Hymenophyllum Tunbridgesne* and *H. Wilsoni*, 4. *Pteris aquilina*, 5. *Asplenium Trichomanes*, 6. *A. marinum*, 7. *Aspidium aculeatum*, 8. *Adiantum Ethiopicum?* 9. *Pteris arguta*, 10. *Ophioglossum vulgatum*, 11. *Botrychium lunaria*.

## LIST OF AUSTRALIAN FERNS,

Systematically arranged, according to the views indicated in Sir William Hooker's "Species Filicum."

## Suborder 1—GLEICHENIACEÆ

## GLEICHENIA.

- G. platyzoma* (*P. microphyllum*, R. Br.)  
*G. rupestris* } Probably mere  
*G. spelunca* } varieties of *G.*  
*G. microphylla* } *microphylla*.  
*G. dicarpa*  
*G. flabellata*  
*G. Hermannii* } Regarded sometimes as  
*G. dichotoma* } varieties of *G. flabellata*

## Suborder 2.—POLYPODIACEÆ.

## ALSOPIHIA.

- A. Australis*  
*A. Leichhardtiana*, or *A. Macarthuri*  
*A. Cooperi*  
*A. Rebecca*  
*A. Robertiana*

## CYATHEA.

- C. Medullaris*  
*C. Lindsayana*

## DICKSONIA.

- D. antarctica*  
*D. Youngii* (C. Moore)  
*D. dubia* (*Davallia dubia*, R. Br.)  
*D. davallioides* (*Davallia flaccida*, F. M.)

## DEPARIA.

- D. Macraei*

## HYMENOPHYLLUM.

- H. marginatum*  
*H. flabellatum* }  
*H. nitens* } *H. demissum*, F.M.  
*H. crispatum* }  
*H. Tunbridgense* }  
*H. Wilsoni* }

## TRICHOMANES.

- T. venosum*  
*T. angustatum* }  
*T. caudatum* }  
*T. rigidum* }  
*T. setiloba* }  
*T. reniforme* (?)

## Suborder 3.—DAVALLIÆ.

## DAVALLIA.

- D. pedata*  
*D. elegans*  
*D. pyxidata* (var. of *D. solida*, F. M.)  
*D. polypodioides* (*D. flaccida*, R. Br.)

## LINDSÆA.

- L. cultrata*  
*L. concinna*  
*L. linearis*  
*L. lanuginosa*  
*L. flabellulata*  
*L. media*  
*L. trichomanoides*  
*L. microphylla*  
*L. pentaphylla*  
*L. ensifolia* (*L. lanceolata*, R. Br.)  
*L. Fraseri*

## Suborder 4.—PTERIDEÆ.

## ADIANTUM.

- A. lunulatum*  
*A. hispidulum*  
*A. Æthiopicum* (*A. assimile*, R. Br.)  
*A. affine* (*A. trapeziforme*, Forst.)  
*A. formosum* (*A. Cunninghamsi*, Hook.)  
*A. paradoxum*, *Pellæa falcata*

## HYPOLEPIS.

- H. amaurorachis*  
*H. Dicksonioides*

Probably varieties of *Polypodium rugosulum*, Hook. and F. M.

## CHEILANTHES.

- C. tenuifolia* }  
*C. Sieberi* } Probably varieties  
*C. pressiana* } of *C. tenuifolia*  
*C. caudata* }

## PELLEA.

- P. falcata* }  
*P. paradoxa* }  
*P. nudiuscula* (?) very little known  
*P. geraniifolia* (*Pteris pedata*, R. Br.)

PTERIS.

- P. Felicienna* (*P. nitidula* ?)
- P. incisa* (*P. vespertilionis*, R. Br.)
- P. comans* var. *P. Endlicheriana*
- P. tripartita*
- P. quadriaurita*
- P. crenata*
- P. longifolia*
- P. umbrosa*
- P. arguta* (*P. tremula*, R. Br.)
- P. aquilina* (*P. esculenta*, R. Br.)

CERATOPTERIS.

- C. thalictroides*

Suborder 5.—LOMARIEÆ

LOMARIA.

- L. Patersoni*
- L. discolor*
- L. lanceolata*
- L. alpina*
- L. procera* } *L. capensis*
- L. eximia* (?) }
- L. fluviatilis*
- L. articulata* (F. M.)

BLECHNUM.

- B. orientale*
- B. striatum*
- B. lævigatum*
- B. cartilagineum*

DOODIA.

- D. aspera* }
- D. blechnoides* }
- D. media* }
- D. caudata* }
- D. Atkinsoniana* }

Suborder 6.—ASPLENIEÆ.

ASPLENIUM.

- A. Australasicum* (*A. nidus*, R. Br.)
- A. simplicifrons* (F. M.)
- A. attenuatum*
- A. paleaceum*
- A. fuscum* } (var. *A. caudatum*)
- A. furcatum* }
- A. flabellifolium*
- A. marinum*
- A. obtusatum* } vars. of *A. marinum*
- A. obliquum* } (F. M.)
- A. difforme* }
- A. bulbiferum* }
- A. flaccidum* }
- A. odontites* }
- A. umbrosum* (*allantodia* R. Br.)
- A. Trichomanes*
- A. cuneatum*, var. *laserpitiiifolium*
- A. polypodioides* (*Diplazium*)
- A. sylvaticum* (*Diplazium*)

Suborder 7.—SCOLOPENDRIEÆ  
Not represented in Australia.

Suborder 8.—ASPIDIACEÆ.

ASPIDIUM.

- A. aculeatum* (*A. proliferum*, R. Br.)
- A. aristatum*
- A. coriaceum*

NEPHRODIUM.

- N. decompositum*
- N. tenericaule*
- N. propinquum* (*N. unitum*)
- N. extensum*

NEPHROLEPIS.

- N. obliterateda*
- N. tuberosa*
- N. exaltata*
- N. acuta*

Suborder 9.—POLYPODIEÆ.

POLYPODIUM.

- P. Australe* (*Grammitis*, R. Br.)
- P. grammitidis*
- P. contiguum*
- P. tenellum*
- P. rugosulum*
- P. proliferum*
- P. pæcilophlebium*
- P. aureum*
- P. verrucosum*
- P. subauriculatum*
- P. angustatum*
- P. acrostichoides*
- P. rupestre*
- P. confluens*
- P. attenuatum*
- P. longifolium*
- P. iridioides*
- P. pustulatum* } *P. scandens*, F. M.
- P. Billardieri* }
- P. quercifolium* } *Drynaria*
- P. diversifolium* }

Suborder 10.—GRAMMITIDEÆ.

NOTHOCLÆNA.

- N. fragilis*
- N. distans*
- N. nudiuscula* (!)
- N. laruginosa*
- N. pumilio* (?)

GYMNOGRAMME.

- G. leptophylla*
- G. rutæfolia*
- G. Muelleri*

MENISCIUM.

- M. Kennedyi*

## ANTROPHYUM.

- A. semicostatum*  
*A. plantagineum*

## VITTARIA.

- V. rigida* (*V. elongata*)

## Suborder 11.—ACROSTICHEÆ.

## ACROSTICHUM.

- A. conforme*  
*A. repandum*  
*A. aureum*  
*A. pteroides*  
*A. spicatum*

## PLATYCERIUM.

- P. alicorne*  
*P. grande*

## Suborder 12—SCHIZÆACEÆ.

## SCHIZÆA.

- S. bifida*  
*S. rupestris*  
*S. flabellum* } (*S. bifida*, F. M.)  
*S. dichotoma* }  
*S. fistulosa*

## LYGODIUM.

- L. microphyllum*  
*L. semibipinnatum*

## Suborder 13—OSMUNDACEÆ.

## TODEA.

- T. barbara*  
*T. Fraseri* (*Leptopteris*)

## Suborder 14—DANÆACEÆ.

## ANGIOPTERIS

- A. evecta*

## MARATTIA.

- M. salicina* (*M. elegans*)

## Subord. 15--OPHIOGLOSSACEÆ

## OPHIOGLOSSUM

- O. gramineum* } (*O. vulgatum* F. M.)  
*O. costatum* }

## BOTRYCHIUM.

- B. Australe* (*B. ternatum* F. M.)  
*B. lunaria*

## HELMINTHSTACHYS.

- H. Zeylanica*

## LYCOPODIACEÆ, from Dr. F.

Mueller's *Fragmenta* (Vol. 5)

## LYCOPODIUM.

- L. selago*  
*L. Phlegmaria*  
*L. clavatum* (*L. fastigiatum*)  
*L. densum*  
*L. Carolinianum*  
*L. serpentinum*  
*L. laterale*  
*L. cernuum*  
*L. scariosum*  
*L. volubile*

## SELAGINELLA.

- S. Pressiana*  
*S. uliginosa*  
*S. concinna*

## PSILOTUM.

- P. triquetrum*  
*P. complanatum*

## TMESIPTERIS.

- T. Tannensis*

## PHYLLOGLOSSUM.

- P. Drummondii*

## THE WOODS OF THE PARRAMATTA DISTRICT.

IT not unfrequently happens, that persons in their anxiety to discover new and valuable productions in some distant part of the globe, overlook those which exist in their immediate neighbourhood. This is especially the case with our indigenous trees and shrubs. Whilst people incur vast expense in importing tim-

ber and other materials for industrial purposes, they despise the noble trees around them, and too frequently ignore the existence of plants and shrubs, which from their medicinal and other properties, might be turned to practical account. On the present occasion, I propose directing the attention of my readers to some of the most useful woods of the district, with a view of inducing those, who have the time and opportunity, to assist in developing our resources and in ascertaining the adaptation of indigenous material to the purposes of the artisan. In the Parramatta district, there are about twenty species of "Gum Trees," or *Eucalypti*, many of which are highly useful, as they afford good timber, resins of a medicinal character, and also volatile oils. The "Blue Gum," or *E. rostrata*, is a very hard compact wood, and when properly seasoned, is exceedingly durable, being well adapted for heavy deck framing, the beams and knees of vessels, and for planking above the light-water mark. This valuable tree, which formerly abounded on the Toongabbie Creek, is not so plentiful as it was in past years, and it is to be regretted that in the early days of the colony, when stumping and burning off was the order of the day, little attention was paid to the preservation of this Gum and other species calculated to be useful in after times. In Victoria, the Blue Gum has been much used for railway sleepers, and has also been employed for making various articles of furniture. The "Iron Bark," or *E. paniculata*, is known as one of our hardest and heaviest woods. Of this wood, there are two kinds with white, and one with red flowers. Passing over some of the ordinary purposes for which\* it is usually employed, it appears from a report published in Melbourne, to which we are indebted for much of this information respecting our common woods, that Iron Bark, from its great strength and tenacity and close grain, is highly useful to the coachmaker and wheelwright for poles and shafts of carriages, and spokes of wheels. Its greasy nature also renders this wood very serviceable to the mill-wright for the cogs of heavy wheels. For this purpose, Mr. Dight of Melbourne and others engaged in similar pursuits, have been accustomed to send to this colony for Iron Bark, and it has also been worked up in various ways in ship-building. It seems rather curious that this wood should be imported into Victoria, when the same species of

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\* Catalogue of the Victorian Exhibition, 1861.

*Eucalyptus* exists in that colony; but the fact is, that our Iron Bark exhibits a much smaller number of cells dispersed through the substance of the woody fibre, and consequently is more imperishable than the Victorian tree. The cause of the variation has not yet been ascertained, but it is supposed to arise from the difference of soil and climate. Gum Kino is procured from the same tree, and by experiments in Melbourne, the destructive distillation was found to yield a particularly thick and rugged substance, studded with deposits of dark gum-resin and containing a large product of pyroxylic spirit. Our "Box," again (*E. hemiphloia*), which is the prevailing tree in some parts of the district, affords a valuable timber, and is largely used by coachmakers and wheelwrights for the naves of wheels and heavy framing; and by millwrights for the cogs of their wheels. In addition to the purposes to which we see it applied in this neighbourhood, it is reported to be employed in ship-building, and forms one of the best materials for treenails, and for working into large screws in the mechanical arts. The "Blackbut," (*E. pilularis*), which does not appear to be so well known in the adjacent colony as the preceding species, has long been used here for flooring boards and house purposes, and is justly regarded as one of our noblest trees. It is found principally upon the banks of our creeks to the north of the town, but owing to the progress of cultivation and the necessary clearing of the ground, the larger Blackbuts in the immediate neighbourhood have long since perished. Three species of "Mahogany," occur near us, commonly called Red, White, and Swamp Mahoganies, all of which are known to practical men as affording abundant material for fencing, slabs, &c., &c. The White species (*E. acenioides*), which closely resembles "Stringy Bark" in its appearance, is probably the least known of the three, and when worked up for palings or flooring boards, has a beautiful satin-like surface. The specific gravity of this wood far exceeds that of Stringy Bark, being closer and more compact, whilst the grain is sometimes prettily waved. Our remaining Gums are not so highly esteemed for the strength and durability of their wood, but many of them possess valuable resins, whilst from the leaves of all of them volatile oils may be distilled, varying in character and specific gravity. When specimens were being prepared for the Exhibition of 1861, our Melbourne friends



procured some excellent volatile oil from the leaves of the "Woollybut" forwarded from Parramatta, and it was found that the oil exhibited the remarkable property of imparting an indelible transparent stain to paper, indicating that a resin was held in solution. "This opinion," continues the report, "was strengthened by the unusually high specific gravity which it possessed, viz., .0940, and by the fact that its boiling points are also much above the average, being 380° and 420° respectively. The taste of this essential oil is aromatic and cooling, with but little pungency; it has a fragrant camphoraceous odour, and an oily consistency. The yield from 100 lbs. of leaves is 3 oz., 3¼ drs. In a kerosene lamp this fluid gives a good bright clear flame, but somewhat inferior to kerosene in intensity." It is strange that our Woollybut, (*E. longifolia*), which is so little esteemed by the Parramatonians, should be so highly valued at a distance, and the fact is suggestive to us; for in the vicinity of our town—not farther than General Macarthur's bush—an abundance of leaves might be gathered for following up the experiments so skilfully commenced at Melbourne. Amongst the other trees of our district, nearly allied to the "Gums," are three species of "Apple," (*Angophora*), and one of "Turpentine," (*Syncarpia*.) In some parts of New South Wales the apple is valued by coachmakers and wheelwrights, being used extensively for the naves of wheels; and the "Turpentine," when properly seasoned, is likely to prove a durable and strong wood. Carpenters complain that it is liable to shrink and warp, but this arises from using the wood in a green state, or from neglecting to fell the tree when it is least influenced by the sap. The process of seasoning timber seems to be very imperfectly understood here, and it is that circumstance, rather than any defect in the wood, which causes people to undervalue our colonial material for practical purposes.

Before I pass over the Myrtaceous trees of the district, I must notice what is called "The Broad-leaved Tea Tree," (*Callistemon salignus*), the wood of which, being very hard, has been successfully employed in xylography or engraving. One of the *Pittosporums*, I have been informed, can be used for the same purpose, but the species to which I refer seldom occurs near Parramatta, and when it does, it is too small to be rendered available. In PYLE'S creek, the "Native Myrtle" (*Backhousia myrti-*

*folia*), another larger-leaved Myrtle with yellow flowers (*Tristania nereifolia*), and the "Lilly-Pilly" (*Eugenia Smithii*), are of frequent occurrence, and the wood of them being very tough, it is often made into flails, handles, &c. Our "Tea Trees," though frequently despised, contain valuable properties, which hereafter will be turned to good account. The bark of some species may be converted into paper, and the leaves of all contain volatile oils, whilst the wood of two admits of a polish and may be worked up into articles of furniture. The oil extracted from the Tea Trees bears a striking resemblance to the cajeput oil of commerce, has a bitter and camphoraceous taste, and is followed by a cool sensation like that produced by peppermint. The three species from which the oil is procured, abound in this neighbourhood viz:—*linariifolia*, *ericifolia*, and *genistifolia*. "It is found that 100lbs. of fresh branchlets and leaves of the first will yield a product measuring 28 fluid ounces. It presents the appearance of a very light straw coloured mobile liquid, of rather a pleasant odour, resembling the oil of cajeput, but less aromatic and pungent, and possessed of a singularly agreeable taste—in which respect it differs from most of the other oils—strongly suggestive of both mace and nut-meg, followed by the usual mintlike after taste, common in a greater or less degree to the myrtaceous oils. The specific gravity is .0903, and the boiling point is 348°." Amongst the smaller trees of the district the "Christmas bushes" are interesting, not merely for the beauty of their flowers, but in one species (*Ceratopetalum apetalum*) for the excellency of its wood, and the fragrance of its bark. This is generally called "Light Wood," and is a favourite with coachmakers. Although on our creeks, it is a small tree, yet in some parts of the colony, especially on the Blue Mountains and the Mittagong Range, it attains the height of 60 feet, and affords fine timber for doors, shutters, &c. It is a curious fact in the distribution of plants, that whilst this species predominates on the creeks to the north of Parramatta, the allied tree (*Schizomeria ovata*), and very similar to it, grows on the Toongabbie Creek. In the same locality also may be found one of our "Native laurels" (*Cryptocarya glaucescens*), which in the early days of the colony was called "Sassafras," and undoubtedly possesses medicinal properties. The tree now called Sassafras belongs to a different family,

and does not occur within twelve miles of the town and then only very sparingly. On the Toongabbie Creek also small specimens of the native "Cork Tree" (*Duboisia myoporoides*) may be found. On PYE'S creek, the "Native Rosewood" (*Synoum glandulosum*) is occasionally met with, and when in flower is very ornamental, but whilst in some parts of the colony it becomes a large tree, with us it is a mere shrub.

The "Native Cherry" (*Exocarpus cypressiformis*) seldom attains any size in our district, but the wood can be used for map-rollers, &c. Our proteaceous shrubs and trees are too diminutive to be of much service. With the exception of two species of "Honey-suckle" (*Banksia*) which can be worked up for knees of boats, the rest do not grow so large as in some other parts of the colony. This is especially the case with our "Wooden Pear" (*Xylomelum pyriforme*), the "Native Beef Wood" (*Stenocarpus salignus*), and *Lomatia longifolia* a tree with flowers very similar to a *Grevillea*. The "Native Oaks," when found sufficiently large, are available for different articles of furniture, and the swamp-oak (*Casuarina paludosa*) is very good for handles. With the exception of two or three species of *Acacia* or "Wattle," there is scarcely any leguminous tree that can be said to make much wood. When the *Acacias* can be found large enough, they are useful for furniture, and one species is exceedingly desirable where toughness and durability are required. All the species are astringent, in a greater or less degree, and a decoction of bark has been found efficacious in curing dysentery when all other remedies have failed.

Without pursuing the subject any further, it must be evident to every reflecting person that the Parramatta district possesses many valuable woods, and that several of their qualities remain yet to be developed. If we are anxious to prepare specimens for our friends in Europe, there is no occasion to go to any great distance for woods, as thirty or forty different kinds could be collected within a few miles of the town. And, indeed, it is a fact that specimens of wood have been recently forwarded to the Paris Exhibition, which are not in any degree rarer than some of our own district; and, therefore, it is to be regretted that the people of Parramatta did not endeavour to secure some portion of the honour which will be bestowed on the colony, by forwarding

a complete set of woods belonging to the district, worked up into different articles of furniture, and arranged systematically for the edification of all interested in such matters. Nature has done more for us than we are thankful for, or are even aware of; and it would be easy for us to prove that the Parramatta district is not only highly favoured in the excellency and durability of its woods, but that its creeks abound in plants which may hereafter be rendered available for the purposes of medicine and the arts in general. We have much to study in our own immediate neighbourhood, and whilst in the pure atmosphere of the country we are engaged in seeking after the useful and beautiful productions of the earth, we shall not only attain in some measure, "a sound mind in a sound body," but also a profound impression that "the works of God" are indeed "great," and "sought out of all them that have pleasure therein!"



## MEDICINAL PLANTS OF THE PARRAMATTA DISTRICT.

IT is much to be regretted that scientific men in this colony have paid so little attention to the subject of Medical Botany. Surrounded, as we are, by shrubs and plants possessing medicinal properties, there is a wide field for investigation; and, no doubt, it will be found in time to come, that we have been sending to distant countries for expensive medicines, whilst remedies equally efficacious might be procured close at hand in all their native freshness. It was the belief of the ancients that all physic is included in simples; and hence they had recourse to remedies "simple, natural, of no expense, always at hand, and within the reach of the poorest persons." Pliny cannot endure the idea of sending to remote countries in quest of medicines, whilst nature in her wild profusion scatters them almost everywhere. The great doctors of antiquity, Æsculapius, Hippolytus, Chiron, and Japis, invariably connected the art of curing with the power of herbs; and, indeed, so impressed were the ancients with the

importance of Medical Botany, that in the earlier times the knowledge of plants was almost exclusively medicinal. In modern times, it has been too often the practice to condemn the use of simple remedies as being anile and quackish, and to extol preparations of a mineral character as being more certain, speedy, and uniform, in their operation. Simple as old women's remedies may be, they generally possess the advantage of being harmless. If they do not effect much good, or at all events, if they do not come up to the mineral medicines in the rapidity of their action, they seldom do much harm; whilst it cannot be denied that the use of calomel and other such medicines, in the hands of unskilful practitioners, often lays the foundation of incurable distempers in the constitution. In such a state of things, therefore, it cannot be denied that the homœopathic doctors are rendering incalculable service to society by introducing to notice some of the old-fashioned medicines, simple in character, indigenous to most countries, and easy of preparation. I am not now discussing the question as to the comparative merits of homœopathy, or allopathy, but simply adverting to a fact which ere long may have its influence in developing the medicinal resources of Australia. When we look round us even in the Parramatta district, there is, indeed, a wide and almost untrodden field before our eyes, containing deeply-buried truths and startling mysteries, which a long life would fail entirely to elicit. The harvest to be reaped is plenteous, but the labourers are few. With the exception of Dr. Ferdinand Mueller, the eminent botanist of Victoria, scarcely anyone has instituted any experiments into the hidden properties of our native plants, and for his researches indeed the people of Parramatta, as well as the scientific world in general, stand deeply indebted, for amongst some of those which he has tested, several species occur in our immediate neighbourhood. But Dr. Mueller, profound and energetic as he is, has not time for pursuing so abstruse an investigation. His duties as Government Botanist of Victoria, and Director of the Botanical Garden in Melbourne, as well as the multifarious works he is engaged in preparing for the press, preclude the possibility of his doing much for practical chemistry. The light, however, which he is throwing upon the subject of medical botany cannot fail to have its effect, and it is sincerely to be hoped, that others profiting by the valuable

suggestions he has given to the world, may enter upon the study of our medicinal plants, and prove that whilst we have valuable remedies within our reach, we need not rely too much upon foreign importations to promote the art of healing. From experiments which were made in Melbourne some seven years ago, the valuable properties of some of our bush trees were fully proved. The secretions of resins and gum resins, as well as the essential oils obtained by distillation from their leaves, were highly commended both for their medical and commercial advantages, and it was truly remarked that "in these resources alone, there is presented a vast field where industry and science may be peacefully associated, and reap the rich reward which is due to exertion and intelligence." And let it be borne in mind that these results arise from no foreign sources, but from the species of *Eucalyptus*, *Melaleuca*, and *Acacia*, or in plain words from the Gum trees, Tea trees, and Wattles all around us. These trees possess properties of an astringent character, and therefore, in a country so exposed as Australia is in some localities to such complaints as diarrhœa, dysentery, and low fever, nature has provided remedies at once simple, near at hand, and within the reach of all. All we require is, that men of science and observation should make known in plain and unmistakeable terms, the species best adapted for our purposes, and the simplest and cheapest method of preparing medicine from them. Amongst the plants on which Dr. F. Mueller has experimented, are *Mentha satureoides* and *Pittosporum undulatum*. The former is well known here by the name of Wild Pennyroyal, and long before the learned Doctor graced our shores, a decoction of it was used as a tonic. It appears, however, that a valuable oil may be extracted from the little plant, which can be employed medicinally, as many species of Mint enumerated in the Pharmacopœia, or chemically in imparting to other ingredients a pleasing flavour and scent. The *Pittosporum*, is not so abundant in our district, but it is a tree frequently cultivated in gardens, and the fact should be made known that the flowers yield an almost jasmine-like scent by distillation. *Prostanthera*, which the Doctor also mentions, occurs but sparingly near Parramatta, but the species of *Zieria*, *Boronia*, and *Corrœa* (all Rutaceous plants) occur frequently, and abound in volatile oils. A series of experiments on these plants would prove not only highly interesting,

but calculated to do much for the promotion of medical botany. The bark of some species of our *Persoonia*, may be employed medicinally in decoctions, but their properties are as yet but little known. Two little plants of the Gentian Family, common enough in the spring, the one with pink and the other with yellow flowers, (*Erythræa Australis* and *Sebæa ovata*) are great favourites with those persons who know the value of them, and they have proved highly efficacious in certain stages of dysentery. The pink one is generally called Centaury and is the more powerful, and like the allied European species "possesses all the essential properties of the gentian of the shops, and although not used professionally, is a very valuable native medicine; in places where it grows, it is carefully collected for use in rustic pharmacy." A learned physician, not a hundred miles from Parramatta, was so impressed with the efficacy of this little herb, from noticing the use of it amongst certain old women in his neighbourhood, that he was not too proud to adopt their remedy and recommended it to his patients. This was an instance of candour in a great mind which deserves to be recorded, for medical men generally are so wedded to what is popularly called "Doctor's Stuff," that nature with all her endearments appeals to them in vain. Our species of native *Rubus* also, I happen to know, was recommended by another medical practitioner amongst us. *Rubus idæus* is known in Europe for its astringent properties, and *R. hispida* of America is used instead of Cinchona. It seems highly probable, therefore, that our *R. parviflorus*, or common native Raspberry, the valuable properties of which have been discovered by the old women, may one day claim a place in the Pharmacopœia. The native Sarsaparilla (*Smilax glycyphylla*) is already to be found in that useful work, but strange to say, although the plant abounds in our creeks, foreign sarsaparilla is imported and sold in the shops. The native plant is said to be tonic and antiscorbutic, and in the form of a decoction, makes a wholesome and agreeable beverage. The late much respected Dr Greenup, (whose name will long be associated in Parramatta with everything that was benevolent and scientific) used to recommend this as an alterative and tonic. It is to be regretted that persons sometimes through mistake use the leaves of *Hardenbergia* or *Kennedia* for sarsaparilla. These cannot have the same good effect. Our true

Sarsaparilla is what is known by the name of "Sweet Tea or Wild Liquorice." One of our native laurels (*Cryptocarya glaucescens*), a tree allied to the Sassafras of the Pharmacopœia, deserves to be mentioned as possessing medicinal properties as yet but little appreciated. The berries would yield oil, and probably a decoction of the wood might be employed for a tonic. Our native grape (*Vitis hypoglauca*) yields a jelly of a beautiful crimson colour, which has a flavour similar to those agreeable remedies that are used sometimes in cases of sore throat. It seems probable that a good gargle might be prepared from this fruit, and if the dye could be fixed, the colour of the juice might be rendered available for many purposes. The *Chenopodiaceæ* of the neighbourhood vary in their properties, some being exceedingly nauseous, whilst others are cooling and antiscorbutic, and prove eatable as spinach. *Verbena officinalis* or the common Vervain, was a very popular plant in ancient times, and even now it is regarded as febrifuge and vulnerary, whilst it may be used externally as a rubefaciant in rheumatism and other pains of the joints. It has been used in this country as a decoction for giving tone to the stomach, and arresting the incipient stages of consumption, but whether it really possesses any efficacy in such cases is not known. The native *Veronica* (*V. plebeia*) is very similar in properties to some of the European species, the leaves of which are substituted for tea, but they are more astringent and less grateful. Our *Gratiola* also should be tested, for as it is common on almost all our creeks and marshes and possesses a powerful scent arising from the volatile oil it contains, the plant may prove serviceable. The *G. officinalis* of Europe which is nearly allied to our *G. pedunculata*, is very acrid and drastic, and although sometimes useful in hypochondriasis, must be employed with extreme caution as it has proved poisonous. It is reported that the prevalence of this weed in some of the pastures in Switzerland, renders them useless. *Prunella vulgaris* or Self Heal is indigenous here as well as in Europe, and, according to the Pharmacopœia, is bitter and astringent, and occasionally used as bark. In the country in England, the leaves are supposed to be efficacious in healing cuts, and hence the name. Our native Currants (*Leptomeria*) have properties which might be turned to other accounts besides that of making jam and jelly. The



different species possess a very powerful acid, which appears remarkably in the way it mixes with other jams. The acid could be employed in flavouring sugar drops, or as affording a substitute for lemon syrup. In addition to the native plants which might be rendered available for medicine, there are now many introduced plants which have become acclimatized and do not seem to vary from the foreign species. Some few of these deserve notice especially *Datura stramonium* or the Thorn Apple, *Ricinus communis* or Castor Oil, *Anagallis arvensis* or Pimpernel, *Phytolacca octandra* or American Nightshade, *Feniculum vulgare* or Fennel, *Euphorbia helioscopia* or Wart-wort, and sundry species of *Rumex* and *Plantago*. Most of these are regarded as affording remedies in certain disorders. Thus, for instance, *Datura stramonium*, though poisonous, is employed in asthma, and the seeds when expressed and made into ointment with hogs' lard, are good for irritable ulcers, burns, and scalds. *Ricinus* not only yields castor oil, but the leaves of the plant have been successfully used by Dr. Pringle as a galactopoeitic. The doctor has recently reported two remarkable cases. The one was that of a woman, who from total absence of milk in one breast, and a very limited supply in the other, had lost two children in succession in early infancy. By the application of the Castor Oil leaves for about a week, the effect was truly astonishing, for the evil was remedied, and the woman was enabled to rear her children afterwards. The second case was that of a delicate lady, who through the same simple application for three days, was rendered capable of supplying the nourishment necessary for twins.

The little weed Pimpernel has a beautiful flower of a rich crimson colour, and is sometimes called the poor man's weather glass, as it is said to close on the approach of bad weather. It is used in mania and hydrophobia, and the juice, when applied to the eye in certain stages of ophthalmia, is reported to cleanse it in a remarkable manner. Mr. Charles Tunks, of Parramatta, tried it on the eyes of a dog and found it very efficacious in removing the ulcerous matter, and improving the vision of the poor animal. *Phytolacca* is spreading very much and bids fair to follow the railway into the interior. It is used as a purgative medicine, &c., and if any method of fixing the colour could be devised, the purple juice of the berries would yield a most valuable

dye. *P. decandra* is cultivated sometimes in gardens, but *P. octandra* is found in so many parts of these colonies, that some persons regard it as indigenous. Fennel is used in Europe for seasoning fish, and an oil is obtained from the seeds. The plant is springing up in many cultivated fields, and some persons regard it as poisonous, but this opinion is decidedly opposed to European experience. Amongst some of Dr. Mueller's recent experiments, he has shown that from the common weed *Myriogyne*, snuff can be prepared, and that from several species of *Pimelea* an acrid resin can be obtained which has remarkable blistering properties. He has also ascertained that our common Apple tree has 2.9 of tannic acid, and 0.9 of gallic, whilst the *Eugenia Smithii* has 16.9 of the former, and 3.6 of the latter. These, and many other results are highly interesting, and whilst they demonstrate the progress of science in these colonies, they exhibit many useful facts which may hereafter exercise an influence on medicine and the arts in general. It seems that *Gastrolobium grandiflorum*, the poisonous plant of the north, and *Swainsona Greyana* which is sometimes called the Poison Pea of the Darling, are to be subjected to a "rigorous toxicological and chemical examination" at an early period.

From the glance that I have taken at the medicinal plants of the neighbourhood, it is quite evident, that they are not merely numerous, but that, as yet, their properties are very little understood. Nature has provided remedies for many diseases to which "flesh is heir," and yet, from carelessness and indifference, or from prejudice and vanity, we neglect to profit by her profusion. In many cases, the qualities of herbs are regarded as fit subjects for quack doctors or old women, whilst in others, an opinion evidently exists, that medicines enough are known already. And yet it is reasonable to suppose that the Great Architect of the Universe created nothing in vain, and that the smallest plant is not only an illustration of His wisdom, but that it occupies a position in the economy of nature, which in the present order of things cannot be dispensed with. It should be the object of science therefore to discover the uses of plants, and when those uses have been discovered, to communicate them for the benefit of mankind. Before the invention of printing, important discoveries were frequently lost to posterity for want of some means

to perpetuate the knowledge of them. Now, however, that we possess the most extended means of circulating information through the press, and of preserving the discoveries of the present age for the moral elevation and material advancement of those yet to come, it behoves us, whenever we have ascertained that the properties of any particular plant have a tendency to alleviate or remove the ravages of any disease, to place the fact on record. And if persons of observation, residing in different parts of the colony would adopt this course, and not act on the selfish principle of acquiring knowledge for their sole gratification or advantage, we should soon collect a body of facts that would tend materially to advance the science of Medical Botany amongst us, and to render unnecessary the importation of many medicines from abroad. What Pliny said centuries ago, is true now even with us, that simple, natural, and in expensive remedies are always at hand: "*Hæc sola naturæ placuerat esse remedia, parata vulgo, inventu facilia, ac sine impendio.*"

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REMARKS ON THE  
BOTANY OF BERRIMA, & THE MITTAGONG RANGE,  
WITH  
A GLANCE AT "FREE SELECTION."

*Read before the Parramatta Church Society, 1864.*

**D**URING a short visit to Berrima and the Mittagong Range in the beginning of October last, I had a favourable opportunity of examining the vegetable productions of those parts, and of collecting many specimens of plants which I had not previously seen in a living state. The town of Berrima is on the Wingecarribbee River (which is a tributary of the Wollondilly), and some years since it was a place of some importance; but owing to the discontinuance of transportation to this colony, and the consequent reductions in the Government establishments, it has become a place of less note. Berrima is rather more that eighty

miles from Sydney, and, now that the railroad has been opened as far as to Mittagong, the journey from the metropolis to Berrima can be accomplished in a few hours. The Mittagong Range, which may be regarded as an easterly spur of the Blue Mountains, forms the northern boundary of the Southern table land on the coast side of the main dividing chain. The highest point is about 2454 feet above the level of the sea, and the range runs through the whole length of the county of Camden, terminating close to the sea in the Illawarra mountain, about fifty miles south of Sydney. The vegetation in the immediate neighbourhood of Berrima varies very much from that of the Mittagong Range, especially where the sandstone rock is covered or displaced by whinstone or trap; but probably some of the prettiest flowering shrubs may be found within a short distance of the town. In reference to the geology of the Mittagong Range, and its resemblance in some parts to that of Tomah, I have received the following communication from my eminent geological friend, the Rev. W. B. Clarke, F.G.S.; "The summit of Mount Tomah is covered by basalt, which extends away to Mount Hay, where, however, the igneous rock somewhat varies from the ordinary character of basalt. The west end of the Mittagong Range is partly trachyte and partly a porphyritic greenstone. But basalt occurs in the more southern part of that range, and forms some isolated hills in the country near the Wingecarribbee Swamp and Mount Kinnoul. Basalt also occurs in great abundance near Ivy Hall—at Cordeaux, on the Berrima Road—and in other parts of that country. The Mittagong carries its igneous character right down to Kiama. It is not, therefore, extraordinary to find the vegetation on Tomah and certain parts of the Mittagong agree. Between the head of Cordeaux River and the Road from Jamberoo to Bong Bong are several other large masses of basalt, and there, also, tree-ferns abound. The different colours on the surface soil of those localities are probably due to a greater or less proportion of iron oxide." Of the Rutaceæ, two species of the genus *Boronia* (*B. microphylla* and *B. anemonifolia*), one of *Phebalium* (*P. squamulosum*), and one of *Philothea* occur frequently amongst the disintegrated sandstone, whilst the *Epacris* family, which in Australia takes the place of Heathworts, is there represented by four species of *Epacris* and three of *Leucopogon*, viz.,

*E. microphylla*, *E. riparia*, *E. onosmæfolia*, *E. nivalis*, and *L. microphyllus*, *L. virgatus*, and *L. ericoides*. All these shrubs are very pretty, and they form a pleasing relief to the rigid proteaceæ with which they are occasionally associated. The proteaceous shrubs belong principally to the genera of *Grevillea*, *Banksia*, *Persoonia*, *Lomatia*, *Hakea*, and *Petrophila*, of which I noticed at least eleven species, (*Grevillea Baueri*, *Banksia Australis*, *B. spinulosa*, *Persoonia virgata*, *P. lucida*, *P. prostrata*, *Lomatia salicifolia*, *L. ilicifolia*, *Hakea microcarpa*, *H. dactyloides* and *Petrophila pedunculata*). The most ornamental of these is the little *Grevillea* which grows close to the town. The leguminous shrubs and trees naturally divide themselves into the Mimosæ and the Papilionaceæ.

Before I enumerate any of the species, I may mention that the plants supposed to be the most injurious to sheep belong to the Leguminosæ, but, with the exception of *Indigofera Australis*, or the native indigo, I did not see any plant of the order which I could look upon as deleterious. And even with respect to that, I am inclined to think that by the term "indigo" many of our squatters mean *Swainsona*; for Dr. Cox and Mr. Russell have recently favoured me with specimens of *S. coronillæfolia* from the Macintyre, which they assure me is called "indigo," and is regarded as a decided poison to sheep or cattle. It is a pretty plant and cultivated in gardens, and is perfectly distinct from the poisonous shrub *Gastrololium grandiflorum* from the Flinders, a species very similar to one in Western Australia which caused such havoc amongst the sheep some few years ago.

Of the Mimosæ, I noticed six species of *Acacia* (*A. multinervia*, *A. decurrens*, *A. falciformis*, *A. oleifolia*, *A. vomeriformis*, and *A. umbrosa*); but only one of these attains any size, the rest being mere shrubs or small trees. The Papilionaceæ are represented by species of *Pultenæa*, *Kennedia*, *Bossia*, *Mirbelia*, *Daviesia*, *Dillwynia*, and *Oxylobium*, (*Pultenæa altissima*, *P. elliptica*, *Kennedia prostrata*, *Bossia foliosa*, *Mirbelia grandiflora*, *Daviesia latifolia*, *D. mimosoides*, *Dillwynia floribunda*, *D. parviflora*, and *Oxylobium arborescens*). *Kennedia prostrata* has pretty scarlet flowers, and is worthy of cultivation. It occurs near the sea-coast, as well as in the more elevated parts of the colony, and it was one of the earliest papilionaceous flowers introduced into England from

this colony. The species of *Daviesia* are not very ornamental; but the leaves contain a powerful bitter property, which renders them palatable to horses and cattle. *Comesperma ericinum* and *Bauera rubiaefolia* occur near Berrima, and seem identical with the species found in the neighbourhood of Sydney. The latter of these has small pink flowers, with eight or ten petals, and it may frequently be noticed near the creeks at the North Shore. The family to which *Comesperma* belongs, viz., that of the Milkworts, is a very limited one in this part of Australia. Dr. Mueller's *Polygala veronicea* is now found to be identical with *P. Japonica*, and it is interesting as being the only species of the genus found in New South Wales. *Comesperma ericinum* and *C. volubile*, as well as the almost leafless little plant *C. sphaerocarpum*, may all be collected near Parramatta. These plants may easily be recognised by any one who is acquainted with the species of *Polygala* so common in gardens, and which are natives of America or the Cape. Some of the cultivated species have a tendency to spread in this colony, and sometimes they may be noticed in the bush, far from any garden, the seeds having been conveyed away in all probability by birds.

Of the *Santalaceæ*, I remarked two species of native cherry (*Exocarpus cupressiformis* and *E. stricta*), two of native currants (*Leptomeria acida* and *L. acerba*), and a small shrub with minute white flowers nearly allied to the same genus (*Choretrum parviflorum*). Some of these occur in the county of Cumberland; but *Exocarpus latifolia* (of which I have recently received specimens from M. Thozet of Rockhampton) is a species of cherry which is almost tropical. This is very different from our species, and has oval nerved leaves. Amongst the other plants which I collected near Berrima were *Pimelea linifolia*, similar to that in the low country, but having somewhat pink flowers; a very pretty *Cryptandra* (*C. propinqua*) with minute wax-like flowers; a *Tetrateca* (*T. thymifolia*) with purple petals; and an elegant *Veronica* with perfoliate leaves (*V. perfoliata*). The genus *Veronica* is well known to gardeners, but the most admired species are natives of New Zealand (*V. Lindleyi* and *V. speciosa*). The common species of New South Wales is *V. plebeia*, a small decumbent plant with blue flowers, and ovate serrate leaves, resembling the European species *V. chamædrys*. Some of the species,

especially the last mentioned, are sometimes used as substitutes for tea, and there is every reason to believe that the one so generally diffused in this colony possesses medicinal properties not inferior to that dignified by the name *V. officinalis*. The species (*V. perfoliata*) which grows at Berrima, and near Mudgee, as well as in other parts of the interior, is a pretty little plant worthy of cultivation. On the banks of the river, *Micranthea hexandra* (*Euphorbiaceæ*) is very abundant, and also the shrubs *Pomaderris ligustrina*, *Panax dendroides*, *Leptospermum obovatum*, *Pleurandra stricta*, *Hibbertia diffusa*, *Frenela Australis* (a native cypress), and a stunted *Casuarina*, or forest oak. Of the difficult genus *Eucalyptus*, or gum, I reckoned eighteen species, several of which are perfectly distinct from any near Parramatta. I am well aware of the difficulty in determining the species of this genus, and until Mr. Bentham and Dr. F. Mueller have carefully examined the specimens forwarded to them from all parts of Australia, it may be as well to rely on the local names, rather than on those which I may imagine they should have. When I find writers of some eminence referring very different trees to the same species, I cannot but see the inadequacy of the descriptions hitherto relied on; and I trust that Dr. Mueller's cortical system may be useful in enabling the student to determine at once the group to which any species belongs. This will be a great step towards the elucidation of the difficulty; for, although in some species the bark varies considerably, yet the Doctor's system is preferable to that of working out species by the comparative length of the operculum, which has undoubtedly led to some confusion. However, whether we place any reliance on the length of the operculum, or whether we adopt the difference of the bark as a convenient mark for distinction of species, it seems almost useless in this genus to regard much either the shape or size of the leaves. Beyond indicating the general form of the leaf in any species, and noticing the ramification of the veins, we must not attribute any importance to the exact outline or measurement of the leaves, for sometimes on the very same tree they may be found of various shapes and sizes. Hence I think it by no means improbable that some of the earlier botanists, who described at a distance, from dried specimens, may have considered mere varieties as distinct species, or what is still more erroneous,

they may have supposed that the young tree, with its ovate or connate leaves, is not identical with the more advanced tree with its stalked and lanceolate leaves. With the exception of the gigantic "messmate," which belongs to the Mittagong Range, I remarked near Berrima a scrubby *Eucalyptus*, similar to that on the Blue Mountains. This I believe to be Cunningham's *E. microphylla*. Not far from the place where I noticed it, the powdery-leaved tree, called the "Argyle apple," was plentiful. There can be but little doubt that this is *E. pulverulenta*. It generally appears on rocky places, and never attains any great size. The tree has some resemblance to the apple of these parts (*Angophora intermedia*), but the leaves are much more glaucous. The Camden woolly-but which is so common near Berrima, appears to me to be *E. diversifolia*, for the leaves are sometimes opposite and sometimes alternate, varying in shape from ovate sessile to narrow lanceolate. This is a large tree, very like the woolly-but of the county of Cumberland in appearance, but the leaves are frequently opposite, and the upper branches smooth: the seed vessels also differ materially. Some time since I was under the impression that our woolly-but was *E. gomphocephala*, but my learned friend Dr. F. Mueller assures me that that species is restricted to another part of Australia. The mountain ash I find to be *E. virgata*, a species not found near Sydney. Influenced by the difference of soil and climate, this useful gum attains a great size, and the wood is very serviceable, being used for shafts, fencing, and other purposes. The bark of this tree is fibrous in the lower part, but the branches are smooth, so that in character and appearance it bears a resemblance to our black-but (*E. pilularis*). One of the species, which is generally found in low flats, is called "the Lead-coloured" or Water Gum," and seldom exceeds thirty feet. It is a well marked species, having the bark wrinkled below, but the greater part of the tree perfectly smooth and of a lead colour. The wood is not much valued. When I first saw this gum I regarded it as a new species, and suggested to Dr. F. Mueller that it might appropriately be named in honour of my worthy friend the Rev. James Hassall, of Berrima, who possessing a thorough knowledge of the district in which he resides, takes a pleasure in conducting his friends through the wildest and most intricate parts of the bush



that he may shew them the hidden beauties of the country. When Sir William Macarthur was collecting woods for the Exhibition, the Rev. J. Hassall rendered him essential service in guiding him to the part of the range called "The Sassafras." To the same gentleman, Mr. Moore, Mr. Hill, and subsequently myself, were indebted for a similar favour. I thought, therefore, it would be a graceful compliment to hand down his name to posterity in connection with one of the noble trees which he delights to exhibit. It appears, however, that the "lead-coloured gum," though differing in the bark from a species previously described, is in reality a mere variety of *E. stellulata*, which Dr. F. Mueller found near Lake Omeo, and the sources of the Macallister, and of which I forwarded him specimens from the neighbourhood of Mudgee. The white gum of the Berrima district is now ascertained to be *E. coriacea*, and the yellow gum near Bongbong, a variety of *E. Stuartiana*. The remaining species which I noticed are identical with those of our district, most of which are described in the second volume of Dr. F. Mueller's *Fragmenta*. On my way to the Sassafras I noticed *Soverbea juncea*, a marsh plant, growing also near Sydney, a plant of the daisy family (*Brachycome*), a wild camomile (*Helipterum anthemoides*), two species of eyebright (*Euphrasia speciosa* and *E. paludosa*), *Stackhousia monogyna*, and a *Renealmia* which seems in some respects to agree with Brown's description of *R. pulchella*. Whether the two species *R. paniculata* and *R. pulchella* are really distinct, or whether they are two varieties of one species, differing in some respects from the effects of the locality in which they occur, remains to be determined. The one termed *R. paniculata* I have seen in gullies at the Kurrajong, and also in a similar situation near Bent's Basin. It seems to me a larger plant than that near Wingecarribbee, and the leaves are generally rough at the margins. Two remarkable trees of considerable size grow near the Wingecarribbee Swamp, which I am happy to find are accurately described in the first and second volume of Mr. Bentham's *Flora Australiensis*. The one locally termed "Acacia," is *Eucryphia Moorei* of the *Saxifrageæ*, an ornamental tree, the young shoots and foliage of which are pubescent, and the buds very gummy. The leaves are pinnate and the leaflets from nine to eleven. Mr. Bentham states that flowers and fruit of this species

are the same as in the smaller forms of *E. Billardieri*, which is a Tasmanian tree. This is one of the most interesting trees of the district, and when not in flower resembles some of the larger species of *Acacia*. It was first found by Mr. Moore, near the sources of the Clyde and Shoalhaven Rivers, but it appears to be abundant in the Berrima district. I dare say that when this tree becomes better known, it will be introduced into gardens and pleasure grounds. The other tree to which I have referred is *Elæocarpus holopetalus* of the *Tiliaceæ*, the wood of which was taken home to the Exhibition by Sir William Macarthur; but as that gentleman had not an opportunity of examining either the flower or seed vessel of the tree, he was unable to determine what it was. The wood was marked number 182, "genus unknown, a beautiful tree with foliage resembling that of the *Quercus ilex*, wood close grained, and good for joiners' work, from an elevation of about 3000 feet near Berrima." This noble tree sometimes attains eighty feet, and differs from the other species of *Elæocarpus* in having the petals entire. *E. cyaneus* which occurs at the North Rocks, near Parramatta, and also in the neighbourhood of Sydney, has a very extended range, for it is found all along the coast from Wilson's Promontory to Rockhampton. *E. obovatus* is also widely spread, and as on the Hunter it was popularly called "ash," it has given its name to Ash Island, where formerly the tree used to abound. Both of these species have fringed petals, but the tree from Mittagong differs in that respect, having the petals entire, and hence its specific name, "*holopetalus*." *Stypantra glauca*, a pretty blue flower of the Asphodel family, occurs frequently on the ranges, and a species of *Pimelea* called "cotton" (*P. hypericina*) grows abundantly in the more open spots. This is a much larger plant than any *Pimelea* I had seen previously, being six or eight feet high. The bark is very fibrous, and is much used by the free-selectors for binding up anything. In marshy places, I remarked *Carex gracilis* and *Spergula arvensis*, the latter of which although very similar to the European plant, can scarcely be regarded as an introduced species. *Mari-anthus procumbens* also was seen in many places. In that part of the Mittagong Range, which has been recently made the object of free-selection, the dense parts of the forest closely resemble those of Mount Tomah. As the geological formation seems

almost identical, and the elevation is considerable, being only 700 feet less than that of Mount Tomah, many of the same shrubs and trees are found in both places. The principal gum-tree of the range is the Messmate, which in appearance is very similar to stringy bark, but the upper branches are smooth and the bark inferior. The origin of the name "Messmate" is somewhat singular. At first the tree was supposed to be stringy bark, but when it was found to differ from that species in the grain of the wood and the fibre of the bark, some one remarked that if the tree were not stringy bark, it was certainly "messmate" to it: hence it was called the Messmate. This species is of gigantic dimensions, being more than 160 feet high and six or seven feet in diameter, and, therefore, the labour of clearing the ground, one would imagine, is somewhat discouraging to settlers. And yet, as I passed along, I heard few complaints on that head, all hands being cheerfully engaged in felling timber, or burning off, or preparing ground already cleared. Most of the men seemed pleased at the idea of being landed proprietors, how limited soever their farms might be; and one in particular spoke in glowing terms of his future prospects, and said that he already valued his land at £10 per acre. There is, doubtless, a pleasing satisfaction arising from the possession of anything which a man may justly call his own; and this feeling is probably enhanced by the amount of labour which he expends upon it in improvements. The terms on which land is obtained, are at the rate of £1 per acre, one quarter of the purchase money being paid as a deposit. According to the Act of Parliament, no farm can be less than 40 acres nor more than 320; so that a person on selecting the smallest block of land has to pay £10, and, at the expiration of three years from the date of purchase, he is expected to tender the remaining £30 to the Colonial Treasurer; but, should that be inconvenient, the payment of the balance may be deferred from year to year at a charge of 5 per cent., or on the payment of 30s. per annum. If the terms of the Act be not complied with, the land will revert to the Crown, be liable to be sold at auction, and the deposit be forfeited.

Without regarding the political aspect of the question, and the evils which may or may not arise from free selection without survey, in other parts of the colony, I could not but be impressed

with the idea, that the system of alienating the public lands in small allotments suitable for farms, is calculated to call forth a great deal of physical energy, and to make a hard-working and industrious population. To ascertain the true character of a people, however, it is necessary to reside amongst them for a time, and to watch their habits closely—not merely when they are engaged in their ordinary occupations, but also when they relax their exertions for a season, and devote themselves to amusement or recreation. It is under circumstances of the latter kind, that a man's true character becomes developed. Whilst engaged in labour which is almost habitual to him, the man of moral and religious feeling, can scarcely be distinguished from one of a very opposite character. The physical powers of both may be the same, and both, as far as external appearances are concerned, seem to have the same object in view. It is only when the pressure is removed, and a man is as it were off his guard, that we see the startling difference; for whilst the really good man, in his seasons of leisure, is anxious to promote the moral welfare of his family, and to redeem the time by the study of the Holy Scriptures, and by those pursuits which are calculated to elevate his nature, ever regarding himself as one that hereafter must give an account of his stewardship—the opposite character devotes himself to pleasures of an unprofitable kind, wasting his time and earnings in gambling and dissipation, and laying the foundation for inevitable misery, both for himself and family. Not, therefore, having had an opportunity of following the free selector, through seasons of relaxation, as well as of active employment, I can speak merely of my impressions from a rapid visit; and such impressions, I must in candour say, are favourable to the individual himself engaged in the clearing and cultivating of the soil, as well as to any system which is designed to open the resources of the country, and to place small farms in the hands of well disposed persons. It was a pleasing feature in the character of many individuals, to hear them speak so anxiously respecting the education of their children, and their earnest desire to have periodical visits from some minister of religion. Where such a desire exists, it is not difficult to foresee that means will be adopted to secure the erection and establishment of schools, and the occasional, if not regular, ministration of religious ordinances.

In the present posture of affairs, when the settlers, from the want of suitable roads, are unable to send their produce to a good market, there would be much difficulty in raising a salary for a minister, or, even without aid from the Government, of founding a school; yet I cannot help thinking that a people who seem to appreciate religious services so highly, and who are pleased even with an occasional visit from a minister, will eventually adopt means to secure the accomplishment of their wishes. At all events, it is a subject for consideration for the committee of the Church Society, and other societies which are intended to afford means of propagating the Gospel in the interior. If one of the objects of free selection is to encourage the emigration of respectable families with a little capital from the mother country, it seems highly important to give due prominence to the moral aspect of the question. The class of people best adapted for the kind of life indicated are little farmers, or men accustomed to hard work, who have saved something by their industry, and are desirous of possessing farms of their own. But it can scarcely be expected that the best description of such persons will be induced to surrender all the endearments of home, and to seek their fortunes in a distant country, unless they hear that some preliminary measures are in progress for the moral and spiritual benefit of those intending to emigrate.

Having digressed a little from my subject, to glance at the free selectors, I must now refer to other plants found on the range. In addition to the Messmate, the *Sassafras* (*Doryphora sassafras*), is very common in some parts where the sandstone gives way to the trap formation. This fine tree affords timber for flooring boards and house purposes, and the bark is used in decoctions for its medicinal properties. There is also the tree called "Beech" (*Schizomeria ovata*), which is nearly allied to *Ceratopetalum apetalum*. Both of these have soft, light, and close-grained wood, not merely useful for cabinet work, but also much in request for coach-building. They may be noticed likewise in the neighbourhood of Manly Beach, and on the Toongabbee Creek; but all the trees of this kind in the vicinity of Sydney and Parramatta, are very much stunted in their appearance, when compared with those of the mountains, for at Mount Tomah and the Mittagong Range, the same species become forest trees,

attaining the height of sixty or eighty feet. It seems almost a pity that in the process of clearing, so many valuable trees of beech, and light wood, should be sacrificed to the flames, for in the course of a few years, as railroads extend into the interior, and means are thus afforded to convey timber to Sydney, such trees will be much sought after. The same remark, indeed, is applicable to other trees in the same locality, such as the "beef wood," or *Stenocarpus salignus*, which on the mountains attains the height of eighty feet, and produces wood of great beauty likely to be useful for veneers in cabinets; *Eugenia Smithii* or "Lilly Pilly," which is also a forest tree with wood which, when properly seasoned, may become valuable to carpenters; the *Polyosma Cunninghamsi*, or Yerella, "a very beautiful small tree with bright glossy foliage and very fragrant flowers, and soft close-grained wood" (Sir W. Macarthur); the black plum or *Cargillia Australis*, a tree of the ebony family, yielding a fruit eaten by the aborigines, and having very tough wood; *Alphitonia excelsa*, or "red ash," a tree sometimes nearly 100 feet high, with close-grained wood; *Trichilia* or *Synoum glandulosum*, or a "native rosewood," a tree which appears very variable in size, for whilst those which I saw on the range were small slender trees, Mr. Moore reports that he found some on the Clarence and Richmond nearly 100 feet in height, "the timber of which when fresh is of a deep red colour, emitting a scent similar to the common rose, and useful for inside lining of houses and ship building;" *Cupania semiglauca*, of the *Sapindaceæ* a small tree with hard wood; and *Drymis dipetala* or the "Pepper tree," a shrub with pretty flowers and pungent seeds. The Musk tree or *Eurybia argophylla* is common in some parts of the range. The leaves of this tree are pervaded by a strong musk-like scent, but it appears after careful experiments that the scent cannot be obtained by distillation as an essential oil. *Hedycarya* or the "spurious mulberry" also occurs in the same locality, and, although of small size, it is said to have a soft beautiful wood quite available for cabinet work. In referring to the woods of the colony, I have been indebted in some instances to the valuable information furnished for the Exhibition of 1862 by Sir William Macarthur. The important services rendered to the colony by that gentleman, in collecting specimens, have been so highly appreciated in Europe, that they

need but little commendation from me ; but I feel great pleasure in associating the name of that much esteemed and indefatigable colonist with a subject in which he has manifested so much interest, inasmuch as he, in company with the Rev. J. Hassall, passed over the same ground that I have been considering, and collected many beautiful specimens of wood in the very spots which I have lately had the gratification to visit. Most of the climbers which I noticed were similar to those of Tomah, belonging principally to the genera of *Aphanopetalum*, *Tecoma*, *Marsdenia*, *Smilax*, *Cissus*, *Tylophora*, *Sarcopetalum*, and *Stephania*. The orchids, especially the parasitical ones, were also identical, as well as the strong scented shrub *Prostanthera*, the pretty little *Citriobatus* or "orange thorn," and a diminutive thorny species of *Canthium*, resembling the *Bursaria* or thorn of the low country. Two of the most remarkable plants of the range are *Fieldia australis*, a climbing rooting-stemmed plant adhering to the trunks of the Tree Fern, and belonging to the *Bignonia* family, but having baccate fruit ; and *Quintinia Sieberi*, a curious tree, which, although sometimes standing alone in the forest, and attaining a height of forty or fifty feet, is frequently to be seen growing from the Tree Fern (*Dicksonia antarctica*), each having its separate stem in the ground, but so blended together as at first sight to appear one and the same tree. Allan Cunningham was the first who noticed this botanical curiosity, on Mount Tomah, but subsequent observers are of opinion, that this extraordinary tree, although sometimes apparently growing by itself, is nevertheless always propagated in the first instance from the stem of the tree fern. The same opinion is also expressed respecting *Eucryphia Moorei*, of which I have already spoken. The cryptogamous botany of the range seems identical with that of Tomah, the ferns, mosses, and lichens, as far as I was able to observe, being alike in both places. The most striking fern is *Dicksonia antarctica*, or a tree fern, remarkable for its graceful palm-like appearance, and attaining in favourable localities a height of thirty feet, and upwards. There were also two other species of tree fern belonging to the genus *Alsophila* (*A. Australis* and *A. Leichhardtiana*), and similar to those occurring within a few miles of Parramatta. The climbing species of *Polypodium* (*P. tenellum*, *P. Billardieri* and *P. rugestrum*), very frequently meet the eye of the observer, the most elegant of which

*P. tenellum*, as it winds round the trees of the dense forest, assumes the appearance of a *Tecoma*. The species of *Asplenium* most abundant are *A. nidus*, or the Bird's Nest Fern, and *A. odontites* or *flaccidum* (Hooker), with its pendulous fronds. *Lomaria lanceolata*, and *L. Patersoni* occur frequently, as well as *Pteris umbrosa* and *Nephrodium decompositum*, with some species of *Schizæa*, *Blechnum*, *Gleichenia*, *Lindsæa*, *Davallia*, and *Doodia*, that are common in our immediate neighbourhood. The ferns most interesting to me, were the small and tender fronds of *Trichomanes venosum* and *Hymenophyllum nitens*. These grow plentifully round the stems of the tree ferns, and afford by their bright green fronds, a pleasing contrast to the dark coloured caudices on which they grow. Of the *Hymenophyllum*, I should have felt inclined to make two species, but I perceive that Sir William Hooker, after a careful review of numerous specimens forwarded to him from these colonics, reduces *H. nitens* and *H. flabellatum* to one species. The only species of *Lycopodium* which came under my notice was *L. uliginosum*, and of the mosses, which appeared different from those of our neighbourhood, were *Hookeria pennata*, two species of *Hypnum* (probably *H. spininerve*, and *H. chlamydidifolium*), and *Leskia mollis*. No doubt many more species occur in the more retired and gloomy parts of the range, which I had not leisure to visit, but I scarcely think that the species vary much from those collected near Tomah.

It is probable that a more careful examination of the range, may reveal other cryptogamous plants, especially of the more minute ferns and mosses, but I doubt very much whether any really new species remain to be discovered in that part. I think it likely, however, that some of the admired ferns of the Kurrajong and Tomah, such as *Leptopteris Fraseri*, *Dicksonia davallioides*, and *Nephrodium molle* may yet be found in the ranges. The *Nephrodium decompositum* is identical with that of Tomah, but it varies considerably in form and appearance from the same species when growing in shady and damp gullies. In Sir William Hooker's opinion, several ferns hitherto deemed distinct, must be referred to this species.

In concluding my remarks on the botany of the Berrima District, I cannot but express the pleasure I felt in visiting a most wild and romantic part of the colony, where I had an opportunity



of examining in a living state many plants quite new to me, and of noticing some of the results of "free selection." It has long appeared to me a most desirable object to place industrious families on small farms, and I cannot but hope that the experiment now being tried on the Mittagong Range, may turn out favourably. I am not called upon in any way to speculate on social and political difficulties, that may arise from affording facilities for the occupation of remote lands, in which from the want of proper communication with the nearest towns, the settlers may be exposed to hardship from inability to dispose of their super-abundant produce. Nor need I dwell too much upon the establishment of people in a remote district, where according to the ideas of some persons, a population must grow up without moral and religious influences. I prefer to view things as they are. Possessing a healthy and bracing climate calculated to develop the physical energies of the people, and favoured with a soil which seems adapted for the raising of agricultural produce, as well as the cultivation of many European fruits and grasses, I can scarcely wonder that some of the settlers are already looking forward to a time when their industry will be rewarded. As we have seen, from a brief glance at the timber of the district, the settlers are surrounded by dense and beautiful woods, which, as the country is opened and facilities are afforded for better means of communication, may become really valuable, not merely from the practical uses to which many of the trees may be devoted, but also from the different kinds of oil which may be extracted from their leaves—a subject far too extensive to be discussed in the present paper, as may be seen by reference to the catalogue of the Victorian Exhibition for 1861. Amongst the woods submitted for examination, it is somewhat remarkable that the specific gravity of our common woolly-but is 1.187, which seems rather high when compared with the other woods, for none of the gums, with the exception of the ironbark and box, stand nearly so high. It seems to me that the specimens of this wood which were procured from Gippsland, must be of a closer grain than ours, or else that the result of steam drying to which this gum was subjected, has given it a comparative increase of gravity. The leaves from which the essential oil was extracted were forwarded by me from Parramatta and this oil exhibits the remarkable property of imparting an in-

delible transparent stain to paper, indicating that a resin is probably held by it in solution. In a kerosene lamp, this fluid gives a good bright, clear flame, but somewhat inferior to kerosene in intensity.

And with regard to the moral aspect of the question, I cannot but see that whilst deprived of many comforts and advantages resulting from town-life, the settlers are removed from many temptations. People are not always moral and religious in proportion to their proximity to "the sound of the Church going bell," as the condition of too many large towns unhappily testifies; nor do men always value ordinances which are conveyed, as it were almost to their doors, without any trouble or expense on their part. If, therefore, in a remote district, the population, feeling the want of those religious privileges to which they have been accustomed in their earlier years, are disposed to make some sacrifice to establish Divine service amongst them, and to offer unto the Lord their God that which costs them something, they will afford a noble example of the efficacy of Christian principles, and prove to their fellow-colonists that as the Gospel is of Divine origin, it must continue to extend its salutary influence, whether supported by the Governments of this world or not; and that in due time the promises God to His Church will be faithfully and literally accomplished. "The kings of the earth," indeed, "may set themselves, and the rulers take counsel together, against the Lord, and against His Anointed," but we are assured that in spite of every opposition, the period will at length arrive when "the earth shall be full of the knowledge of the Lord, as the waters cover the sea."

And here I might very properly close my remarks, but perhaps some apology is due for having amalgamated in one paper topics which some persons may deem incongruous. Botany, free selection, and the claims of religion, have all passed rapidly before us; and yet when we consider the common bond of union, which either directly or indirectly connects every pursuit of this lower world, and the sanctifying influence which religion sheds on the discoveries of science, I cannot but think that we should rejoice in every opportunity of associating any objects which are calculated to promote the glory of God, or to elevate the moral nature of man. As we pursue our course through this wide and beauti-

ful world, it behoves us to take an extensive survey of all around us, that we may see the harmony and perfection of God's works, and acquire a comprehensive view of the admirable "adjustments which exist in creation as a whole."

"Happy is he who lives to understand  
 Not human nature only, but explores  
 All natures,—to the end that he may find  
 The law that governs each; . . . .  
 . . . . . that does assign  
 To every class its station and its office  
 Through all the mighty commonwealth of things.  
 Up from the creeping plant to sovereign man."

And if on any occasion it is expedient to introduce the claims of religion, and to show that the investigations of science are not inconsistent with the moral and spiritual interests of our fellow-men, it must be peculiarly appropriate to dwell on such topics when addressing the members and friends of a society which is engaged, in any degree, how humble soever it may be, in swelling the notes of that angelic anthem, "Glory to God in the highest, and on earth peace, goodwill towards men." To confine myself to mere matters of detail, would amount almost to a dereliction of duty; for whilst the Church Society, or, shall I say, the Christian Church, has such claims upon its sympathies, and so many in isolated spots are echoing the cry to send them help, I feel happy in directing the attention of my fellow-Christians to the present posture of affairs, with a view of stirring up the slumbering energies of those who have the means of rendering material aid to the propagation of the Gospel. Such a topic as this, I must repeat, is appropriate at any time when addressed to a religious society, but it is certainly so in an eminent degree when we consider that legislative aid is gradually dying out, and that the church must now throw herself upon the sympathies and affections of the people. In such circumstances, we cannot too strongly protest against the notion which even yet lingers in many minds, that the bishops, or the clergy, or any church officers constitute "the Church." Every believer in Christ who has been admitted into the Church by baptism is a member of the same, and, no matter how humble his position in society, he must be regarded as an integral portion of the Church. If the laity in general could realise this idea, and the responsibility which it entails upon them, "numbers and perseverance," to use an expres-

sion of our late Bishop, would soon accomplish much more than State-aid has ever yet done; and in that case the very measure, which some denounce as an unmitigated evil, would tend to develop the resources of the Church, and expand the affections of the faithful. Out of apparent misfortune, therefore, good may arise, and thus, by a mysterious dispensation, the clouds and darkness, which now seem to envelop what may be termed, the transition state of the Church in these colonies, may clear away, and thus introduce a purer state of things. There is, indeed, a mystery in all around us—whether we regard the natural or the moral world—and as a late writer remarks “the more we examine into all God’s ways and doings in providence and grace, the more are we led to see the force of the Apostle’s statement,—‘O the depth of the riches both of the wisdom and knowledge of God! How unsearchable are His judgments and His ways past finding out!’”

“So He ordained, whose way is in the sea,  
His path amidst great waters, and His steps  
Unknown; whose judgments are a mighty deep,  
Where plummet of Archangel’s intellect  
Could never yet find soundings, but from age  
To age let down, drawn up, then thrown again,  
With lengthened line and added weight, still fails;  
And still the cry in Heaven is, ‘O, the depth!’”

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## DR. F. MUELLER’S LITHOGRAMS OF NATIVE PLANTS.

(4to 1865.)

DR. F. Mueller’s last work on “the Plants indigenous to the colony of Victoria,” has briefly been noticed in the daily papers, but I think that a publication so eminently calculated to make known the Flora of Australia, deserves additional consideration. In the article to which I refer, it was remarked “although the illustrations are principally designed to make known the plants of Victoria, the reader will perceive that many of the species are common in other parts of Australia; and, therefore

the work before us will be regarded as a most valuable accompaniment to the *Flora Australiensis*." The truth of this observation must be evident to every one who has carefully examined the work, for of the sixty-six lithograms presented to the public by the learned doctor, no less than thirty-seven of them are illustrations of species common to New South Wales and Victoria, whilst eighteen may be regarded as typical of genera scattered widely over the continent of Australia. In referring to the great utility of the work, therefore, as affording assistance to the student of Australian botany, and enabling him to recognise some of our most interesting plants, it may be well to remark that although the illustrations were "principally designed" for a limited flora, they are in reality of a much more expansive character, and throw considerable light on the obscure structure and remarkable peculiarities of many Australian genera. The importance of this consideration may be inferred by consulting the species of the following genera, as described by Dr. F. Mueller:—

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|---|-----------------------|-------------------------|
| 1. <i>Acacia</i>                          | 7. <i>Eurybia</i>     | 13. <i>Prostanthera</i> |
| 2. <i>Antennaria</i> or <i>Gnaphalium</i> | 8. <i>Galium</i>      | 14. <i>Stackhousia</i>  |
| 3. <i>Bauera</i>                          | 9. <i>Grevillea</i>   | 15. <i>Stenanthera</i>  |
| 4. <i>Calotis</i>                         | 10. <i>Mirbelia</i>   | 16. <i>Stylidium</i>    |
| 5. <i>Cassinia</i>                        | 11. <i>Plantago</i>   | 17. <i>Tetragonia</i>   |
| 6. <i>Conospermum</i>                     | 12. <i>Pomaderris</i> | 18. <i>Veronica</i>     |

Although the identical species of these genera do not occur in our immediate neighbourhood, yet they faithfully exhibit the generic characters which associate them with other species familiar to us; and thus they must contribute and tend materially to assist the student in the labour of classification. If, for instance, the first lithogram be examined, viz., that of *Tetragonia implexicoma*, no one can fail to observe its striking resemblance to *T. expansa* or the "New Zealand Spinach," whether, indeed, he regards the general appearance of the plant, or the organic structures developed in the sectional drawings. Hence the student, who is acquainted with Dr. Mueller's lithograms, when meeting with the spinach so common in some parts of our coast, will find no difficulty in ascertaining the genus to which it belongs. Take again the pretty little *Bauera* figured by Dr. Mueller, and compare it with the species at the North Shore and other places near Sydney, and it will be found that the lithogram connects

the two species together in an unmistakable manner, so that whilst studying the peculiarities of a plant found on Mount William, the mind will associate them with those of another species in the immediate neighbourhood of our metropolis. I might, indeed, go through the species of all the eighteen genera, and show how profitably they could be studied with a view of becoming acquainted with our own flora of Australia in general; but as I think this must be abundantly evident to the careful observer, I shall proceed to notice particularly the plants which are common to both colonies. Of these it may be interesting to remark nine species were described many years ago, by the celebrated Robert Brown, viz., *Boerhavia mutabilis*, *Cassia platypoda*, *Cassytha glabella*, *Lobelia purpurescens*, *Lyonsia straminea*, *Myrsine variabilis*, *Notelea ligustrina*, *Persoonia Caleyi*, and *Taxanthea Australis*. The first of these plants is placed by Brown amongst the tropical ones, but since the publication of the Prodrromus, *Boerhavia* has been found not only in Victoria, but in many parts of the interior of this colony. Dr. Mueller's figure is so well executed that, in comparing it with a specimen I lately received from the neighbourhood of Mudgee, it was impossible to mistake the species. *Cassia platypoda* is described in the Flora Australiensis (vol. 2, p. 287), under the name of *C. eremophila*. It is a species found in Eastern, Western, and Southern Australia. *Cassytha* is a parasitical plant, resembling the dodder in appearance, and *C. glabella* and other allied species are so common in Eastern Australia, that the lithogram will easily be recognised. The uses of this plant are not known, but the fruit (which is a nut coated by the permanent calyx) is sometimes eaten by our colonial youths. *Lobelia purpurascens* is a pretty little flower common in our creeks, but whilst interesting in a scientific point of view, it is not likely to find favour amongst gardeners. *Lyonsia straminea* is a climbing plant of the Apocynaceæ, more remarkable for its comose seeds than for the beauty of its flowers. I have lately noticed a *Lyonsia* on General Macarthur's estate, which has nearly reached to the top of a swamp oak. *Myrsine variabilis* is a shrub of the same family as the *Ardisia*, and it is well named variable, for not only the leaves, but the general character of the plant is much influenced by the locality in which it grows. In comparing some of the diminutive shrubs of this species growing near the salt

water with others flourishing on fresh water creeks, one might be led to separate them; and yet there is nothing in these varieties to mark specific characters. *Notalea ligustrina*, or one of our native olives, is another of Brown's plants. The allied species *N. ovata* is much more common in this colony, and I believe it was from that species that Mr. Shepherd succeeded in obtaining some good specimens of olive oil. *Persoonia Caleyi* does not occur in the neighbourhood of Sydney, but it closely resembles some of the species so familiar to us under the name of *geebung*. *Taxanthema Australis* is now transferred to the genus *Statice*. It is mentioned as one of the plants found in the early days of the colony at Port Jackson and Hunter's River, but I do not think it can be common, as I have never succeeded in finding it in a wild state.

Having noticed the lithograms which illustrate the plants described by Brown, I now turn to those remaining figures which also represent species common to New South Wales and Victoria. Of these (exclusive of *Mirbelia oxylobioides*, which is said to have been found in Argyle by Cunningham), there are twenty-eight lithograms of plants which occur in various parts of the colony, some near the coast, and others in the interior. The family which Dr. Mueller has laboured most effectually to describe is that of the Composites, which, whether regarded as one of the most extensive in this part of the world, or whether contemplated as exercising more profoundly than any other, the skill of the scientific botanist, is attended with much difficulty. In other orders, flowers which closely resemble each other may frequently be referred to their respective genera with moderate care and attention; but amongst Composites it sometimes happens that plants which are widely separated by technical distinctions, appear very similar in their general characters, the classification depending mainly on the shape of the style. Amongst these Composites, there are eight species figured which may be said to belong to this colony, viz.:—*Solenogyne bellioides*; *Senecio vagus*; *Myriogyne Cunninghamsi*; *Eclipta platyglossa*; *Elachothamnus Cunninghamsi*; *Humea ozothamnoides*; *Polycalymma Stuartii*; and *Ethuliopsis dioica*. The first of these Composites is a little plant of the daisy kind, which, perhaps, is one of the commonest we have; but unless considered microscopically with reference to the adaptation of its organs for the functions designed by nature, it has but little beauty to re-

commend it. *Senecio vagus* is of the groundsel genus, and whilst, according to Dr. Mueller, it flourishes in shady, moist valleys of the Dandenong ranges of Mount Disappointment, and on the Delatite, I have collected specimens of it on creeks in the county of Camden. *Myriogyne Cunninghamsi* is an insignificant little plant, remarkable for the abundance of its female florets, and if not identical with the species common in the neighbourhood of Sydney, is certainly closely allied to it. *Eclipta platyglossa* is a small trailing plant with yellow flowers and opposite leaves. We have hitherto regarded it as a species of *Wedelia*, but whether the species found in moist places in the county of Cumberland, is distinct from that collected at the Clarence, remains for consideration. Dr. Mueller's figure suggests the propriety of regarding them as different species. *Elachothamnus Cunninghamsi* has been sometimes referred to *Therogeron*, and sometimes to *Erigeron*. It does not appear to grow near Sydney, but it has been noticed in the interior, particularly on the Darling and Macquarie. *Humea ozothamnoides* does not at all resemble the species of *Humea* so common near Sydney and Parramatta, and so remarkable for its strong scented, tobacco-like leaves, but it looks like a *Cassinia* or *Ozothamnus*. Dr. Mueller, who first noticed this species on the Upper Murray and the Snowy River, regarded it as the type of a new genus (*Hæckeria*), but subsequently he referred it to *Humea* (Frag. vol. 1, p. 17). *Polycalymma Stuartii* is a largish flower, consisting of a dense head of yellow florets, and belonging to a genus established by Dr. Mueller in 1852. I have never seen it in a living state, but my friend Mr. Frederick Suttor sent me some good specimens of it from the Darling. *Ethulipsis dioica* is the *Ethulia* of Sir Thomas Mitchell, and the *Epaltes* of De Candelolle, and is remarkable for its dioecious flowers, the male and female plants being distinct. The figure deserves attentive study, and, in common with the other Composites of the work, affords much assistance to any one desirous of arranging such flowers on proper principles, and of referring them to their appropriate place in the natural system. This flower occurs on the Macquarie, Lachlan, Murrumbidgee, Murray, and Darling. Two of the myrtaceous lithograms represent trees which are very interesting. *Eucalyptus odorata* is the "peppermint" of South Australia, but it is said to extend as far as New England. Whether this is



really the case, or whether the New England species is *E. piperita*, remains yet to be determined. In the present unsettled state of the genus, when all the known species are passing under the careful review of Mr. Bentham and Dr. F. Mueller, for the purpose of identification and scientific arrangement, it would be inexpedient to form any definite opinion. I cannot, however, agree with the view expressed in the *Fragmenta* (vol. 2, p. 66), that *E. odorata* is scarcely to be separated from *E. populnea* or *E. populifolia*. They appear distinct species, and I think that when the Doctor compares his own elegant figure of the species with that of Sir William Hooker's, he will modify the opinions which he has published on the subject. The other Myrtaceous tree is that formerly known as *Eugenia Smithii* or *Acmena elliptica*, but now transferred to the genus *Syzygium*, as *S. brachynemum*. This is our "Lilly Pilly," which although on our creeks a small tree, attains, in favourable localities, the height of eighty feet or more, and affords excellent timber for carpenters and coopers. The figure of this tree is perfectly correct, but it scarcely conveys an adequate impression of the freshness and beauty of the Lilly Pilly as seen on the banks of our creeks or shady gullies. When the fruit is ripe, and its white, purple, or plum-coloured tints afford a pleasing relief to the dark and sombre evergreen leaves around it, there is scarcely a prettier object. The berries vary very much in colour, and before they assume the shrivelled appearance, as represented in the figure, are decidedly ornamental. Of the leguminosæ, I notice only two which can strictly be said to belong to this colony, viz., *Trigonella suavissima* and *Psoralea acanthocarpa*. The first of these was particularly noticed by Sir Thomas Mitchell in his expedition on the Darling, but it seems to have been previously collected by Cunningham on Molle's Plains: the other is now called *Glycyrrhiza psoraleoides* and grows on the Lachlan and Darling. *Celastrus Australis* is a tall woody climber not uncommon in some parts of the bush in the county of Camden; and *Sambucus xanthocarpa*, or the native elder, with yellow fruit, may be found near Sydney.

Both of these shrubs will be easily recognised, as also our native raspberry (*Rubus parviflorus*) which some have thought might be much improved as a fruit by grafting and proper cultivation. Of the Goodeniaceæ, there is a figure of *Velleya connata*,

which resembles *V. lyrata* that occurs frequently near Randwick ; but it seems to be more closely allied to *V. perfoliata*, a species somewhat rare, which Miss Atkinson found near the Valley of the Grose. It is described in Brown's Prodrômus as a species belonging to Port Jackson and the Hunter, on the authority of Alexander Gordon. The plant figured by Dr. F. Mueller has not been found in this neighbourhood, and it seems to belong almost exclusively to Victoria, as it was collected at the boundary between the two colonies. *Logania nuda* is an almost leafless shrub with small flowers, found principally on the banks of the Murray. *L. floribunda*, which is common with us, differs very much from this species in appearance and character, and is one of the few Australian flowers that is remarkable for its scent. Our little *L. pusilla* is a very diminutive plant, with white flowers and triangular interpetiolar stipules. *L. nuda* is elaborately described by Dr. F. Mueller in the Fragmenta (vol. 1, p. 129). *Zehneria micrantha*, or *Cucumis Muelleri*, is an interesting plant of the Cucurbitaceæ or cucumber family, and in the Fragmenta it is said to be indigenous on the Murray and the Darling. Some little time since I received a specimen from Duck Creek, and I felt pleased with it, as being one of a very small family in this colony, for with the exception of our native gourd (*Sicyos Australis*, or *S. angulata*), I am not aware that any other species of the order exists near us. The figure of *Loranthus eucalyptioides* of the mistletoe family is so much like the ordinary forms of *Loranthus* prevailing in this colony, that I feel little hesitation in claiming it as one of our native mistletoes. At present, there is some difficulty in defining the species, as it seems that several forms have flowers almost identical, whilst the leaves vary according to the nature of the tree on which they are parasitical. This circumstance has not escaped the notice of Dr. F. Mueller, who remarks: "All the described species require a careful new disquisition, as they are not only parasites of various plants similar to each other, but also of genera of very different natural orders." Thus, *L. eucalyptioides* produces, as long as it adheres to *Eucalypti* or *Casuarinæ*, or now also to *Virgilia capensis*, long falcate leaves, which, when the plant receives its nourishment from *Banksia integrifolia* assume an ovate orbicular shape, and a very fleshy consistence, whilst the flowers become sessile. (Definitions &c., by

F. Mueller, p. 48). If this be correct, the number of species commonly so called must be considerably diminished, and a question of no little interest must be raised as to the possibility of rearing very different forms from similar seeds. It may be well to observe that the species of *Loranthus* are not dioecious as the European mistletoe is, the latter genus being represented in this colony by *Viscum incanum* or *aureum*, a parasite on *Eucalypti*, and *Angophoræ* occurring in different places from Twofold Bay to the Burnett. The variety *V. aureum* was collected on Ash Island by Miss H. Scott, and on the Blue Mountains by Miss Atkinson: it does not appear common in New South Wales. *Eremophila bignoniflora* of the Myoporium family is found in the northern parts of this colony, as well as in Victoria. It was collected by Sir Thomas Mitchell and others, and is worthy of cultivation. I scarcely know whether I should include *Sebæa albidiflora* of the Gentian family amongst our indigenous flowers, as it seems to belong rather to Tasmania or Victoria. If, however, the exact species does not occur in this colony (of which I am by no means certain), we have *L. ovata*, which, with the exception of the colour of the corolla, resembles it very closely, and probably possesses the same qualities. These little medicinal plants, together with *Erythraea Australis*, are valuable for their bitter properties, and are used with good effect in certain stages of dysentery. The asclepiad *Rhyncharrhena quinquepartita* is found on the Murray and Darling, whilst an allied species occurs on the Suttor and Dawson. In the neighbourhood of Sydney this order is represented by *Marsdenia* and *Tylophora*, some of which are remarkable for their milky juice. One of the former is rather an elegant climber, with sweet-scented flowers, and another of the same genus has large tuberous roots, which are said to be edible when boiled. Dr. Mueller's *Solanum vescum*, which he regards as "a new indigenous fruit of Victoria," seems almost identical with *S. laciniatum* or our kangaroo apple. The native name of this fruit is "gunyang," and the Doctor says that hitherto it has been found only in Gipps Land. Without expressing any opinion on the subject, I am tempted to make particular reference to it, as in the course of my rambles in the bush, I have certainly seen forms of *Solanum* very like that represented by the Doctor's figure. It seems probable that the exact species may occur in some parts of

the colony, and that hitherto it has been confounded with *S. laciniatum*. The pretty genus *Halgania* is brought before us in the figure of *H. andromedifolia*, which has been collected at the Murray, Lake Tyrrel, and Phillip's Range. The flowers of a species which I received from the Lachlan, were of a beautiful blue colour, the brilliancy of which remained for a long time even in a dried specimen. Of the Euphorbiaceæ, the Doctor has given a figure of *Bertya gummifera* or *oleifolia* which deserves attentive consideration from the faithful manner in which the minute parts of the flowers are represented. By studying this species, a person may easily recognise other species which occur twenty or thirty miles from Sydney, especially *B. pomaderrioides*, which I found some little time since in a gully, near Bent's Basin. Dr. Mueller, to whom I forwarded my specimen, regarded this as a new species, and described it as such in the Fragmenta (vol. 4, p. 34). *Tillea purpurata* is of the Crassulaceæ, and in the Flora Australiensis, it is noticed as one of R. Brown's plants, Parramatta. There are two species of the genus here, but they are so small and insignificant that they would escape the notice of any one excepting the systematic observer. The figure of *Haloragis odontocarpa* gives a good idea of the family with which it is associated, and will enable the student to make out the other species which frequently occur in the damp places around us. I have collected four or five, but they are not remarkable for any beauty, nor do they appear to possess any important properties. The last plant to be noticed is *Panax dendroides* of the Araliaceæ. This is common in the vallies of Southern and Eastern ranges of Victoria, and it also grows in some parts of New South Wales. *P. elegans* was collected on Ash Island by Miss H. Scott, and *P. sambucifolium* is abundant on our creeks. *P. Murrayi* from Twofold Bay, is stated by Dr. Mueller to be a very noble and graceful tree, attaining the height of sixty feet.

Dr. Mueller's lithograms must prove of incalculable advantage to those who are engaged in the study of Australian botany, and indeed to that large class of persons who, being content with a general knowledge of matters, may rest satisfied with being able to refer a plant to its natural order without entering into those minute details which are the objects of systematic botany. For the further accomplishment of this purpose, I think that a brief

synopsis of the natural orders most prevalent in Australia, would assist very much in conveying correct impressions to the reader. Dr. F. Mueller has already furnished a table of the kind in the first volume of his work on Victorian Plants, and a similar one might advantageously be added to the publication now under consideration. The present volume does not supply a type of all the great orders of this vast continent, as the *Rutaceæ*, *Dilleniaceæ*, *Sapindaceæ*, &c., are as yet unrepresented in these lithograms; and of the three extensive orders (*Epacridaceæ*, *Myrtaceæ*, and *Compositæ*), so beautifully illustrated in the figures I have noticed, the Composite is the only order that is so fully represented as many will desire. As the work progresses, however, we may be assured that all the orders found in Australia will be duly and faithfully delineated by the learned Doctor, and that he will spare no exertion to render it as useful and popular as it can be. The design of the Doctor is certainly a step in the right direction, for whilst the "Fragmenta Phytographiæ Australiæ," and even the "Flora Australiensis," may remain as sealed books to many, every one will admire and appreciate the elegance and accuracy of the lithograms. It might be wished, indeed, now that photography is rendering invaluable aid to various branches of science, that means could be adopted to place within reach of every one anxious to gain some knowledge of the vegetable kingdom in Australia, copies of these lithograms at a moderate price, and perhaps of reduced size. The splendid volume now before the world, which reflects so much lustre on the talents of Dr. Mueller and the liberality of the Victorian Government, must necessarily be an expensive work, and consequently not accessible to the masses. Hence I have ventured to offer to my excellent friend, a suggestion which I trust may lead to practical results, and throw additional brilliancy on the reputation he has acquired throughout the civilised world. Scientific works, and more especially when illustrated, are usually very expensive, and on that account I suppose, more than any other, we seldom meet with such books as "Harvey's Australian Sea Weeds," or "Hooker's Species of Ferns," in private libraries. Any one who contributes to the dissemination of useful knowledge by reducing the expenses of publication, and by popularising the scientific labours of the learned, may justly be deemed a man of progress in the most en-

larged sense. Dr. Mueller has evidently felt the force of this consideration, for whilst soliciting the sympathy and co-operation of the colonial Governments, and thus endeavouring to effect objects which are unattainable by isolated individuals, he has adopted two measures which cannot fail to advance the cause he has so near his heart. He has, in the first place, laid before the Australian public, in the "vulgar tongue," a mass of varied and useful information respecting the flora of this country; and, secondly, he has illustrated, in a popular manner, some of the most interesting species common to these colonies.

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## PLANTS FROM THE DAWSON AND THE DARLING DOWNS.

(1866.)

MY friends Mr. E. Ross, of Dyngie, near Banana, and Mr. James Mills, of the Darling Downs, have lately forwarded to me some interesting specimens which they had collected in their respective rambles. As many of the plants which these gentlemen noticed, are but little known in this part of Australia, it may not be unprofitable to make some remarks on the collection transmitted to me. Amongst the Proteaceous shrubs which Mr. Ross saw on the Dawson, are *Hakea lorea* and *Grevillea striata*, the former being remarkable for its thong-like leaves, sometimes measuring two feet in length, and for its hard woody seed vessel, and winged seed. The species of *Hakea* common in the neighbourhood of Sydney, are *H. pungioniformis*, *H. gibbosa*, *H. acicularis*, *H. saligna*, and *H. dactyloides*, which, although differing in foliage and habit, may be easily recognised by their woody follicles, which after a time split in half and display two black seeds with a long broad wing at one end of them. The *Grevillea* of the Dawson has long rush-like leaves, and seems identical with that found on the Castlereagh. The species of the genus

near Sydney, are merely shrubs (viz.; *G. punicea*, *G. sericea*, and *G. linearis*), with purple and white flowers, not very ornamental; but on the Richmond River, the silky oak (*G. robusta*) is a very fine tree, sometimes attaining the height of 70 feet, and affording a suitable wood for the staves of casks, whilst the bright orange colour of its flowers gives it a very showy appearance. This and some other species of *Grevillea*, have been cultivated with success; but the smaller and more delicate species, such as *G. Baueri* and others, seem rather impatient under the care of the gardener, and do not display the same beauty which is so attractive in their native scrubs. *Xylomelum pyriforme*, "the wooden pear," occurs on the Darling Downs, and so also does *Conospermum ellipticum*, a herbaceous plant with dull white flowers. Other Proteaceous plants, not very far from the same locality, are enumerated in Sir Thomas Mitchell's Tropical Australia; but it has been justly remarked that "from the parallel of the mass, the order diminishes in both directions, but the diminution towards the north appears to be more rapid on the East, than on the West Coast." The leguminous plants forwarded to me, with the exception of *Canavallia obtusifolia* and *Vigna vexillata*, and some species of *Acacia*, do not occur near Sydney. The *Canavallia* is a long trailing plant with purple flowers and large pods, and must be familiar to those who are in the habit of amusing themselves on the rocks at Manly Beach. The *Vigna* is another twiner of a similar character, and nearly allied to the kidney bean. It seems to have a very extensive range, as it has been gathered in many places between the Blue Mountains and the northern parts of Australia, being identical with the species found in tropical Asia, Africa, and America. Mr. Ross mentions the occurrence of the coral tree (*Erythrina vespertilio*), with leaves resembling a bat's wing extended. Sir T. Mitchell found this tree at the base of Mount P. P. King, and particularly observed the pod, which contains two peas of a bright scarlet colour, about the shape and size of a French bean. The natives use the trunk of this tree for various purposes, but it seldom attains more than a foot in diameter. The "Bat's Wing coral tree" is now cultivated in the neighbourhood of Sydney. Another leguminous tree which attracted Mr. Ross's attention was *Bauhinia Carronii*. The leaves of the genus are remarkable, the leaflets being either two distinct

from the base, or united into an entire or two lobed leaf, with five to eleven digitate nerves. Three species are described in the "Flora Australiensis," and since the publication of that work, a fourth species with very small leaves has been found near the Gulf of Carpentaria. *Hovea longipes*, Mitchell's *H. leiocarpa*, is also on the Dawson, and, in some respects, resembles the species near Sydney in the blue pea-shaped flowers and somewhat ovoid pods; but from the report of my friend, it is a much larger shrub, the trunk being nearly two inches in diameter. The wood, when polished, is rather ornamental, as it is marked with dark yellow and brown streaks. This is the same shrub which Mitchell noticed in a valley near the Belyando, which he says "was gay with the ultramarine blue flowers" of the *Hovea*. The species of *Acacia* seem to be very numerous in North-eastern Australia, and two of them (*A. homalophylla* and *A. pendula*) have a dark coloured fragrant wood, better known by the name of myall, which the natives sometimes make into boomerangs, and the stockmen into whip handles. The myall is often referred to by travellers in Australia, and is distinguished by its abundance of yellow flowers, silvery drooping branches, and the violet perfume of its wood. My young friend sent me ten different species of *Acacia* from the Darling Downs, and some of them (such as *A. linifolia*, *A. vomeriformis* and *A. cultriformis*) are remarkable for their wide distribution. *A. spectabilis*, from the same quarter, resembles *A. discolor*, which is abundant near Sydney, but the flowers are brighter, and the leaflets not so numerous. Associated with these, are two papilionaceous shrubs (*Pultenæa foliosa* and *Indigofera Australis*), the former of which was collected by Cunningham, near Wellington Valley, and by Fraser, at the Lachlan; the leaves are very numerous and minute, and the flowers of an orange colour. My learned friend Dr. F. Mueller has kindly determined this species for me, and he also informs me that the little indigo, which I had supposed to be a distinct species, is a mere variety of *I. Australis*. I see that Mr. Bentham is of the same opinion (Flora Aust.: vol. 2, p. 200), although no one who had not seen the large suit of specimens which led to this conclusion, could suppose that the diminutive plant in question was a mere variety of the well known shrub of this district. Mr. Bentham reckons five varieties, of which the one from the Darling Downs is var. *I.*



*signata*. The little plant is rigid, glabrous, and almost leafless, the numerous rigid petioles bearing very small obcordate leaflets in distant pairs, with very prominent dark-coloured stipellary glands. In the instance before us, there is an example of the great difficulty which the systematic botanist has to contend with in the determination of species; for, when between plants apparently of distinct origin there are so many connecting links, he is led to conclude that the variations may be accidental, and that, therefore, it is imprudent to multiply species unnecessarily. Until greater progress has been made in the investigation of this abstruse subject, and it has been ascertained by the diligent observation of species under cultivation, whether they are indeed liable to the amount of variation which is now assumed, it seems in many cases quite impossible to assign to them their proper places in the respective genera. The careful student of Australian botany will fully appreciate these remarks, when he is endeavouring to fix the species of such genera as *Daviesia*, *Dillwynia*, *Indigofera*, &c., and he will rest satisfied with believing that much remains to be elucidated by the gradual advancement of science. Amongst the specimens, there are several species of *Cassia*, three of which appear to be *C. lævigata*, *C. Australis*, and *C. eremophila*, the others being too imperfect for determination. Mr. Bentham remarks in reference to the first of these, it is "a common species in tropical America, occurring also in tropical Africa, but probably introduced there, and perhaps not really indigenous in Australia." This shrub is often called Laburnum, and is allied to a *Cassia* from which senna is prepared. The flowers of this and most of the species are of a showy yellow, the sepals and petals five, stamens ten, anthers generally perfect, opening in terminal pores or short slits. In the course of his excursions, Mr. Ross noticed "the wax plant" (*Hoya carnosa*), "the Spotted Tree" (*Flindersia maculosa*), "the Bottle Tree" (*Sterculia rupestris*), "the native lemon" (*Atalantia glauca*), three species of "caper" (*C. Mitchellii*, *C. nummularia*, and *C. sarmentosa*), and the Moreton Bay "yellow wood" (*Xanthoxylon brachyacanthum*). The *Eremophila Mitchellii*, which on the Dawson is frequently called "sandal wood," seems to be somewhat plentiful. This was first observed by Sir T. Mitchell, who speaks of it as a fine tree fifteen feet high, with white flowers; but it has subsequently been found

on the Castlereagh and the Darling. *Pittosporum phillyræoides*, a graceful tree with seed vessels containing red seeds, occurs pretty generally in the interior; but the two plants which seemed to please my friend more than any others, were *Pimelea hæmatostachya*, and *Cardiospermum Halicacabum*. The former of these I was disposed to think identical with Mitchell's *P. trichostachya*, which that distinguished explorer found on the Maranoa. Dr. F. Mueller, however, who has carefully studied the new species of the genus, assures me that this is not the case. The *Pimelea* of the Dawson is certainly the prettiest of the genus, and attains the height of two feet. The flowers are in dense spikes, of a cylindrical form, and of a reddish colour. (See *Frag.*, vol. 1, p. 84). It is said to flourish in basaltic plains, from the Newcastle range to the Burnett. This plant differs so much in appearance from the species of *Pimelea* common in New South Wales, (*P. linifolia*, *P. curviflora*, and *P. spicata*), that at first sight one would scarcely be inclined to associate it with them. The *Cardiospermum* (so called from the heart-like spot on the seeds) is a straggling or climbing plant, and resembles *Cissus clematidea* in its leaves and habit. The flowers are white and inconspicuous, but the seed vessel is an inflated membranous capsule, from which circumstance the plant is sometimes called "balloon vine." As the seed vessels hang from the vine, they have the appearance of small silken bags. The species is not peculiar to Australia, being found in the East, and also West, Indies. Mr. Ross reports that the blacks eat the fruit of a *Jasminum*, and probably also the tender parts of the stem, and the base of the leaves of *Cymbidium caniculatum*, which, according to Dr. F. Mueller, is "the only orchid of the interior of tropical Australia" which affords mucilaginous food. The climbing plants *Stephania hernandifolia*, *Lyonsia straminea*, and two species of *Marsdenia*, seem to be widely diffused, and it is said that the blacks eat the unripe pods of some species of asclepiad. One of the most interesting plants from the Darling Downs is *Stenochilus maculatus*, or the native fuchsia. The name designates the narrowness of the lip in the corolla, by which peculiarity it is distinguished from some allied genera; but I believe that Dr. Mueller proposes to unite the genus with that of *Eremophila*. A good idea of these flowers may be formed from Dr. Mueller's elegant lithogram of *E. bignoniiflora* (Pl. 55), and

also those of *E. Latrobii* and *E. Woollsiiana*, which are figured and described in the first volume of the "Fragmenta Phytographiæ Australiae." Sir T. Mitchell collected one species of *Eremophila* and four of *Stenochilus* [See "Tropical Australia"], and Mrs. E. Forde has recently noticed some of the same family on the Lower Darling. Nearly allied to these plants, is *Myoporum Cunninghami*, a shrub, which, in some respects, resembles *Pittosporum phillyræoides*, but differs altogether in the formation of the seed vessel. The *Dodonæa* (a shrub with hop-like fruit) forwarded to me, seems identical with *D. cuneata*, which is plentiful in this colony, but probably a more attentive examination might lead to the conclusion that it is the allied species *D. peduncularis*, which has been collected on the Maranoa. One of the most interesting of the genus is *D. multijuga*, an elegant variety of which Miss Atkinson found in the Valley of the Grose. The common species near Sydney, are *D. triquetra* and *D. viscosa* (var. *angustifolia*), the first of which has a pretty appearance, and is sometimes called "the Hop-plant." There is certainly considerable difficulty in fixing the species of this genus, and it seems highly probable that many of the so-called species will be referred to *D. viscosa*. Some time since the writer of this paper discovered a pinnate variety of *Dodonæa* near Hunter's Hill, which he was inclined to regard as one of the pinnate series of the genus; but as he has never been able to find a similar tree since, he is satisfied with Dr. Mueller's solution of the difficulty, by referring it to *D. viscosa*. The pretty little *Calythrix* (a heath-like shrub, with a long hair at the end of each lobe of the calyx) from the Darling Downs, is very like the forms *C. glabra* and *C. pubescens*, which occur near Sydney, but probably it is *C. scabra*, *Teucrium argutum* (a labiate with pink or purple flowers), *Boronia ledifolia* (a rutaceous shrub with red flowers, and allied to our native rose); *Leptospermum flavescens* (a myrtaceous shrub, known as one of our "tea-trees"); and three Composites, viz., *Ozothamnus*, *Cassinia*, and *Eurybia*, (strongly scented shrubs with white flowers); all these may be collected in the county of Cumberland. The Euphorbiaceous shrub, resembling the castor oil (*Adriana acerifolia*), and probably possessing medicinal properties, was first collected by Allan Cunningham on the Lachlan, and referred by him to the genus *Croton*. Sir T. Mitchell found it on the Maranoa, and the writer of this paper

has frequently seen it on the Cowpasture and Nepean Rivers, and attaining a much greater height than that mentioned by Mitchell. *Xerotes leucocephala* (a rush-like plant, with dense woolly heads of flowers) was also noticed by Mitchell, as it grew in the light dry sand. This is similar to one of my young friend's specimens. The prostrate plant of the *Lobelia* family is, *Pratia Cunninghami*. The common forms of *Lobelia gracilis*, *L. dentata*, *L. alata* (with blue flowers), *L. purpurascens* and *L. inundata* (with white or pinkish flowers), must be familiar to most people who notice the bush flowers near Sydney. The only Epacrid of the collection is a *Leucopogon*—a small heath-like shrub, with minute flowers bearded in the segments of the corolla. This is *L. cuspidatus*, a species similar to some of those in the county of Cumberland, but apparently not so large as *L. Richei* and *L. lanceolatus*. The ferns of the collection are only *Asplenium nidus* and *Davallia pyxidata*, both of which are well known to fern gatherers; and the grasses, which in all probability are far more interesting to squatters, are limited to three species—*Andropogon intermedius*, *Holcus plumosus*, and *Aristida calycina*. A good collection of the native grasses, from the Dawson and the Darling Downs, would be very acceptable. They are, no doubt, more numerous than many persons imagine, and some of them might be improved by cultivation. I find that Sir T. Mitchell, in his various expeditions, collected specimens of about thirty species; but this gives a very inadequate idea of the numbers that may exist in any given area, for in the Parramatta district alone, no less than forty species of native grasses have been reckoned. The *Panicum lævinode* of Mitchell (probably Brown's *P. decompositum*), has been cultivated by Mr. Josephson, and favourably noticed by the Acclimatisation Society; and *Bromus Australis*, which has been compared with the squarrose Brome grass of Europe, is not only a fine grass for cattle, but from some remarks which have lately been published in the colonial papers, it appears that it has been cultivated and highly valued by scientific persons on the continent of Europe. Sir T. Mitchell informs us that he collected near the Darling, twenty-five different kinds of grass, only six of which grew on the alluvial bank of the river. It appears, therefore, that we are by no means so deficient in native grasses as many suppose, and there is a probability that as our knowledge of their properties is

increased, species hitherto lightly esteemed, will be turned to some valuable account. *Panicum lævinode* (sometimes called "umbrella grass"), *Bromus Australis* (an oat-like grass), and *Anthistiria Australis* (the kangaroo grass), are already known as some of the most nutritious grasses in the interior, and in ordinary seasons, they afford the principal food for cattle. Some of the native grasses are too coarse to be appreciated for grazing purposes, and others grow so scantily that they are rather objects for scientific arrangement, than for practical advantage to the grazier. But in some parts where this is the case, nature has supplied species of *Mesembryanthemum* and *Chenopodiaceæ* (better known by the names of "pig-face" and "salt-bush"), which sheep and cattle devour greedily, and by which they are kept in the best condition. Of the salt-bush, which is by far the more valuable, there are many species. Those sent to me from the Darling Downs, are species of *Rhagodia* and *Kochia*. The common saltbush is *R. hastata*, and that with the largest leaves is *R. parabolica*. These plants are palatable to sheep and cattle on account of the salt which they contain, nearly two ounces having been obtained from two pounds of leaves; but travellers in the interior have also found them to be exceedingly useful as vegetables. Sir T. Mitchell relates that after twice boiling the leaves a few minutes in water to extract the salt, and then an hour in a third water, they formed a tender vegetable resembling spinach. An allied plant (*Chenopodium erosum*), Dr. F. Mueller calls "the Australian spinach"; but it may be remarked of this species, as well as of what is called New Zealand Spinach (*Tetragonia expansa*), and some of the most useful cresses, that they are almost limited to Eastern Australia. In the Expedition conducted by Mr. Gregory, the common purslane (*Portulaca oleracea*) was regarded as an excellent antiscorbutic. This plant often grows in cultivated soil, and is commonly called pig weed. In former times it was considered as a garden herb, and was used for salads and pickling, but owing to the introduction of other more nutritious vegetables, it has long ceased to be esteemed. The Pharmacopœia still retains the purslane, however, not only "as a pot-herb," but as "useful in scurvy and bilious disorders," and the seeds are said to be "vermifuge." With reference to the *Chenopodiaceæ*, the order of plants to which the "salt-bush" belongs, the species,

although very numerous in some parts of the interior, are exceedingly limited in this district. On the mud flats near the Parramatta River, *Salicornia Indica*, or, as it is sometimes termed, "the marsh samphire," is very abundant, and *Chenopodium Australe* is generally associated with it. Both of the plants are useful for pickling, although inferior to the European samphire. *C. triangulare* is a very common plant, and *Rhagodia linifolia* occurs sparingly. The introduced weeds of this order, are *C. ambrosioides*, *C. murale*, and *Blitum glandulosum*, which now occur frequently in cultivated ground, as well as in waste places. On the banks of the Hunter, the order is much more plentiful than it is here.

In concluding these remarks, I would remind those gentlemen who are visiting distant stations, or who have opportunities of procuring new or rare plants from the interior, that the President of the Linnean Society, assisted by Dr. F. Mueller, is now engaged in preparing the "Flora Australiensis," and that any specimens of uncommon and interesting shrubs and trees, will be most acceptable to those distinguished botanists. Labouring as they are for the good of these colonies, by endeavouring to develop the vegetable resources of this vast continent, and make them known throughout the civilised world, the learned editors of our "Flora" have every claim upon the sympathy and co-operation of the colonists; and perhaps I may be permitted to mention from personal experience, with a view of exciting the energies of others, that any little assistance which is rendered to these indefatigable labourers, will be promptly and politely acknowledged.

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## PLANTS INTRODUCED ACCIDENTALLY. (1866.)

AT the present time, when so much useful information is being laid before the public, by the Acclimatisation Society, with a view of encouraging the introduction of those plants which are suitable for our climate, it may not be unprofitable to take a glance at some of the vegetable productions which are finding

their way into the colony, in a manner apparently accidental. It is true that many of these are what we popularly term "weeds," and those sometimes of a very troublesome and noxious character, not merely detrimental to the pursuits of agriculture and horticulture, but also containing in some instances deleterious and even poisonous properties. Yet the evil is not unmixed with good, for the spontaneous or fortuitous introduction of some useless species of a particular genus, is an indication that other species of the same genus, probably containing properties of a useful character, may flourish in the same climate. Thus Nature herself in some instances, seems to point out suitable objects for acclimatisation, or at all events to show the natural families from which we may select individual species with the fairest prospect of adapting them to the country in which we live. But many of these so called weeds are really highly useful to man, some of them being known to possess medical virtues, which may be rendered available with very little trouble, and others being well calculated to serve as esculent vegetables in seasons of scarcity; whilst some few of them may hereafter afford material for colonial manufacture. Some years ago, the whole family of Algæ, or seaweeds, was pronounced to be useless, and the great poets of antiquity, when denouncing anything that appeared to them vile or despicable, were wont to compare it with the *vilis* or *inutilis alga*. Indeed, we are credibly informed that not more than fifty or sixty years ago a learned professor, when consulted by one of his pupils respecting some species of Algæ, which he had collected on the sea coast, pushed them from him, with the disdainful remark, "Pooh! a parcel of seaweeds! sir, a parcel of seaweeds!" When we consider the wonderful progress that has been made of late years in the study of Algæ, and the useful properties which modern ingenuity has extracted from many of the species, we may be tempted to smile at the ignorance of the learned professor; but, in so doing, we must beware lest we do not expose ourselves to a similar feeling of contempt from a future generation; for whilst we have lived to see that the weeds of the ocean, are not merely the "flowers of the sea," but in some species highly valuable for commercial and medicinal purposes, posterity may find out that amongst the weeds of the land, which many so unscrupulously condemn, there are some of the marvellous beauties

of nature. I believe that God has made nothing in vain, and that every species, whether in the animal or vegetable kingdom, has been created for some especial purpose in the economy of nature. If we cannot at present discover these purposes, it is rather owing to our ignorance, than to any other cause. The progress of science has cleared up some of the mysteries which have long enveloped many natural objects; and doubtless, as our knowledge increases, we shall have more and more reason to admire even the meanest animal, or vegetable which we now contemptuously tread under our feet. With this conviction, therefore, I proceed to enumerate some of the species of plants, which are springing up accidentally amongst us. There is certainly some difficulty in distinguishing some species, which are considered cosmopolitan, from plants really introduced, but these are comparatively few; and I have taken it for granted, that those plants which have appeared in the settled districts of the colony, since the publication of Brown's *Prodromus*, and the earlier botanical works on New Holland, are not indigenous, for I cannot conceive it possible, that any species widely scattered over the colony, could have escaped the observation of our first collectors, as any object similar to what they had known in Europe, must have excited particular attention.

In the first great division of the vegetable kingdom, viz., the Thalamifloræ, I have remarked that the introduced plants belong principally to the following natural orders:—(1) *Caryophyllaceæ*, (2) *Crucifæræ*, (3) *Flumariaceæ*, (4) *Geraniaceæ*, (5) *Linaceæ*, (6) *Mulvacæ*, and (7) *Phytolaccaceæ*.

(1.) *Caryophyllaceæ*.—Of this order, the species most common in gardens and cultivated places are *Polycarpon tetraphyllum* or "all-seed," *Stellaria media* or "chickweed;" and *Cerastium vulgatum* or "mouse-ear chick-weed," but I find that my learned friend, Dr. F. Mueller is disposed to think that the first two of these may be indigenous, although in speaking of *Stellaria media*, he remarks that "the plant which inhabits our forests and alps, constitutes a race somewhat different to the ordinary form, which occurs here as a common garden weed." *Sagina apetala*, or "pearlwort," which in England grows in dry, gravelly, or sandy places, Dr. Mueller considers as decidedly indigenous. *Slane Gallica*, or "catch-fly," is becoming a troublesome weed in gardens, and



I have noticed *Spergula arvensis* in orchards and fields, whilst *Dianthus prolifer*, or a wild pink, is confined to a few localities, having apparently been introduced, with some English grasses. To these Dr. Mueller adds *Agrostemma Githago*, and *Arenaria serpyllifolia*. The last I have not observed in this colony, the only species of *Arenaria* common amongst us being *A. marina* now referred to *Spergularia rubra*, which must be regarded as indigenous.

(2.) *Cruciferae*.—Plants of this order are somewhat rare in Australia, being almost unknown in the tropical parts of this continent, and not numerous even in the mountainous districts. In the neighbourhood of Parramatta, there are not more than three indigenous species, even if we include *Lepidium ruderales*, which Dr. Mueller says occurs in many parts of South Australia, Tasmania, and Eastern Australia, and agrees with the descriptions of the European species. The native species here are *Cardamine stylosa* and *C. tenuifolia*, whilst *Nasturtium terrestre* is found on the banks of the Nepean. The introduced species are the wild radish, wild mustard, and hedge mustard (*Raphanus raphanistrum*, *Sinapis arvensis*, and *Sisymbrium officinale*), and they appear here, as in Europe, in corn fields, and amongst rubbish; and also *Seneliera didyma* or “swine’s cress,” and the interesting *Capsella bursa pastoris* or “shepherd’s purse.” *Sisymbrium* has had a reputation for curing hoarseness, and ulcers in the throat, and *Seneliera* is antiscorbutic, as indeed are most of the *Cruciferae*, as long as they are used whilst fresh.

(3.) *Fumariaceae*.—The only species of this order that has been introduced, is the one so common in gardens viz., *Fumaria officinalis*, or common fumitory, with rose-coloured flowers, dark red at the summit, and pale green leaves twice pinnate. The leaves and stalks are bitter, “slightly diaphoretic and aperient: the juice was formerly administered in cutaneous diseases, and obstructions of the liver.” (Pharmacopœia.)

(4.) *Geraniaceae*—Two species of *Erodium* (viz., *E. moschatum* and *E. cicutarium*) have appeared amongst us. They differ little from each other, excepting that the former has a musky scent, and the leaves less deeply divided.

(5.) *Linaceae*.—Of the flax family, *Linum Gallicum*, a plant with small yellow flowers, has certainly been introduced, but *L.*

*marginalis* (formerly *L. angustifolium*), a plant with blue flowers, which De Candolle supposed to have been imported from Europe, is now considered to be indigenous. Dr. Mueller says, "The Australian flax differs, as pointed out by Dr. Planchon, from the European *L. angustifolium*, principally in highly connate styles. The bast of the Australian flax is of considerable length, and well adapted for textile fabrics. The aborigines convert it into nets fishing lines, and other articles of great strength and neatness. The seeds may be used for mucilaginous decoctions, for expressing oil, for preparing poultices, and for any other uses for which common linseed is employed."

(6.) *Malvaceæ*.—Of the mallow family, there are some interesting species amongst those introduced. *Malva sylvestris*, commonly called marsh mallow, but very inferior to the real marsh mallow (*Althæa officinalis*), is still used on account of its demulcent properties. *M. verticillata*, *M. rotundifolia*, and *M. crispa* have also found their way to the colony; and *Sida rhombifolia* or *S. retusa*, a small shrub, which Mr. Moore states was introduced from the Mauritius. This is the plant which, according to the experiments instituted by Mr. W. Hill, Director of the Brisbane Botanical Garden, yields an excellent fibre. It is becoming a troublesome weed in Australia, and is spreading from one end of the continent to the other. With respect to the other malvaceous plant—*Parvonia hastata*, Mr. Bentham regards it as indigenous, but Dr. F. Mueller speaks of it "as being naturalized in the Eastern warmer parts of Australia." I have had specimens from the Hawkesbury, and not long since I saw a plant of it growing in one of the streets at Penrith, but as it has been found in many other parts of Australia, it seems probable that *Pavonia* is really a native. This shrub is remarkable for producing two kinds of flowers, a fact first pointed out by Dr. F. Mueller. To these I may add *Cristaria coccinea*, which is spreading very much in cultivated ground.

(7.) *Phytolaccaceæ*.—The only species of this family which has been accidentally introduced is *Phytolacca octandra*. This plant appeared first in the neighbourhood of Sydney, but latterly it has found its way inland, springing up in Parramatta, on the Richmond and Windsor Roads, &c. I am aware that some persons regard this species as indigenous, but this opinion is not held, I

believe, by any botanist of eminence. *P. decandra* has been introduced as a garden plant, and in America it is used as a common domestic purge.

In the second great division of plants viz., the Calycifloræ, the following natural families are represented in Australia by introduced species: (1.) *Asteraceæ*; (2.) *Euphorbiaceæ*; (3.) *Leguminosæ*; (4.) *Lythraceæ*?; (5.) *Onagraceæ*; (6.) *Rosaceæ*; (7.) *Sanguisorbaceæ*?; and (8.) *Umbelliferæ*.

(1.) *Asteraceæ*.—The species of introduced plants belonging to the Composites, are rather numerous, some of them being very troublesome weeds, and increasing with the greatest rapidity, owing to the easy manner in which the seeds of many species are wafted from place to place. *Erigeron Canadense* and *E. linifolium* are of this character, and are well-known pests to the agriculturists under the name of cobbler's pegs. *Gnaphalium luteo-album* and *G. Indicum* grow almost everywhere in waste places, and are apparently of little use to man. Two species of thistle, viz., the "Virgin Mary thistle, (*Carduus Marianus*), and the "Scotch thistle" (*Onopordon Acanthium*), have spread very much of late years in many parts of the colony, especially the former, which, under the name of "milk thistle" or "Our Lady's thistle," has had a reputation as "pectoral, antipleuritic, and aperitive," whilst the full-grown leaves are said to be "sudorific and aperient." This thistle is as beautiful as any of the family, and it may easily be distinguished by the milky vein which runs through its dark green spiny leaf. The Scotch thistle well merits the motto which Scotsmen of old have affixed to their natural emblem, "*Nemo me impune lacessit*," which Baxter interprets into the plain Scotch "Ye maun't meddle wi' me." *Tanacetum vulgare*, or common tansy, is now growing wild in many places, but it seems in the first instance to have escaped from a garden, having been probably imported by the early colonists, as a medical plant, for tansy wine is said to have valuable remedial effects, and a decoction of this plant is used as a medicine for gout. Perhaps the introduction of *Pyrethrum Parthenium*, or "fever few," may be attributed to a similar cause, but it does seem to be a plant likely to spread much. The introduction of *Anthemis cotula*, or "stinking camomile," I think may be traced to some European packing cases of Messrs. J. and W. Byrnes. In the first instance, it

sprang up in a field adjoining the mill of that firm, and subsequently travelled into the neighbouring cultivated lands. Every part of this plant is fetid and acrid, blistering the skin when much handled. Its decoction is a strong and active bitter, in a dose of a teacupful, producing copious vomiting and perspiration. I have noticed a European species of *Bidens*, and also a Chilian *Tagetes*, (*T. glandulifera*) springing up occasionally in waste places. The latter I have been informed, is becoming a troublesome weed on some parts of the Hunter. *Cichorium Intybus* or chicory, may be seen growing on the banks of the Nepean at Menangle, and more abundantly in the neighbourhood of Camden. This useful plant is extensively cultivated, especially in France, as a substitute for coffee. There is a species of *Sonchus* indigenous, but *S. oleraceus* or the Sow-thistle, appears to have come to us from Europe, as well as the common dandelion (*Taraxacum dens leonis*), and four weeds similar to that plant in appearance, though far inferior in point of utility, viz.:—*Hypochaeris radicata*, *H. glabra*, *Leontodon hirtus*, and *Crepis japonica*. As these spring up in places where English grasses have been sown, there can be no doubt as to their origin. *Galinsogea parviflora*, a South American plant, with small yellow flowers, and ovate three-nerved leaves, is becoming one of our commonest garden weeds. *Siegesbeckia orientalis* appears to be indigenous, as it is found in the interior in many places. Latterly I have frequently noticed it in orchards near Parramatta. Dr. Mueller mentions a species of *Crepis* as of foreign origin, but he regards *Leuzea*, and I believe also the *Bidens*, to which I have referred, as indigenous. *Centaurea solstitialis*, or *C. melitensis*, is a yellow prickly plant, growing in wheat-fields, and is very annoying to reapers. This appears to be of European origin; but the Bathurst bur, or *Xanthium spinosum*, although indigenous in the south of Europe, is said to have found its way to this colony from South America. Perhaps this is the most injurious composite plant that we have, as it not only takes the place of more useful vegetable productions, but the burs seriously affect the wool in some parts of the colony. An infusion of *Xanthium* is sometimes used as a yellow dye. To the composite flowers, may be added *Cryptostemma calendulaceum* from the Cape of Good Hope, a very troublesome weed, introduced into the Botanical Garden at Melbourne, and now spreading in

the neighbourhood of Sydney; *C'rysanthemum segetum* or the "corn Marigold," *Senecio vulgaris*, or the common "Groundsel," and *Tragopogon porrifolius* or the "Goat's Beard." With the exception of the first of these, however, none appear to increase much in this part of the colony.

(2.) *Euphorbiaceæ*.—Of this family there are three species of *Euphorbia* of foreign origin, *E. peplus*, *E. helioscopia* and *E. chamæsyce*, the milky juice of which is very acrid, and is regarded as a useful remedy for warts. *Ricinus communis*, or the castor oil plant, is spreading in many parts of the colony, and possesses medicinal qualities too well known to require any remark. In addition to the ordinary uses of this plant, I may mention that the leaves of the castor oil are now sometimes employed as a galactopoeitic. I do not think, however, that they should be used in this way without medical advice, if it can be procured.

(3.) *Leguminosæ*.—The introduced leguminous plants are not so numerous as many would suppose. Two species of Vetch as well as the common one (*Vicia sativa*), are often seen in or near cultivated ground, and the scented trefoil (*Melilotus parviflora*) is so abundant in some districts, as to do considerable injury to agriculturists, by deteriorating the quality of their flour. Many millers refuse to purchase wheat which is impregnated with this weed, as it imparts a nauseous flavour to the bread. *Medicago nigra* is of the same family, and has a bur which adheres to wool. *Trifolium repens*, or white clover, has spread suprisingly in some districts, and occasionally two other species of trefoil, and one of *Lotus*, may be found amongst the English grasses. *Cassia levi-gata*—a shrub nearly allied to the senna of chemists, the leaves of which are also purgative—now grows wild in waste places. *Lespedeza juncea*, which occurs sparingly in these parts, is probably indigenous; but the "furze," or *Ulex Europæus* was introduced.

(4.) *Lythraceæ*.—The common *Lythrum hyssopifolium*, which may be gathered in almost every moist place in this part of the colony, is decidedly a native, and Dr. Mueller (Frag. vol. 3, p. 109) also regards *L. salicaria*, the "spiked purple loose-strife" of England, as indigenous. Sir Thomas Mitchell found this plant in abundance amongst the reeds of the Macquarie, and I have seen specimens from Mudgee, Clarence River, &c. In this

district I have found only one plant of it, and that was not far from General Macarthur's garden.

(5.) *Onagraceæ*—The species of *Epilobium* (*E. roseum*) which flourishes here, is of European origin. The down of this plant, as well as of others belonging to the same genus, has sometimes been mixed with cotton and manufactured into stockings, and, mingled with the fur of the beaver, has served for hats and other articles of clothing. There are two species of *Oenothera* (evening primrose), originally garden flowers, which seem likely to grow wild here in most places.

(6.) *Rosaceæ*—Of this family the sweet brier (*Rosa rubiginosa*), is complained of by some settlers, but I think that most English people will be pleasingly reminded of the old country by the sight of the eglantine, or sweet brier; and the fruit, which in some countries is made into a conserve, furnishes food for small birds. Although this shrub was brought to the colony in the first instance designedly, yet it is worthy of mention, as it has spread very widely.

(7.) *Sanguisorbaceæ*—There are two species of *Acæna* found in this neighbourhood—*A. ovina* and *A. sanguisorbæ*. The former seems to have been brought into this district from Bathurst, many years since, and it may still be seen growing luxuriantly in St. John's Churchyard. It seems probable that in the early days of the colony some sheep may have occasionally been kept in the church-yard, and that they conveyed the seeds to this locality. A friend of mine assures me that this plant was cultivated in former years for sheep, but Dr. Mueller inclines to the opinion that both of them are indigenous.

(8.) *Umbelliferæ*.—A species of the American *Oreomyrrhis*, has found its way into some parts of the colony, and also *Sium latifolium* generally deemed poisonous, and the common fennel (*Fœniculum vulgare*). The fruit of the last is aromatic, hot, and carminative, the roots opening, and the leaves diuretic. It is used in England as seasoning to fish. To these umbelliferous plants a few species of suspicious ones might be added which seem to find their way hither with English seeds, but as they seldom extend beyond the garden in which they are sown, they do not fall within the limits of my present communication.

In the third division of the vegetable kingdom, viz., the *Cor-*

*rollifloræ*, I shall make some remarks upon species under the following families: (1.) *Asclepiadaceæ*; (2.) *Caprifoliaceæ*; (3.) *Convolvulaceæ*; (4.) *Galiaceæ*; (5.) *Gentianaceæ*; (6.) *Lamiaceæ*; (7.) *Oleaceæ*; (8.) *Plantaginaceæ*; (9.) *Primulaceæ*; (10.) *Solanaceæ*; (11.) *Verbenaceæ*.

(1.) *Asclepiadaceæ*: In this family there are many native climbers, but the *Asclepiad* spreading most widely in New South Wales, is said to be a native of the Cape of Good Hope. This is the wild cotton of the colonists (*Gomphocarpus fruticosus*), although it is not in any way allied to the cotton of commerce (*Gossypium*). This plant is called Argel in Syria, and is used to adulterate senna, rendering it bitter and irritating, and there can be no doubt but that the milky juice is very acrid. It is a fact worthy of notice, that a species of aphid is frequently found on this plant similar to that which sometimes infests the *Hoya carnosa*, or wax plant. We have in this neighbourhood two species of *Marsdenia*, and two of *Tylophora*, and also one of the *Apocynaceæ* (*Lyonsia straminea*), all of which have seeds similar to those of the wild cotton, but the habit of these indigenous climbers differs very much from that of the introduced plant.

(2.) *Caprifoliaceæ*: The black-berried elder (*Sambucus nigra*) has a tendency to run wild in some localities. One might naturally expect this to be the case, as two species of the same family (*S. Gaudichaudiana* and Sir Thomas Mitchell's *Tripetelus Australasicus*) are natives of the colony. The latter was found by Sir Thomas on the banks of the Lachlan, but it also occurs in many places near Sydney.

(3.) *Convolvulaceæ*: Some species of this family which have been cultivated in gardens seem well adapted to our climate, and are likely to spread. Though somewhat troublesome in orchards, they are not calculated to do much mischief, but the injurious *Cuscuta epithimum* is doing much damage to the Lucerne, particularly in the neighbourhood of Goulburn and Bathurst. For this pest, the colonists are indebted to the mother country. I have found the native dodder growing on the stems of *Polygonum*, near the Nepean, but not extending into the cultivation so as to injure the crops. It seems probable that the climate of this neighbourhood is too warm for the increase of *Cuscuta*, and that its ravages are more to be dreaded in the colder parts of the

colony: *Batatas edulis*, or the sweet potato, has been found growing in a wild state on the banks of the Nepean. This plant, generally called "New Zealand potato," from the fact of Captain Cook's having found it in that island, is indigenous in the Malayan Archipelago, and is spreading over all the warmer parts of the world. It is said that this useful plant was cultivated in the south of Europe before the introduction of the potato.

(4.) *Galiaceæ*: Of this family, there are two species common in New South Wales, one of which (*Galium Gaudichaudi*) is certainly indigenous. The species of *Asperula* (*A. conferta*) that appears so frequently in gardens and cultivated grounds, is regarded as a native, and is identical with the plant noticed by Sir F. Mitchell (see Tropical Australia, p. 360), and alluded to by Dr. F. Mueller, in his report on the plants discovered on the North Australian Expedition. *Galium aparine* is probably an introduced plant.

(5.) *Gentianaceæ*: Of this family there are two species, viz., *Sebæa ovata* and *Erythræa Australis*, which are described by Brown as indigenous. These little plants appear in the early part of the summer, and may be distinguished by their yellow and pink flowers, opposite leaves, and bitter properties. The second of these is a variable plant in size and appearance, and when growing in salt marshes sometimes attains the height of two feet, but the little *Erythræa*, or centaury, which spreads over cultivated fields, and seldom exceeds five or six inches, may probably be an introduced species. In England there are said to be four wild species of this genus, but they differ so little from each other in their essential characters, that some botanists are inclined to regard them as mere varieties.

(6.) *Lamiaceæ*: Of this family there are two plants which have spread very widely in this colony, viz., the little *Stachys arvensis*, from which scarcely a garden or field is free; and *Marrubium vulgare*, or horehound, which occurs frequently in waste places. Both of these plants have a place in the Pharmacopœia, the former being mentioned in connection with *S. betonica*, which is sometimes made into a tea with honey, and considered diaphoretic and expectorant; and the latter, being recommended as a pectoral for colds and coughs. The white horehound is undoubtedly a useful plant, and its extract is a popular remedy for coughs and asth-



matic complaints. It has been recommended as stimulating and tonic, and an infusion of the leaves has been found serviceable in chronic catarrh. In Sir T. Mitchell's *Tropical Australia*, p. 8, the writer remarks: "We halted at another sheep station of Mr. Boyd's. Here I perceived that horehound grew abundantly; and I was assured by Mr. Parkinson, a gentleman in charge of these stations, that this plant springs up at all sheep and cattle stations throughout the colony—a remarkable fact which may assist to explain another, namely, the appearance of the couch grass or dog's tooth grass, wherever the white man sets his foot, although previously unknown in these regions." This passage is quoted in an interesting work on English wild flowers, published under the auspices of the Christian Knowledge Society, and the writer, I think incorrectly, supposes that the horehound mentioned by Sir Thomas is *Ballota nigra*, or the English black horehound, whereas the species spreading in these colonies is *Marrubium vulgare*, or the white horehound. *Prunella vulgaris* is indigenous, and seems identical with the European plant, but a species of *Salvia* which has appeared in the Bathurst district, and another of *Molucella*, from the Murrumbidgee, are regarded by Dr. Mueller as introduced plants.

(7.) *Oleaceæ*: As *Olea paniculata* and *Notelæa ovata* of the olive family, are common in many parts of Australia, it is not surprising that the European olive (in two varieties) has a tendency to escape from cultivated places and spring up in suitable localities. I have noticed both of these plants growing wild in different parts of the bush, to which, in all probability, seeds have been conveyed by birds.

(8.) *Plantaginaceæ*: There are several species of native plantain described by Brown, but the common ribwort (*P. lanceolata*), and the greater plantain (*P. major*) are apparently of European origin. The former is employed in agriculture as a herbage plant, but it is not now much esteemed by farmers; and the spontaneous appearance of it in any locality is regarded as a certain indication of a dry soil. *P. major* is a native of the East as well as of Europe, and generally springs up by the wayside. The seeds afford food for small birds, and the leaves are often used for wounds and sores. An American negro once received a reward for discovering a remedy for the bite of a rattlesnake, and it is

said that the principal ingredient in the preparation was the greater plantain.

(9.) *Primulaceæ*: The indigenous species of this family are very limited, and two only (viz., *Samolus littoralis* and *S. valerandi*) are common in extra-tropical Australia. I mention these, because the genus was originally considered European, and one of our species is identical with that which occurs in Britain. *Anagallis arvensis* and *A. cærulea*, sometimes called "Pimpernel, and the poor man's weather glass," may often be noticed in cultivated ground, especially in wheat fields. They seem to be only varieties of one species, differing principally in colour, the one being scarlet, and the other blue. These pretty little plants were formerly used in mania and hydrophobia, and although perhaps their virtues have been overrated, yet we are assured on good authority that three drachms of the extract prepared from pimperl are sufficient to destroy a dog. The scarlet pimperl is one of the flowers composing Linnæus's "Floral Clock," and it is called "The poor man's weather-glass," because it closes in rainy and cloudy weather.

(10) *Solanaceæ*: Amongst the species of this family which have become acclimatised, perhaps the Cape gooseberry, or *Physalis pubescens* (the same as *P. edulis* and *P. Peruviana*) was the first, for although it is described by Brown, that eminent botanist remarks that it was introduced from Brazil or the Cape of Good Hope. This is certainly a very useful plant, for the fruit is a good substitute for gooseberries, and makes excellent jam. Another plant sometimes mistaken for it often occurs in gardens; this is *Nicandra physaloides*, which is probably indigenous only in Peru. The corolla is large, bluish, and rayed, with a white bottom, which is marked with five dark blue spots. I have mentioned this because it is probable that the fruit is of a poisonous character. *Solanum nigrum*, and *S. verbascifolium* are regarded by Brown as indigenous: the former has small black berries, which are frequently eaten by children in this colony, and do not appear to occasion any unpleasant consequences, although the same plant in England is looked upon as suspicious. It seems that the properties of the fruit become modified by the climate, for, according to the Pharmacopœia, the berries produce mania, somnambulism, and even death! *Datura stramonium*, or thorn apple, is

spreading very much in waste places, and although it is a useful remedy in skilful hands, yet it should be regarded as a dangerous plant, being a powerful narcotic, and the effects of it are similar to those of *Atropa* and *Hyoscyamus*. It is said that the Indian poisoners employ it for the purpose of producing lethargy without killing, in order to facilitate theft and other criminal designs. Some practitioners recommend the smoking of the leaves in paroxysms of pure spasmodic asthma; but when any portion of the plant is taken internally in too large a quantity, serious consequences, even death itself, may result.

(11.) *Verbenaceæ*: the common vervain (*Verbena officinalis*) is indigenous, but *V. Bonariensis* is of foreign origin. This plant, which came in the first instance from South America, may be found not only in waste places in the neighbourhood of Sydney, but it has travelled beyond Mudgee. *V. officinalis* is a popular remedy amongst country people, but the other species is not regarded as possessing any medicinal properties.

In the fourth division of the Vegetable or the Monochlamydeæ, the introduced species may be referred to the following families:— (1.) *Amarantaceæ*; (2.) *Chenopodiaceæ*; (3.) *Polygonaceæ*; and (4.) *Urticaceæ*. In the first of these, two species of *Amarantus* are very common, spreading almost everywhere in cultivated ground and waste places, viz:—*A. oleraceus* and *A. blitum*. These, although regarded as mere weeds, are not without their uses, for in seasons of scarcity they might be eaten as pot-herbs, and in some countries they are employed in emollient poultices. Of the *Chenopodiaceæ*, *Chenopodium murale*, and *C. ambrosioides*, are also abundant. They have a place in the Pharmacopeia, but perhaps with little reason. In the *Polygonaceæ*, there are three species at least of *Rumex* or dock, which have found their way to these shores. *R. crispus* and *R. sanguineus* have had some reputation; the first as a cure for the itch, and the second as a mild aperient, but the species most troublesome in fields and gardens is *R. acetosella*. This plant is said to be antiscorbutic, and the leaves make excellent whey by being boiled in milk; but as it has a tap root, which it is difficult to eradicate, and which spreads very much in any loose soil where it has been introduced, the whole plant is much disliked by the gardener and agriculturist. *Polygonum aviculare*, or knot grass, is another plant of the same family. It derives its

specific name from the fact that little birds are fond of its seeds, and it is called knot grass, not because it is in any way allied to the grass family, but because cattle, and especially hogs, feed upon it, Of the *Urticaceæ* or Nettle family, there are two species of *Urtica*, *U. urens*, and *U. dioica*, found in waste places. The first of these appears to have come accidentally amongst us, but whether the latter is indigenous here, as well as in many other countries, I cannot determine, for I have noticed it in remote parts of the colony. This plant is esteemed astringent and diuretic, the tops of the shoots are sometimes eaten as a pot-herb, and the stalk has the texture of hemp, so that it is capable of being manufactured into cloth, ropes, and paper. As a remedy for the sting of the nettle, its own juice or that of the dock may be applied. (*Pharmacopœia.*)

I must now refer briefly to the Endogens, or Monocotyledons, which have been introduced. In this division of the vegetable kingdom, there are plants of a cosmopolitan character, such as *Alisma plantago*, and some species of *Juncus*, *Cyperus*, &c., which most frequently meet the eye of the observer. These were noticed by the earliest botanists, and, therefore, they cannot be reckoned amongst the introduced plants. Of the *Iridaceæ*, I have found three species which appear to be of foreign origin, viz., *Sisyrinchium micranthum*, (?) *S. anceps*, and a purple *Crocus*. The first of these is a small yellow flower, with grass-like leaves, which in the beginning of summer almost covers some of our cultivated fields. It is not more than two or three inches high. The second is a larger plant, growing somewhat sparingly in moist fields amongst foreign grasses. With respect to the third, I may remark that I have never found it anywhere excepting in the neighbourhood of Botany. Of the *Cyperaceæ*, we have one intruder which is becoming a complete nuisance in many of our gardens. It is commonly known by the name of "bulbous grass," but it is *Cyperus hydra*, or the "nut grass" of the West Indies, which in some instances is reported to have overrun sugar plantations and have rendered them barren. This troublesome weed, which appeared first in Sydney, has found its way to Parramatta and other inland towns, and latterly to the banks of the Hawkesbury. A farmer in the neighbourhood of Richmond told me that he had incurred some expense with a view of removing this pest from his ground, and he thought he had succeeded; but after a

few weeks he found that all his labour had been expended in vain, for the weed sprang up as vigorously as ever. The difficulty of removing this *Cyperus* arises from its tuberous roots, which in alluvial soil strike very deeply. Steudel, in his work on the Sedge family, describes the rhizome or rooting stem as "*longe repente tuberifero*," a character which agrees well with the introduced plant. With the exception of a few species of *Graminaceæ*, which have found their way accidentally to the colony, most of the foreign grasses were brought hither by the early settlers. *Hordeum murinum*, or squirrel-tail grass, has become very annoying in some parts of the interior. The awns or heads of this grass are so injurious to the gums of horses that it should be carefully eradicated wherever hay is grown. *Lolium temulentum* is likewise another injurious grass, being the only one of the family which has deleterious properties. This grass is described by Steudel as being indigenous in New Holland, as well as in many parts of Europe, Asia, Africa, and America; but as Brown does not enumerate it amongst the Australian grasses, I think it must have been introduced. The seeds of this darnel or rye grass are said to produce intoxication and fatal convulsions, and it is undoubtedly the tare mentioned in the New Testament (Matt. xiii. 25)—a noxious weed, which modern travellers assure us is pulled up and separated from the wheat just as it was eighteen centuries ago! As the "summer grass," or *Panicum ciliare*, and the "couch grass," or *Cynodon dactylon*, are described by Brown amongst our indigenous grasses, I must omit these from the number of introduced plants, although I believe many persons consider that the latter was brought from the East Indies. The same remark may probably apply to *Panicum crus galli* (a coarse grass which can endure hot weather), which Brown himself found here in a wild state. *Poa annua* seems to be cosmopolitan, as it may be found in almost all temperate climates, but *P. glauca*, and *P. pratensis* were introduced from England, and also *Briza media*, *B. maxima*, *Lolium perenne*, *Holcus lanatus*, and *Festuca bromoides*, all of which may be noticed occasionally in a wild state. *Bromus Schraderi* (prairie grass), and *Hemitaphrum glabrum* (buffalo grass), have not been so long in the colony as those enumerated, but as they seem more suitable for this climate than many of the English grasses, they are likely to spread more

widely. The prairie grass affords excellent pasture for the winter, and the buffalo grass is very useful for binding the soil together in sandy places. I have seen specimens of *Lappago racemosa* from remote parts of the colony, and I believe that it is now considered indigenous.

In closing my present paper, I feel some pleasure in having opened up a subject which affords a very wide field for investigation. For some years past, I have paid attention to introduced plants, but as my observations have been confined to Eastern Australia, they are necessarily imperfect. It would be well if observers in Western and Southern Australia would communicate to the public the result of their inquiries, for probably many plants, which have not appeared amongst us, have found their way accidentally into the other Australian colonies.

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NOTE.—I have noticed *Argemone Mexicana* of the Poppy Family growing wild on the banks of the Hunter, and also *Linaria spuria* in a field near Parramatta. *Gymnosperma glutinosum* sprang up in the same neighbourhood, but it does seem likely to spread. *Verbascum* in two varieties comes up occasionally in cultivated ground, and *Senecio scandens*, *Passiflora cærulea*, *Alaternus*, and *Pelargorium graveolens* frequently escape from gardens and appear in waste places.

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## ALGÆ OR SEA-WEEDS.

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WHEN strolling along the shore at Manly Beach some little time since, I met with a lady in the midst of a mass of brown sea-weeds, earnestly engaged in seeking for the beautiful marine plants which are so frequently found about their roots. Perceiving that she was occupied in the same pursuit as myself, I took the liberty of addressing her, with a view of ascertaining whether she could assist me in determining some of the difficult species. I found, however, that my fair fellow-labourer was simply searching for red sea-weeds, without any reference to genera or species, probably intending them for some ornamental work. It struck me at the time, and it has often occurred to me

since, that if some of the ladies who visit Manly Beach and other places on the coast, would collect sea-weeds, and arrange them systematically according to the families indicated in Dr. Harvey's splendid work on Australian sea-weeds, they would not merely tend to advance the study of marine botany, but also secure for themselves an endless source of amusement when rambling along the shores in search of the beauties of the deep.

The satirist of old, ignorant of the value and use of sea-weed, exclaims, "Birth and virtue, unless accompanied with property, are viler trash than sea-weed;" and yet in the progress of science, we have lived to see the vile sea weed applied in so many ways for the benefit of man, that a volume might easily be written on the subject. Some are useful for food and fuel, others for medicine and manure, whilst in Glasgow alone, no less than twenty establishments are engaged in the lixiviation of kelp and manufacture of iodine, working up, it is stated, 3000 tons a year. Many sea-weeds contain great quantities of mannite, and in China some species have long been used in the preparation of ornamental articles, as well as in the composition of mucilaginous beverages intended for invalids. The Irish moss or *Chondrus crispus*, is well known as a popular remedy for pulmonary consumption, and is given in the form of a decoction, made by boiling an ounce in a pint and a half of water or milk. On the coast of Ireland, it is converted into size for the use of house-painters, and also employed in lieu of isinglass in the preparation of cream and other confectionery. *Laminaria*—a genus which abounds on these coasts, as well as in Europe—contains a nutritive jelly, more or less saccharine. It is eaten by man and beast, and is also burned for kelp.

In collecting specimens, it will soon be found that some species will not adhere to paper, whilst others become so firmly attached to it as to give the idea of a picture, rather than that of a plant. The former kinds may be washed in fresh water, and dried and pressed as phanerogamous plants are; but the preparation of the latter is a delicate operation requiring some patience and skill. Dr. Harvey, after recommending collectors to procure large flat dishes, for the purpose of washing and expanding their specimens in fresh water, so as to remove from them any particles of mud, sand &c., says "next, a piece of white paper, of suitable size is introduced into the plate, under the expanded specimen. The

paper then, with the specimen properly displayed upon it, is cautiously brought to the surface of the water, and gently and carefully drawn out, so as not to disarrange the branches of the specimen. A forceps, a porcupine's quill, or a knitting needle, or any fine pointed instrument, will assist the operator in displaying the branches, and keeping them apart while the plant is being lifted from the water. . . . The specimen, as now displayed on a piece of wet white paper, is to be placed on a sheet of soaking-paper, and other specimens placed beside it, till the sheet be covered. A piece of thin calico or muslin, as large as the sheet of soaking-paper is then spread over the wet specimens. More soaking-paper, and another layer of specimens covered with a cotton rag, are laid over the first; and thus a pile of alternate soaking-paper, specimens, and rags is gradually raised. This pile or bundle is then placed between a pair of flat boards, a weight put on it, and it is left for some hours. It must then be examined, the wet soaking papers removed, and dry ones substituted; but the cotton rags may be allowed to adhere to the face of the specimens until the latter are perfectly dry, and when they will come off without trouble, even from the most gelatinous kinds."

The classification of algæ is a matter of difficulty, and depends principally upon the different modes of fructification noticed in different parts. Some species which closely resemble each other in appearance, and which by the casual observer would be referred to the same genus, are found to differ greatly in their fructification, when viewed under a powerful microscope, and hence they must be placed in very different genera. This, indeed, is the case with two of our most admired red sea-weeds, *Ptilota* and *Phacelocarpus*. They may easily be mistaken for each other, so similar are they in the ramification and colour, and in the elegant pectinated appearance, of their ramuli, and yet according to a systematic arrangement, they must be placed in families widely separated.

In order that we may have some general ideas of classification, it is necessary to observe that Phycologists now divide sea-weeds into three sub-classes, viz :—(1.) *Melanospermeæ*, (2.) *Rhodosperrmeæ*, and (3.) *Chlorospermeæ*, and that these are again subdivided into families or orders according to their fructification, texture, &c. One of the latest writers on sea-weeds (Dr. Harvey), makes the following divisions the basis of his system:—



(1.) *Melanospermeæ*; which are marine plants of an olive green, or olive brown colour, having a monœcious or diœcious fructification. The spores are olive-colored, each enveloped in a pellucid skin, and either simple or separating into two, four, or eight sporules. They produce *antheridia*, or transparent orange-colored vivacious corpuscules, moving by means of vibratile cilia.

(2.) *Rhodospermeæ*, which with one or two exceptions, are marine plants, mostly of a rosy red or purple colour. The fructification is of two kinds; either of spores in external or immersed conceptacles, or densely aggregated together and dispersed throughout masses of the frond; or of tetraspores of a red or purple colour, external or immersed in the frond, and each enveloped in a pellucid skin which at maturity separates into four sporules. Some possess antheridia which are filled with yellow corpuscules.

(3.) *Chlorospermeæ*, which are marine or fresh water plants of a green colour. The fructification is diffused through all parts of the frond. The sporules are green, formed within the cells and often at maturity having vibratile cilia. They produce also gemmules or external vesicles, which contain a dense, dark-coloured granular mass, which finally separates from the frond.

The division of sea-weeds into the brown, red, and green series, is certainly a very natural one, but in the examination of dried specimens, too much importance must not be attached to mere colour, for although some of the red series retain their colour for years, there are others which become green, olive, and even black in drying! Hence arises the necessity of paying great attention to the fructification, for as my learned friend Dr. F. Mueller remarked on another occasion, "It is equally true in Botany as in Divinity, that By their fruits ye shall know them." Amongst the red series, *Ballia* and *Haloplegma* assume a yellowish green and tawny colour in drying, whilst *Thysanocladia* becomes dark reddish brown, and looks like a plant of the brown series. The same may be said of *Lenormandia*, *Melanthalia*, and *Polyphacum*, all of which, in certain conditions, may be referred by the inattentive observer to the *Melanospermeæ*. There are other Australian sea-weeds that change their colour in a similar manner, but I have preferred instancing those species of which I have specimens in my possession. With respect to the fructification

of the red series, although many kinds are furnished with a double system of fructification, yet it is generally considered that the one is as capable of producing a new plant as the other. A late writer on British sea-weeds remarks:—"The greater part, if not all, of the red series is furnished with this double fructification, the primary, or capsular, on one plant, and the secondary, or granular, on another plant. Though the capsules of two different genera and species bear no resemblance to each other, yet there are many modifications of shape, so that they are at once like and unlike, and to become acquainted with the minor differences requires time and attention."

Persons not accustomed to search into the works of nature will be astonished to find a very extensive field for investigation, in the flora of the deep. During Dr. Harvey's botanical voyage to the Australian colonies he collected no less than 20,000 specimens of six hundred species of sea-weeds, and he estimates the number of species of Algæ dispersed along our coasts at nearly 1000! Some of the species so beautifully figured and described by that eminent phycologist, are indeed very rare, and perfect specimens of them can seldom be procured without dredging; but some of the more common forms are frequently cast upon our shores. It is to these forms that I wish to direct attention in the present communication, because it is almost impossible to walk along the shore without noticing some of them, and I think that the study of them affords a very suitable introduction to the investigation of the marine flora of Australia in general.

Of the *Melanospermeæ*, which are common at Manly Beach, and other places on the coast, the following genera can scarcely fail to be noticed, even by a casual observer, viz., *Sargassum*, *Cystophora*, *Phyllospora*, *Hormosira*, *Laminaria*, *Padina*, *Zonaria*, and *Dictyota*. They are all of a brown or olive-brown colour, and after a storm large masses of the commoner kinds may be seen strewed along the beach. The genus *Sargassum* prevails over a wide extent of ocean, but from the circumstance of its having been early observed to be abundant in the Gulf of Mexico, it has very generally been called the "gulf-weed." The fronds of this genus are leaved, the leaves stalked, and generally with a mid-rib: air-vessels simple, axillary, and stalked: receptacles small, linear tuberculated, mostly in axillary racemes, seeds in distinct cells. Many

species of *Sargassum* are found on these coasts, and some of the rarer ones are figured in Harvey's Phycologia. The common species *S. bacciferum* (so termed from its berry-like vesicles which have sometimes been called sea-grapes) may often be collected, and indeed it has been found almost at the head of the Parramatta River, whither it had been conveyed by the tide. This species is the one alluded to in Robertson's History of America: "When about 400 leagues to the West of the Canaries, Columbus found the the sea so covered with weeds that it resembled a meadow of vast extent, and in some places they were so thick as to retard the motion of the vessels. This strange appearance occasioned new alarm and disquiet to the sailors. They imagined that they were now arrived at the utmost boundary of the navigable ocean, that these floating weeds would obstruct their further progress, and concealed dangerous rocks, or some large tract of land which had sunk, they knew not how, in that place. Columbus endeavoured to persuade them that what had alarmed, ought rather to have encouraged them, and was to be considered as a sign of approaching land." I have instanced *S. bacciferum* as being likely to catch the eye of the observer on account of its frequent occurrence; but other species, particularly *S. vulgare*, *S. ligulatum*, *S. filifolium*, &c., are often found on the eastern shores of Australia. The genus *Cystophora* is peculiar to these coasts, and according to Harvey, represents *Cystoseira* of the Northern Hemisphere, differing from that genus chiefly in the position of the receptacles. In *Cystoseira* the air-vessels are arranged within the substance of the branch-like leaves, whereas in *Cystophora*, they are stipitate and rarely absent. In *Sargassum* the receptacles are mostly axillary in racemes, whereas in *Cystophora* they are pod-like, torulose or moniliform, developed in the ramuli.\* *C. spartioides* and *C. platylobium*, as well as other species, occur frequently near Sydney, and *C. botryocystis* was discovered by Dr. Mueller at Port Phillip. *Phyllospora comosa*, or *Macrocystis comosa*, may often be found at Manly Beach. It has a stem flat, smooth, and pinnately branched; leaves marginal, lanceolate-linear, attenuate, distantly toothed; vesicles elliptical, leaf-bearing. This is one of the largest of our sea-weeds, and is allied to *Macrocystis luxurians*, which, Dr. Hooker says, in its horizontal growth at the surface of the ocean, ranges between 200 and 700 feet in length, whilst at the Falkland

Islands the beach is lined for miles with entangled cables of this plant much thicker than the human body. *Hormosira Banksii* is a sea-weed which everyone must have noticed on the rocks near high water mark, and it differs so much from every other in its leafless moniliform frond, that it cannot be mistaken for any other. It derives its name from *hormos* a necklace, and *sira* a chain, as it consists of a series of inflated internodes, similar in character to vesicles. There are many varieties of this plant, arising probably from the depth of the water in which it grows, but Harvey refers them to one species. The fructification consists of spore-cavities sunk in the vesicated internodes. *Laminaria* is so called from *lamina*, a thin plate, in allusion to the flat frond, and is popularly termed "sea-girdle or tangle." *L. digitata* occurs in Europe as well as on these coasts, and is one of those weeds which contribute to the formation of kelp, and no sea-weed is said to be so rich in iodine as the species in question. *L. digitata* and also *L. potato-rum* are common, and the former extends some distance up the Parramatta River. The other species derives its name from the circumstance of its being used by the aboriginal natives for the conveyance of water. *Padina pavonia* is a much smaller weed than any of the preceding, and its general resemblance to the expanded tail of a peacock has been noticed by all authors. The frond is flat, ribless, fan-shaped, and marked at regular distances with concentric lines. The genus *Zonaria* is represented by several species, *Z. Sinclairii* being one of the most common. It is called *Zonaria* from the Greek word, which signifies a zone or girdle, because the frond, in many species, is marked with distant, concentric lines. *Padina* and *Zonaria*, as well as *Dictyota*, which is sometimes found in company with them, belong to the class of sea-weeds called Dictyotææ, because when viewed under a lens the fronds appear reticulated.

Of the second series, or Rhodospermeæ, which on account of the brilliancy of their colours, and the elegance of their fronds, are more especially objects of interest to the collector, there are numerous species on these coasts, but the genera most likely to be met with without the trouble of dredging are *Ptilota*, *Phacelocarpus*, and *Plocamium*. These, together with some of the more minute species, which can scarcely be seen without the aid of a microscope, are often found at the roots of the brown sea-weeds,

or lying in fragments along the shore. The first two of these are so much alike, that they may be mistaken for each other, but upon examination it will be found that, although both of the fronds are similar in colour, and pectinato-pinnate, yet *Ptilota* of the natural family Ceramiaceæ has the fructification involucrate, terminating short branches; whilst *Phacelocarpus* has the fruit of both kinds external, and generally pedicellate, and hence Dr. Harvey refers it to the natural family Sphærococcoideæ. *Plocamium coccineum* is a cosmopolitan, and, according to Dr. Greville, is "one of the most charming and symmetrical algæ in the world, extremely common, and a universal favourite." This species may be often collected at Manly; but *P. confervaceum* and *P. Presianum* are not so common. For a beautiful specimen of the latter, I am indebted to Mrs. S. Pearson, of Illawarra, a lady who has devoted much attention to the collection of Algæ, and who, in addition to the species of *Plocamium*, has succeeded in finding some rare and elegant plants. The species of *Ceramium* which I have found are very small; but one of them, when magnified, is exceedingly interesting, and similar to *C. miniatum*. Nearly allied to this genus is that of *Ballia*, of which I have received a specimen from Dr. Mueller, which I believe he procured at the Port Phillip Heads, by dredging. To the same kind friend, I am indebted for *Gelidium glandulæfolium*, but this is not a favourite with collectors in general, as it does not adhere to paper. *Rhabdonia*, *Hymenocladia*, *Rhodymenia*, and *Nitophyllum* occur in different parts of the coast; but *Laurencia* seems much more common, and is represented by three species. And yet I have not found any specimen of this genus, so elegant as *L. concinna*, which was collected many years since in New Zealand, by Mrs. Josiah Betts, when visiting the Bay of Islands in company with her venerable father, the Rev. Samuel Marsden. *Thysanocladia laxa* has been found by Mrs. Pearson at Illawarra. This, Dr. Harvey mentions "as a rare species, and, like all the others, a deep water plant." The corallines, such as *Corallina officinalis*, *Jania rubens*, and *Melobesia* are very common. These were formerly regarded by many naturalists as animals, but Dr. Harvey says, "The question of the vegetable nature of corallines may now be considered as finally set at rest by the researches of Kützing, Philippi, and Decaisne. Whoever macerates a portion

of one of these stony vegetables in acid, till the lime it contains is dissolved, will find he has a structure of a totally different nature from that of any zoophyte, while it is perfectly analogous to that of many algæ." In the natural family of Rhodomeleæ, there are some interesting and beautiful sea-weeds, such as *Poly-siphonia*, *Dasya*, and *Martensia*, which are most appropriate objects for the microscope. *P. forfex*, though not likely to arrest the attention of the casual observer, is elegantly figured by Harvey, and is well worthy of examination under the microscope. Persons not accustomed to such investigations, will gaze with astonishment at the regularity and beauty of these insignificant plants, and they may be led to conclude with the Psalmist that "the works of the Lord are great, sought out of all them that have pleasure therein." Of *Polyphacum* I have received a specimen from Victoria, and I have also in my collection *Lenormandia*, and a fragment of *Jeannerettia*, but I do not know where they were procured. The last genus is named in honour of Dr. Jeanerett, an investigator of the botany of Tasmania, and well known to many persons in this colony. There are many more plants of the red series which remain to be considered on some future occasion, and I confess that I should esteem it a high honour if, in the course of my investigation, I could discover any traces of the singularly curious species, *Claudea Bennettiana* (named in compliment to Dr. Bennett, the accomplished naturalist) of which, to the present time, only one specimen has been found, and that in the Parramatta River, near Spectacle Island. In a pretty album called "Treasures of the Deep," containing fifty specimens of of Scottish Algæ, there are some elegant lines applicable in an especial degree to the red series of sea-weeds. With these, therefore, I shall conclude my brief review of our Australian Rhodosperms:—

"Call us not weeds, we are flowers of the sea,  
For lovely, and bright, and gay tinted are we;  
And quite independent of culture or showers,  
Then call us not weeds—we are ocean's gay flowers."

Of the third series, or the Chlorospermeæ, one of the most common, and at the same time most interesting, is *Microdictyon Agardhianum*. This derives its generic name "a small net," from the filmy network of the frond. It is abundant throughout Port Jackson, and in the Parramatta River, and I have collected a

specimen as far up the river as Newington. Harvey describes the frond as "from one to twelve inches broad, of no certain outline, lying flat on the surface of rocks or sand, unattached, or fixed to Algæ and Corallines by several points of its lower surface, wholly composed of confervoid, articulated, anastomosing filaments, and comparable either to a network with irregular meshes, or to a skeleton leaf." The species of *Enteromorpha*, *Ulva*, and *Conferva*, all of which extend far up the Parramatta River, seem to be cosmopolitan, and so also do many of the species of *Cladophora*; but of the family of Siphonæ, there are some remarkable plants, which deserve more than a passing remark. Of *Codium*, I have noticed three species—*C. tomentosum* (which also occurs in Europe), *C. spongiosum*, and *C. mamillosum* (?). The fronds of *Codium* are sponge-like, being composed of one-celled branching filaments filled with green matter, and the fructification is minute, consisting of spore cases attached laterally. Of the genus *Caulerpa* there are several species figured by Harvey, but of these I have met with only two—*C. hypnoides*, and *C. sedoides*, for both of which I am indebted to Mrs. Pearson. This genus derives its name from *caulos*, a stem, and *erpo*, to creep, the creeping surculi being the characteristic of the genus. *C. hypnoides* has the appearance of a *Hypnum*, or moss, and is said to bear a close resemblance to a Swiss fossil, figured by Brongniart under the name *Fucoides hypnoides*.

In bringing this communication to a close, I may remark that the study of sea-weeds is attended with many collateral advantages, for it is almost impossible to examine the forms and structure of them without being occasionally diverted to other studies. Many beautiful zoophites will be frequently found adhering to them, and hence the collector is imperceptibly led to the consideration of matters beyond the range of the vegetable kingdom. In my inquiries, trifling and limited as they have been, I have noticed with much pleasure several species of *Flustra* and *Sertularia*. These are interesting objects for the microscope, and the study of them is calculated to give us a most extended view of the Creator's works, for in a common specimen of *Flustra*, it has been estimated that there are 18,000 polypi, 396,000 tentacula, and 39,600,000 cilia on these tentacula! "How much life and active employment," says a late writer, "on a small polypidom".

Most of the zoophytes to which I now refer, are too small to interest the general observer, but as he is wandering amongst the rocks near the sea, he cannot fail to notice the sea-anemones or *Actinia*, for these are visible to the naked eye, and claim attention on account of their beauty. Nor, indeed, as he walks along the shore of Manly at certain periods, will the Portuguese Man-of-War (*Physalia*) escape his observation, for specimens may be seen in great abundance, as the retiring tide leaves them on the strand. This little acalephous creature is figured and described in Dr. Bennett's work; but I would caution the uninitiated not to handle it too affectionately, for by persons of certain temperaments, it cannot be touched without inconvenience. Most persons are stung or burned in the fingers by handling it, but sometimes more serious consequences arise, as indeed Dr. Bennett has hinted. The same unpleasant sensations arise from coming in contact with some species of *Medusa*, as in not a few, Cuvier informs us, the gelatinous matter which fills the integument of the disc is of so acrid a nature, as to irritate and blister the skin. I recollect having visited the baths at Southampton many years since, and on coming out of the water where there had been some *Medusa*, I experienced the same feelings as if I had been rolling in a bed of sting-nettles. There is another animal which may often be seen at Manly, for a description of which we are indebted to the distinguished naturalist W. S. Macleay, Esq., I mean *Boltenia reniformis*, belonging to a sub-genus of ascidia. The following is the generic character of *Boltenia* as reformed by Mr. Macleay:—"Body with a coriaceous test, supported from the summit by a long pedicle, and having both orifices lateral and cleft into four rays. Branchial pouch divided into longitudinal folds, surmounted by a circle of compound tentacula, and having the reticulation of its respiratory tissue simple; abdomen lateral, ovary multiple."

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## L I C H E N S .

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IT was observed many years since, by the celebrated Robert Brown, that two thirds of the lichens found in New Holland are identical with European species; and more recent authors have proved that many of the common forms (such as *Usnea barbata*, *Cladonia pyxidata*, *Lecanora subfusca*, &c.), are truly cosmopolitan. In treating of the mosses that occur in this neighbourhood, I have already had occasion to notice that as we descend in the vegetable kingdom, there is a remarkable similiarity in the species which are found in different parts of the world, and that under certain conditions the same plants invariably spring up. How this happens, learned men are unable to explain; but perhaps it may assist our comprehension of the subject, if we reflect on the amazing fecundity of well-known cryptogamous plants, and the probability that their spores are almost indefinitely diffused, and ever ready to appear when conditions favourable to their development occur. In the common English fern "hart's tongue" (*Scolopendrium*), it has been calculated that in a good-sized frond, there are at least fifty sori or patches of spore cases, that each sorus contains from four to six thousand thecæ or cases, and that these thecæ themselves inclose about fifty spores. Now these facts, which the microscope has revealed to us, lead to the wonderful conclusion, that a single leaf of the plant may give rise to no less than ten millions of young ferns! The sporules of some species of moss (such for instance as *Dicranum bryoides*, *Funaria hygrometrica*, *Tortula muralis*, *Didymodon purpureum*, &c.) are likewise exceedingly numerous, and probably almost indefinitely diffused. Nor, indeed, must it be overlooked, that innumerable as the sporules may be, they do not appear in every case necessary for the propagation of these minute plants, for of the many species which clothe the rocks of Spitzbergen, few are ever seen in a state of fructification. It may be mentioned, therefore, on the authority of Dr. Hooker, that what are considered the seeds of mosses, are not requisite for the increase of these plants. On this subject,

there is evidently much obscurity, and although as in the case of ferns and mosses, the spores of lichens seem to be wafted by the breeze, or conveyed by falling rain, and afford "one means of that gradual but never-ceasing disintegration or decay, which is wearing down the densest and loftiest pinnacles of the earth;" yet the mode of their fructification is but imperfectly understood. Without offering any speculative opinion, therefore, on the fact that certain conditions only seem necessary for the production of many cryptogamous plants, I shall endeavour to enumerate the species of lichens which occur in this neighbourhood, and to point out some of their probable uses in the economy of nature.

The word Lichen is of Greek origin, and means a wart, and it seems to have been applied to this family of plants, from a fancied resemblance between warts, and the fructification of some lichens. In common conversation, many of the lichens, especially *Usnea barbata*, (the "bearded Moss" of the poets), and *Cladonia bellidiflora*, (the "Red-cupped moss" of Mrs. Hemans and others) are termed mosses, and, therefore, it may be desirable to state, that, according to the definition of a late writer, "Lichens are aerial plants with leaves and stem combined into a visible above-ground thallus, which either spreads horizontally in the form of a lobed, irregular crust or plate, or rises erect with irregular, unsymmetrical branches, the reproductive organs being embedded in external disks or shields." With respect to these organs, however, there is much difficulty, and the nature and functions of what lichenologists call spermatia (that is minute acicular, or linear bodies, straight or curved, and of various forms) is wholly unknown. These spermatia are developed long before the spores, and according to late writers, they bear some analogy to the antherozoids of the genus *Chara*. Very high powers of the microscope have been applied to these bodies; but owing to their extreme tenuity, they have hitherto baffled examination. It would occupy too much space to pursue this subject any further, nor indeed would it interest the general reader; but I may remark that in the vegetable, as well as in the animal kingdom, there are many mysteries to be solved in reference to the lower forms, especially as regards their varying modes of reproduction. How the sterile moss, or the sterile lichen (no organs of fructification being apparent) spreads over the barren

rocks, it is difficult to conceive; and if Dr. Hooker's opinion on the subject be correct, it is evident that we have much to learn. Without descending, however, so low as mosses and lichens, there are in Australia, two instances, one from the animal, and the other from the vegetable kingdom, that seem to open up a very wide field of inquiry. I allude particularly to the shrub called *Cælebogyne ilicifolia*, which without any apparent male organs, seems to propagate itself from generation to generation; and also to the troublesome insect called Aphis or plant-louse, which according to Cuvier and Owen, is capable of multiplying in a manner different from the higher forms of animal life, and that to such a degree, that supposing one aphis produced one hundred at each brood, she would at the tenth brood be the progenitor of one quintillion of descendants—1,000,000,000,000,000,000.

The Lichens, which I have collected belong to the following genera: (1) *Usnea*, (2) *Cornicularia*, (3) *Ramalina*, (4) *Parmelia*, (5) *Lecanora*, (6) *Lecidea*, (7) *Opegrapha*, (8) *Graphis*, (9) *Bæomyces*, (10) *Cladonia*, (11) *Collema*, (12) *Pertusaria*, and (13) *Verrucaria*.

(1) *Usnea*.—This is a cosmopolitan, and is said to derive its name from an Arabic word, which is a generic term for all Lichens. As it hangs gracefully from the branches of old trees, it is compared by some of our poets to "old men's beards," and by Shakspeare it is called "idle moss." It is said to be a stringent, and in some parts of the world it is collected and preserved as winter fodder for domestic animals. *Usnea* has had its reputation as a dye, and also as a remedy for hooping cough, but whatever may be its utility in these respects, there can be little doubt respecting its use to the bird stuffer, and as it is found in almost all countries, from the Arctic to the Antarctic regions, it is [always available for collections of stuffed birds. Although *Usnea* may be seen on most of our old trees and fences, yet it is not so abundant as in colder climates, where it attains the greatest size, and sometimes covers the surface of the rocks. The species so common here appears to be *U. barbata*, and is of a greyish colour, but in some parts of the colony it assumes an orange or straw colour; and it seems probable that one of these varieties has furnished the orange dye to which allusion has been made.

(2) *Cornicularia* derives its name from corniculum, "a little horn," in allusion to the little horn-like divisions into which the thallus is divided. The species *C. flavicans* is common not merely on bush trees, but also on many kinds of garden fruit trees, and it may readily be distinguished by its golden yellow or orange colour. Some of the brightest specimens which I have noticed in this neighbourhood were growing on Acacia or Bursaria; but I think, as a general rule, this Lichen seldom appears on young and healthy trees, and some horticulturists, being of opinion that it is injurious, remove it as soon as possible. Lichens or as they are generally termed by gardeners, "Mosses," are not popular amongst horticulturists, and in a late work the following passage occurs:—"The most effectual, most salutary, and least disagreeable remedy for moss on trees is of trivial expense, and which a gardener need but try upon one individual to insure its adoption. It is with a hard scrubbing-brush, dipped in a strong brine of common salt as often as necessary, to insure each portion of the bark being moistened with it, to scrub the trunks and branches of his trees at least every second year. It most effectually destroys insects of all kinds and moss, and the stimulating influence of the application, and the friction, are productive of most beneficial effects." Of mosses, truly so called, there are two (*Gymnostomum* and *Zygodon*), which may frequently be seen on the mulberry and English oak when growing in damp and shady places, and although they are very beautiful objects for microscopic investigation, I suppose they will be included also amongst the "nuisances" referred to in the preceding paragraph.

(3) *Ramalina* is so called from ramale, "a dead twig," because that is a very common habitat of its species. *R. fraxinea*, which is so generally found in this part of the world, derives its name from fraxinus, the ash tree, but it occurs not merely on that tree, but also on many other trees, so that, as far as this colony is concerned, the specific name is by no means appropriate. Some of the best specimens which I have seen, were found adhering to the bark of *Acacia cinerascens* on the banks of the Nepean, not far from the residence of my gallant friend, H. T. Shadforth, Esq., but it may be seen on many of our forest trees, and also on old fences. Some botanists regard the different varieties of this lichen as distinct species, but one of the latest writers has ar-

rived at the conclusion that at least all the British Ramalinæ are only varying forms of one species. This species has a very wide geographical range, being found on the Himalayas, and in different parts of India, in Lapland, and in the polar regions, in North America, and it is said to contain a considerable amount of gum, which has been used instead of gum arabic in calico printing and in the making of parchment and pasteboard; in a pulverised form it has been used as the basis of hair powders. ("Lindsay's British Lichens.")

(4) *Parmelia* seems to be derived from *parma*, a round buckler, in allusion to the appearance of the apothecia, or the horny disks arising from the thallus, and containing the spores. This is one of the largest and most extensive genera of lichens, and its species are very widely distributed in all parts of the world, being found even "on all the rocks projecting through snow, without any limitation as to height, and ascending far above the snow-line: they also occur at above 16,000 feet on Chimborazo." The forms or species of *Parmelia* so common in Europe, are found in similar situations here, namely on rocks, old trees and fences. *P. caperata*, *P. pulverulenta*, and *P. stellaris*, generally occur on trees and fences, and *P. saxatilis* and *P. olivacea* on rocks in or near creeks; but as in Europe, so also here, the last-mentioned species is sterile and degenerate when in such localities, and it appears to afford an instance, similar to that already adverted to in some mosses, of increasing and spreading without fructification. These lichens appear as white, grey, greenish, or olive coloured patches, and they are very abundant on trees, (particularly *Casuarina*, &c.), when growing in shady places near creeks, increasing apparently in size and beauty, as the trees become old and decayed. In the Pharmacopœia, *P. caperata*, *P. olivacea*, and *P. saxatilis*, are mentioned as "roborant" and "astringent," and it is stated that in some parts of the world, they are used in dyeing, but in "Lindley's Medical and Economical Botany," the only species retained is *P. parietina*, or as it is called in Europe the Yellow Wall Lichen, which is said to be bitter, and yielding a yellow colouring matter. I have noticed this species near Parramatta, but it grows on sandstone rocks near the coast. On some of the inland species, I have seen some minute species of *Jungermannia*, but not differing materially from those described as European.

(5) *Lecanora* comprises a genus not so easily distinguished as the preceding, and the species here are much smaller than some already enumerated. The name of this genus is taken from *le-cane*, a dish or platter, in allusion to the form of the apothecium. Two species *L. atra* and *L. subfusca*, are very common, and they may be found on trees, rocks, fences, and sometimes even on the ground. The apothecia of these appear very much alike both eventually becoming black, though in *L. subfusca* they are not so *ab initio*. It is almost impossible to examine the bark of trees or the rocks without noticing the small black shield-like bodies which constitute the sporangia of these lichens. *L. subfusca* may be termed cosmopolitan, and Dr. Hooker states in his work on the Cryptogamic Antarctic Flora, that it is one of those plants which with a few mosses, comprise the last remnants of vegetation in the Southern Hemisphere.

(6) *Lecidea* is another genus which takes its name from the form of its apothecia, which are supposed to resemble a dish (*Lecos* a dish and *eidōs* like). The apothecia are black, flattish and marginate or uniform. The species which I have noticed on the sandstone rocks to the north of Parramatta, appears similar to the *L. petræa* of Europe, and it is evidently nearly allied to *L. geographica*, but differing from that species in the colour of the crust, and the shape of the apothecia. When viewed with the naked eye, this lichen appears on the rock as a white patch, with innumerable black specks on it, but under a lens the thallus has a somewhat tessellated appearance, and the black specks are seen as apothecia grown into the crust, with a tumid elevated contracted margin. I have been thus particular in describing the appearance of this diminutive plant, as I believe it to be one of those insignificant but wonderful agents employed by Divine Providence for the disintegration of rocks, and the gradual preparation of a humble soil for mosses and other plants. This opinion I mentioned some little time since to my eminent geological friend the Rev. W. B. Clarke, and I was pleased to find that he agreed so far with me, as to attribute much importance to the slow and almost imperceptible changes affected by "mosses." Since that conversation, I have had an opportunity of reading a late work on British Lichens, and in that I find several interesting facts, mentioned in reference to the genus *Lecidea*, which

tend to show that the species are interesting to the geologist as well as to the botanist. The writer states, "almost all lichens are more or less intimately united to the bodies on which they grow," the surface of the latter is frequently pierced or broken up by the tissues of the lichen; nay, the hardest calcareous rock, the smoothest quartz, is corroded and disintegrated; and deeply sunk in their substance we find the fructification of several species of *Verrucaria* and *Lecidea*. This phenomenon has hitherto been unexplained; it probably depends on some chemical action exerted on the rock by the lichen." In reference to the formation of soil, the same writer remarks, that "lichens form a soil fitted for the germination and growth of higher plants—a saxicolous, crustaceous species growing on the bare quartz summits of the highest mountains; or, he adds, we may suppose its habitat to be the bare lava of a volcanic district, or the equally sterile surface of a newly upraised coral island. The delicate spores of such a species have been wafted thither by a breeze or washed to its surface by a shower. They germinate, and develop a thallus, which becomes adherent to the rocky surface by a process of disintegration. From the atmosphere chiefly, and from the rock perhaps to a slight extent, the plant derives nourishment, grows, and in the course of time dies, thereby adding to this stratum of mineral soil, which it has produced, a thicker layer of vegetable soil. This soil is now suited for fructiculose or foliaceous lichens; these in their turn decay, and contribute to the increase of the vegetable soil, which is next taken possession of by mosses and ferns, and gradually, by various phanerogamic plants, shrubs, and trees. . . . Linnæus denominated the mosses, servi—handmaids of nature. We think the reader will agree with us in considering that the lichens have a superior claim to the appellation." With regard to the habitat of the genus *Lecidea*, it may be remarked that it is found at the greatest elevation hitherto reached by man; it occurs far above the line of perpetual snow on the Alps, and is the last type of vegetation met with on the Andes and Himalayas, and on the deserts of Nova Zembla.

(7 and 8) *Opegrapha* and *Graphis* are two genera of minute lichens that have acquired their respective names from the resemblance of the species to written characters. *O. vulgata* and *G. scripta*

may be found not only on the introduced oak and pine, but also on several colonial trees, especially *Casuarina paludosa*. One of the most prominent differences between the genera, is in the disposition of the apothecia, those of the former being sessile, and those of the latter immersed.

(9) *Bæomyces*, which derives its name from *baios*, small, and *myces*, a mushroom, is a genus consisting of diminutive plants closely resembling fungi. Of this genus I have noticed only one species, viz., *B. rufus*. This plant has been placed in somewhat the same position with regard to fungi, as *Collema* has to algæ, for whilst the one has been claimed as a fungus, the latter has been claimed as an alga. The presence, however, of what lichenologists term gonidia (or green reproductive granules found in the medullary layer), is said to have settled the question.

(10) *Cladonia*. This genus was formerly called *Cenomyce*, but it is now more usually termed *Cladonia*, from *clados*, a small branch, in allusion to the branch-like appearance of some species of it. From possessing a vertical, as well as horizontal thallus, the *Cladoniae* rank amongst the highest typical forms of lichens, the podetium or the stalk-like elevation of the thallus being regarded by some as a modification of the foliole, or squamule. I have collected near Parramatta, *C. pyxidata*, *C. furcata*, *C. gracilis*, *C. bellidiflora*, and *C. cervicornis*. The first of these acquires its specific name from *pyxis*, a cup or box, in allusion to the scyphiferous podetia, and it is of a greenish or greyish colour. There can be no doubt of the medicinal properties of this species, though probably they have been much over-rated. It contains a considerable amount of starchy matter, and in many respects resembles *Cetraria Islandica*, or Iceland moss, being useful in affections of the chest. *C. furcata* is very common, and is either glaucous or brownish, growing not only on the shady banks of creeks, or on moist rocks, but also in damp places generally. During the late wet season, it has appeared in almost all the fields of the neighbourhood. This species is liable to considerable variation, and one of the varieties resembles *C. rangiferina*, or reindeer moss, so closely that it may easily be taken for it. *C. gracilis* is of a colour similar to the last, and grows on the ground, and generally amongst moss. It is also very widely distributed, being found both in the Arctic and Antarctic regions. *C. bel-*



*lidiflora* is a much admired species, the colour of the apothecia, which are often conglomerate, being a beautiful scarlet. Mrs. Hemans is supposed to allude to it in the lines:—

“ They find the *red cup moss* where they climb,  
And they chase the bee o'er the scented thyme.”

*C. cervicornis* has been very abundant during the wet weather, and it may be seen almost everywhere in damp shady places. The thallus is nearly horizontal, laciniate-lobed, and of a green colour above. Some writers look upon this as a macrophylline state of *C. gracilis*. The most interesting lichen that I have seen in Australia is *C. retipora*, but it does not occur in this neighbourhood. The Rev. T. Hassall gave me a specimen of it, which he procured from the vicinity of Berrima, and the accomplished authoress of “*Gertrude*” and “*Cowanda*” informs me that she has had specimens from the same locality; but as the species was described by Sprengel many years since, I think that it must occur somewhere nearer the coast. It grows to the height of several inches, and the upper surface is granulate. The podetia are erect, tubularly ventricose, pierced with numerous small apertures, of a sulphury brown colour, branched, and having small black apothecia. As it becomes old, it assumes somewhat a coralline appearance, becoming nearly white. My learned friend Dr. F. Mueller informs me that *C. retipora* is common in the glacial regions of Tasmania and New Zealand.

(11) *Collema*. This is one of the gelatinous or jelly lichens, and is so called from a Greek word, signifying a glutinous substance. All the species are gelatinous, which are supposed by Pries to be algæ, in a licheniform state, *Nostoc caruleum* being positively stated to be convertible into *Collema limosum*. When I was searching for mosses some little time since, in the Native Vineyard near the Rev. T. Hassall's, I met with a species of *Collema* growing amongst the mosses, and at first sight I supposed it to be nostoc, but after careful examination of the fructification, which consists of apothecia discoid and scutellate, I came to the conclusion that it was *C. atrocæruleum*, a species distinguished by a very thin and somewhat transparent thallus, from lead colour becoming reddish, when moist, olive coloured. With regard to more minute distinctions, which can only be ascertained by a very high power of the microscope, I must again quote from Dr.

Lindsay: "This is one of the species possessing a distinct cortical layer, composed of intimately united, polyhedral cellules, while the medullary tissue resembles the filamentous texture of the more gelatinous collemas. Its spores are ellipsoid, acuminate at the ends, having a delicate wall, and containing several transverse rows of cellules, separated by indistinct, and sometimes unsymmetrical septa."

(12) *Pertusaria* (from *pertusus*, full of holes or cracked in allusion to the appearance of the fructiferous warts) is represented here by one species *P. communis*, which frequently occurs on trees and rocks. In this species, the spores are so large, that under certain circumstances, they may be rendered visible to the naked eye. When growing on trees, *P. communis* is of a greyish white colour; but on the rocks, owing probably to some chemical action, it is somewhat yellowish. On the thallus of this lichen, there is sometimes a very small one parasitical (*Calicium turbinatum*).

(13) *Verrucaria epidermidis* is also a very minute plant. The name of the genus refers to the warted appearance of the species, which are scattered over the bark of trees like black or dark coloured warts. I have not noticed any of the genus on rocks, but in Europe, many such have been described.

In addition to the species mentioned, I have also a specimen of *Sticta crocata* in my collection, but I have not mentioned it with the others, as it does not occur anywhere near Parramatta. From the subjoined list, which I quote from the "Annual report of the Government botanist, and the director of the Botanic Garden of Melbourne for 1858," the reader will have an opportunity of ascertaining the names of the species collected by Dr. F. Mueller up to that period.

#### LICHENES, MICHELI.

<i>Ramalina membranacea</i>	<i>Cladonia vermicularis</i>
<i>Sticta orygmæa</i>	<i>C. neglecta</i>
<i>S. crocata</i>	<i>Lecanora coarctata</i>
<i>Parmelia perforata</i>	<i>L. parella</i>
<i>P. caperata</i>	<i>Gyrophora cylindrica</i>
<i>P. conspersa</i>	<i>Coccocarpia rubiginosa</i>
<i>P. enteromorpha</i>	<i>C. leucorrhiza</i>

To this list must be added eleven species, which, together with those already enumerated, appear in the "Journal of Botany," published at Halle, in 1856, as a part of the "Plantæ Muellerianæ," or the plants collected in Victoria by Dr. F. Mueller:—

*Cladonia cornicularia*

*C. carneola* var. *gracilis*?

*C. furcata*

*C. rigida*

*Usnea florida*

*Peltigera polydactyla*

*Sticta aurata*

*S. cinereo-glauca*

*Parmelia perlata*

*P. spinosa*

*Biatora cinnabarina.*

## KURRAJONG AND TOMAH.

(1861.)

During a late trip to Tomah, I was particularly interested with the cryptogamous botany of that locality, and I think that any persons who are anxious to make collections of ferns could scarcely select a more favoured spot as the scene of their exertions. *Dicksonia antarctica* is the most splendid of the tree ferns, and some of them exceed fifty feet in height. It was mentioned some years since by Mr. Cunningham as a botanical curiosity, that "every specimen of the *Dicksonia* had young seedlings of *Quintinia Sieberi* growing from its stem into which they were well rooted." This curious fact may still be noticed in one part of the mountain, but the beautiful *Quintinia* is not always parasitical, for some splendid specimens of it may be seen growing independently as forest trees near the Cut Rock and other places. In connection also with *Dicksonia*, the interesting climbing plant *Fieldia Australis* of the Bignoniac family may be mentioned, as it is frequently met with in the shady woods, adhering to the stems of the tree ferns. The smaller *Dicksonia* (*D. davallioides*) is very abundant; but as the fronds are very membranaceous, and liable to be injured by some insect, it is dif-

ficult to meet with perfect specimens at all seasons. Brown mentions this fern as being closely allied to *Davallia* or *Dicksonia dubia* (Hooker), so common in this neighbourhood. The chief points of difference appear to be the delicate texture of the frond, the paucity and somewhat marginal character of the sori, and the better defined forking of the veins. The other tree ferns are *Alsophila Australis*, and *A. Leichhardtiana*. The latter, which may be distinguished by its darker rachis and serrated segments, is not noticed in Sir William Hooker's "Species Filicum;" and it is somewhat remarkable that that eminent writer speaks of *A. Australis*, so abundant on the mountains, as "probably a rare species," remarking that the only specimens he was so fortunate as to possess were amongst Sieber's collections! The genus *Polypodium* has two species plentifully distributed amongst the larger ferns, and they may frequently be seen twining round the caudices of the tree ferns, or spreading over the rocks. These are *P. Billardieri* and *P. rupestre*, and *P. attenuatum* has been found in an adjacent gully. *P. Billardieri*, or, as it is sometimes called, *P. scandens*, is a very variable fern, the fronds of which are sometimes simple and sometimes pinnatifid—the former being frequently in a fertile state as well as the latter. Of the genus *Asplenium*, *A. odontites* (Brown) is very common on the trees at Tomah; and *A. nidus* and *A. flabellata* occur in the neighbourhood, and I have been informed that *A. difforme* has been found in the same locality. Connected with this genus, and perhaps unnecessarily separated from it, is *Allantodia tenera*, a very delicate fern, now placed in the genus *Asplenium*, and frequently growing in company with *Dicksonia davallioides*. The genus *Lomaria* or *Stegania*, which has three species at or near Tomah, viz., *L. Patersoni*, *L. lanceolata*, and *L. procera*, occasions some difficulty to the pteridophilist from its resemblance to the genus *Blechnum*. Indeed the two genera are not in some species easily separated, unless we adopt Smith's canon, "that from *Lomaria*, the genus *Blechnum* differs not only in its fertile fronds not being contracted, but also in the venules being continued beyond the soriferous receptacle and terminating in the margin." Adopting this view, I think that one so-called species of *Blechnum* common on the creeks near Parramatta, must be referred to *Lomaria*, as the fertile fronds are certainly contracted. In addition to the ferns enumerated, *Gram-*

*mitis*, *Hypnophyllum*, *Trichomanes*, *Lindsæa*, *Adiantum*, *Todea*, &c., occur, and also some very interesting mosses. On a former occasion, I noticed the truly Australian moss *Dawsonia polytrichoides*, but lately my friend Miss Atkinson has been so fortunate as to find *Polytrichum aloides*, which I regard as an interesting fact in the cryptogamous botany of the Blue Mountains. When studying the mosses of the Parramatta district, I referred to this country as being unfavourable for the development of mosses. Generally speaking, it is so, but in some of the gullies on the mountains, large patches of moss are to be met with, which are very interesting to the Bryologist. At Tomah, I again noticed the moss which I believe to be Sprengel's *Hookeria pen-nata*, as well as several species of *Hypnum* (*H. proliferum*, *H. minutulum*, and *H. cupressiforme*), and a few others, which, being in a sterile state, I was unable to determine. In the secluded spots to which I have alluded, the mosses most attractive were *Bryum Gaudichaudi*, *B. Billardieri*, *Dicranum scoparium*, *D. glaucum*, and *Orthotrichum crispum*, as well as several species of *Jungermannia*, one of which, probably identical with the European *J. tomentella*, formed large patches in moist places. The lichens which I saw belonged principally to the genera *Cladonia*, *Collema*, and *Parmelia*, and the fungi to *Agaricus* and *Polyporus*, the latter being very abundant in the gullies.

On the road between the Kurrajong and Tomah, the forest trees are principally of the Myrtaceæ, the most remarkable of which are *Syncarpia* or turpentine; *Angophora lanceolata*, or red gum; and several species of *Eucalyptus*. There is great difficulty in fixing the species of the last, but as far as I can determine, the blackbut is *E. pilularis*; the bloodwood, *E. corymbosa*; stringy bark, *E. obliqua*; peppermint, *E. piperita*; mountain blue gum, *E. eugenioides*; forest mahogany, *E. resinifera*; and the grey gum, *E. tereticornis*. Beyond the line, two more species of *Eucalyptus* are met with, which are certainly the trees mentioned by Cunningham, as *E. microphylla* and *E. pulviger*; the former is said to form brushes on the more elevated parts of the mountains, and the latter agrees with specimens sent to me from the neighbourhood of Goulburn under the name of peppermint. The flowers and seed vessels of the mountain blue gum, closely resemble those of the gum frequent at the North Shore, near Sydney, and

which appears to be *E. hæmastoma*. *Tristania nereifolia*, and *Eugenia elliptica*, occur frequently in the gullies; and of the former genus, there is a species, probably *T. laurina*, which is seen growing in the forest. In some places, four or five species of *Personia* occur, together with *Banksia* and other proteaceous plants. The species of *Acacia* also appeared numerous, but I noticed only one in flower, which was different from those of this neighbourhood, viz., *A. asparagoides*, a species intermediate between *A. acicularis* and *A. juniperinus*, and apparently not found in the low country.

As Tomah, according to the computation of the Rev. W. B. Clarke, the eminent geologist, is 3400 feet above the level of the sea, and of a basaltic formation, lying above what my learned friend terms "the Wianamatta beds," it might naturally be supposed that the vegetation of the more elevated portions of the mountain would be different from that of the sandstone adjacent. This we have already seen to be the case in reference to the cryptogamous plants which have been enumerated, and the same remark is applicable to the trees of the forest. Instead of the gum trees so common in the lower country, the Sassafras (*Doryphora Sassafras*) and the white wood or light wood predominate. The latter was termed by Cunningham *Ceratopetalum apetalum*, but he expressed some doubt respecting the tree, as he was unable to find the fruit. Dr. F. Mueller of Melbourne, to whom I have forwarded specimens, refers the tree to the genus *Schizomeria*, and certainly, from a recent examination of the flower, I have arrived at the same conclusion, for it undoubtedly has jagged petals, and the anthers are cordate and awnless. It is probable, however, that further search may prove the existence of both species in the mountains. Both the Sassafras and the lightwood are very useful; the wood of the former being employed for flooring boards, and the bark for its medicinal properties, whilst the latter is a favourite with coach-builders. To this family the Christmas bush (*Ceratopetalum gummiferum*), and *Callicoma serratafolia* belong. The latter is sometimes used for making baskets, and it is one of those trees to which the early colonists gave the name of "black wattle;" but this term is now generally applied by workmen to a species of *acacia*. Nearly allied to this is *Calycomis verticillata*, a shrub found on moist rocks on the mountains,

being distinguished for its tufted flowers and oblong cordate serrated leaves, which are nearly sessile, and three in a whorl. On the summit of Tomah, there is a species of spinose shrub of the natural family *Rubiaceæ*, which is very common. It is described in Don under the name *Marquisia Billardieri*, and is the same as *Canthium quadrifidum*, which Dr. F. Mueller informs me is synonymous with Cunningham's *Coprosma microphyllum*. The flowers of this plant are small, and the berries red, of an ovate shape, and two-celled. There are several more shrubs of this family, growing on the mountains, which belong to the following genera:—*Morinda*, *Psychotria*, and *Opercularia*. All of the last three, indeed, are found in the neighbourhood of Parramatta, but during my late visit, I procured specimens of two which were new to me, but which I am unable at present to refer to their respective genera, as the fruit is unknown. The plants of this family are well defined, being principally distinguished by their opposite leaves with interpetiolar stipules. Amongst the shrubs on Tomah, I remarked also the elder with yellow berries (*Sambucus xanthocarpa*), several species of *Solanum*, and the rutaceous plant *Zieria lanceolata*, which on the mountains attains a much greater size than it does in this district. I shall not allude particularly to the parasitical orchids of Tomah, and the gigantic climbers so abundant in the woods because few of them flower in the season at which I visited the place.

Whilst at the Kurrajong, I had an opportunity of visiting Cabbage Tree Flat, and the hills overhanging the Valley of the Grose, and although the season of the year was unfavourable for flowering plants, yet I was not altogether unrewarded. Besides the *Corypha Australis*, or the cabbage tree, which has characterised the scenery of the former locality, I was pleased to notice the varying forms of *Alsophila*, differing from each other in the size of the caudex, the hairs which clothed it, and the simple or serrated nature of the segments. I can scarcely think that such variations are sufficient to constitute more than two distinct species. Amongst the larger trees, the Turpentine and Bloodwood are the most remarkable. Of the latter, two kinds are reckoned by bushmen; but as far as I could judge from the seed vessel, which in this species of *Eucalyptus* is large and well defined, they are mere varieties. Near the water, we noticed *Lomatia longifolia*,

or, as it is called "Mountain Beech," and *Drimys dipetala*, a shrub that is known by the pungent nature of its seeds. The principal climbers seemed to belong to the Asclepiad and Menispermiaid alliance, the former, of the genera *Marsdenia* and *Tylophora*, and the latter, *Sarcopetalum* and *Stephania*. The Menispermiaid plants, when a transverse section of their stem is made, present the appearance of spokes radiating from a centre, and one of those to which I have referred is nearly allied to *Cocculus*, and bears a striking resemblance to some of the species of that genus. As we passed on our way towards the range, we saw great quantities of *Stypandra* (not in flower), a fine species of *Stylidium* (a pink flower remarkable for its irritable column), and a *Trachymene*, similar to that found near Parramatta. On the higher ground I noticed *Eurybia microphylla*, in flower, and also two orchids *Acianthus fornicatus*, and *Caladenia carnea*. There was also a species of *Hibbertia*, which was interesting to me, as it differed from any that I had previously seen. My learned friend Dr. Mueller is inclined to regard it as a mere variety of *H. monogyna*, although it differs from that species in not having the leaves two or three toothed at the apex. On the same range there was abundance of *Bossiaea rotundifolia*, some splendid specimens of *Macrozamia spiralis*, *Leptomeria acida*, or the native currant, two species of *Leucopogon*, and a rutaceous plant which I thought was *Phebalium lachnæoides*. Here also were many proteaceous shrubs, particularly *Xylomelum*, or the wooden pear, *Banksia*, or honeysuckle, *Lambertia*, and the curious cyperaceous plant *Caustis flexuosa*.

Near the inn at the foot of the Big Hill, there is a plant which has been the subject of some interest, as it is stated to be poisonous, (*Duboisia myoporoides*). My fair friend of the Kurrajong, after describing the cork-like bark of the tree, and its lilac-white blossoms, remarks "It grows also on the Shoalhaven and at Illawarra, and has an intoxicating property. The aborigines make holes in the trunk and put some fluid in them, which when drunk on the following morning produces stupor. Branches of this shrub are thrown into pools for the purpose of intoxicating the eels and bringing them to the surface. I have known an instance in which giddiness and nausea have arisen from remaining in a close room where branches of it have been placed." This



shrub occurs on the Toongabbie creek, but I have not heard of any injury arising from it in this neighbourhood. It would be well, however, if *Duboisia*, as well as the native indigo, and also the corms of the *Arum orizense* were subjected to chemical analysis, as persons in different parts of the colony regard them with suspicion. In addition to the trees of the Kurrajong which belong for the most part to the myrtaceous family, I may instance one of the laurel family (*Tetranthera dealbata*), and *Alphitonia excelsa*, an elegant tree, with leaves that are nearly white on the under surface. I find that the tree called "Kurrajong" (*Sterculia diversifolia*) in the low country, is by no means common in that district, and that the trees whose bark is still used by the settlers for tying up things, are *Hibiscus heterophylla*, and *Sponia*, the former of which is by far the better of the two.

In the present communication I have referred but little to the Epacris family, as I noticed so few in flower. On various parts of the Blue Mountains, however, the following genera have been recognised, viz., *Epacris*, *Styphelia*, (of which one very pretty species does not occur in the low country), *Lysinema*, *Melichrus*, *Leucopogon*, *Lissanthe* (viz., *L. sapida* and *L. daphnoides*.) *Poncelletia* (a rare shrub, found near King's Table Land, adhering to rocks perpetually damp, and also in similar situations nearer Sydney), *Monotoca* (a shrub larger than any of those mentioned, found not only on the mountains, but also at Manly Beach, and other places near the coast), *Dracophyllum secundum* (a beautiful plant, with bell-like drooping white flowers, which also occurs on Mr. Statham's Creek, near Parramatta), and *Acrotriche divaricata*. The last mentioned shrub occurs plentifully in a gully near the Cut Rock, and also in the neighbourhood of Parramatta. This genus was appropriately named by Brown in reference to the bearded tips of the corolla's segments. The Epacris family is, on many accounts, an interesting one, principally however, because it is almost peculiar to Australasia, and occupies the same place in the vegetable kingdom here, that heathworts do at the Cape of Good Hope. The chief difference between the two families is in the structure of the anther, that of Epacrids being one-celled with a single receptacle of pollen, and that of Heathworts being two-celled, the cells hard and dry, separating either at the apex or base. All the berries of the Epacris family are

edible; but most of them are very small, with seeds large in proportion to the pulpy covering. "Ground berries," and "five corners," are too well known to need any reference to them, but the berries of two species of *Leucopogon*, and also of *Lissanthe*, are by no means despicable.

In concluding this rambling communication, I cannot do otherwise than recommend invalids or persons fond of natural history to visit the Kurrajong and Tomah. The scenery is truly magnificent, and exercises a powerful influence on the feelings, especially in those places from which a panoramic view of the low country and its misty towns, is distinctly visible as the morning vapours pass away. There is, indeed, a wide field for the naturalist, whether his taste may lead him to entomology, ornithology, geology, mineralogy, or botany, and the bracing air of the mountain cannot but renovate a frame enervated by the cares and troubles of a city life. Now that facilities are afforded for speedy communication with Richmond and Penrith, it is probable that many favoured spots on the mountains, will become places of fashionable resort for invalids and tourists, and increased exertions will be encouraged for the development of the natural resources of these beautiful regions. In treating on such subjects, however, one is painfully reminded of the shortness of life, and the trifling amount of knowledge which any individual, how accomplished soever he may be, can acquire. It was said of a distinguished general of antiquity, that although he was cut off in the prime of life, yet so far as the glory of his actions was concerned, he had indeed passed through a very long course. In civil and military affairs this may be regarded as figuratively true, but in matters of science, in which the progress is slow and tedious, and each step makes a man more and more sensible of the worlds which yet remain to be conquered, he may indeed attain a reputation for the importance of his discoveries, and the brilliancy of his acquirements; but, after all, he must be fully aware, with the greatest of modern philosophers, that an ocean of truth rolls undiscovered before him. What, however, one individual may fail to accomplish, may be effected to a certain extent by the combined exertions of many; and hence arises the vast importance of concentrating the efforts of genius, and bringing them to bear unitedly on any branch of art or science. It would

occupy too much space to follow up this idea, and to show how much lustre would be reflected on any Government which afforded facilities for making observations, and collecting specimens of natural history in all parts of this vast continent. In the present state of affairs, the prospect is not very cheering; but, having firm faith in the future, I feel assured that out of the chaotic elements around us, a *melior ordo* will yet arise.

NOTE —Not far from Tomah, I discovered a new species of *Xanthosia*, and also particular attention was directed to an interesting shrub of the *Loranthaceæ*, formerly called *Nuytsia*, but now referred to a new genus (*Atkinsonia*). This differs from most of the order in being terrestrial, and not parasitical. It is also hexandrous. Some interesting species of orchids (of *Dendrobium*, *Bolbophyllum*, *Sarcochilus*, &c.) were collected on the Blue Mountains, by Miss Atkinson, and also amongst cryptogamous plants, *Lepopteris Fraseri*, *Trichomanes angustatum*, *Asplenium falcatum*, *A. præmorsum*, *A. attenuatum*, and *Pteris umbrosa*. The same lady, likewise, collected specimens of *Gymnostachys anceps*, *Symphyonema montanum*, *Dampiera purpurea*, *D. ovalifolia*, *Goodenia decurrens*, and *Velleia perfoliata*. The new genus *Atkinsonia* was established in honour of Miss Atkinson, whose exertions have been so successful in developing the vegetable resources of the Blue Mountains. (Fragmenta vol. 5)



## CULTIVATION OF WHEAT.

A friend who has had much experience in the flour trade, has lately called my attention to a plant, allied to the trefoil genus, which in some parts of the colony grows amongst the wheat, and imparts an aromatic flavour to the flour. On examination, I find that the plant is *Melilotus parviflora*. It has the appearance of a trefoil, having small yellow flowers and trifoliate leaves, but it differs from that genus in having the legume longer than the calyx, and the flowers arranged in loose racemes. In Don's work, an allied species (*M. arvensis*) is described as indigenous in Germany, and growing amongst corn; but in the additional supplement to Loudon's "Encyclopædia," it is mentioned as a native of England in sandy places, and also appearing

in corn. There can be no doubt but that *M. parviflora* has been introduced into Australia from the south of Europe, probably in the early days of the colony, with seed wheat. The plant, especially in a dry state, is exceedingly fragrant, and the perfume is agreeable, but when flour has become impregnated with it, the consequences are anything but pleasant; for the bread made from such flour has an aromatic, or somewhat medicinal taste which soon renders it unpalatable. It does not appear that there is anything deleterious in the plant, or that any evil effects arise from eating bread flavoured by it; but as a matter of expediency farmers should keep their fields as free as possible from this *Melilotus*, lest their wheat should be regarded as of inferior quality. Wherever it has become troublesome, the agriculturist would do well to let the ground lie fallow for a season, and then destroy the young plants before they seed. By this course, or should the operation be regarded too tedious, by adopting what in England is called "a green fallow" (that is where the land is rendered suitable, and clear from weeds by some green crop), the fields may be prepared for wheat, and benefit will arise from the change. It is advisable, also, that care be taken in procuring good seed wheat, or the evil may be perpetuated notwithstanding every precaution. Fallowing, under any circumstances, is an important operation, but especially so when injurious weeds have appeared amongst the crops; and I cannot help thinking that when the Jewish legislator determined that the land should enjoy its Sabbaths, he had some reference to the inconvenience of exhausting the soil by continual crops, as well as to those more important reasons mentioned in Exodus xxiii., 11.

The genus *Melilotus* derives its name from *mel*, honey, and *lotus*, because many of the species are similar to the *lotus*, and are much esteemed by bees. One species (*M. officinalis*) has had its reputation in medicine, but it is known principally from the flavour which it imparts to the Gruyere cheese, and it is said that, notwithstanding the strong smell of the plant, and its bitter, acrid taste, it does not appear to be disagreeable to any kind of cattle. In former times it was cultivated as food for horses and cows, but at present it is not used for that purpose.

Whilst writing on this subject, I may allude to another plant which grows amongst wheat and barley, and is decidedly noxious,

viz., *Lolium temulentum* or the bearded darnel. Perhaps the bad effects of this grass may have been exaggerated, but, according to the best authorities, it acts as a narcotic-acrid poison, and therefore, is much more to be dreaded than any melilot. Instances have been recorded of persons being intoxicated by eating the bread in which the seeds of the darnel have been ground up with the wheat, and it is reported that even fatal convulsions have arisen from a similar cause. In Knight's Encyclopædia, it is stated: "According to Christison, darnel when mixed with flour and made into bread, has been known to produce headache, giddiness, somnolency, delirium, convulsions, paralysis, and even death. A few years ago, the same author tells us, almost the whole of Sheffield workhouse were attacked with symptoms supposed to be produced by their oatmeal having been accidentally adulterated with *lolium*; and a case is on record of a small farmer near Poitiers in France, having killed himself by persevering in the use of darnel flour for making bread; his wife and servant, who discontinued to eat it, escaped, but were violently affected by vomiting and purging." There seems to be every probability that this darnel or rye-grass is the "tare" of the New Testament. The original word in St. Matthew is *zizanion*, a word not found in any Greek author; but the fact that a plant exists, called by the Spaniards *zizañion*, and by the Arabs *siwan*, similar in every respect to darnel, has induced modern commentators to conclude that the "tare" mentioned in the parable is *lolium temulentum*. The same word also may be traced in the Rabbinical word *zinin*, which means hybrid wheat. Volney, in alluding to the frequent occurrence of this weed in Palestine and Syria, says, "The peasants of these countries, lest they should lose a single grain of the corn, do not cleanse away the seeds of the weeds from it, and often leave the rye-grass, in Arabic called *siwan* amongst it, which stuns people, and makes them giddy for some hours." That this is really the "tare" of the Testament, is confirmed by the fact that until the wheat is in the ear, the darnel is so much like it as to be easily mistaken for it; and also by the remarkable custom preserved even to modern times, that both wheat and darnel are suffered to grow together until harvest, when, as in the days of old, the tares are bound in bundles to burn them, whilst the wheat is gathered into the barn!

The vast importance of this subject should induce agriculturists to direct their attention to the best method of extirpating these noxious weeds. I am not aware that the melilot has been much noticed in England, for a late writer simply remarks that *M. arvensis* is found in waste places in Cambridgeshire; and doubtless, if it did appear too frequently in the wheat fields of the mother country, the improved system of farming, and the proverbial diligence of the British agriculturist, would soon devise some means to remedy the evil. It would be an indivious task to point out those farms in the colony which are becoming almost valueless from the prevalence of *melilot*, or to mention particularly those cultivators whose wheat is regarded with suspicion, from the mixture of noxious or unpleasant weeds with it; but I think that the cultivation of wheat is a matter so seriously affecting the interests of the whole community, that the Agricultural Society would confer a benefit on the colony by inquiring whether something may not be done for those districts in which the melilot has spread.

NOTE.—*M. parviflora* may be readily known by its peculiar scent, but the following is the general description:—"Stem ascending, branches spreading; lower leaflets obovate-roundish, entire; upper ones oblong, obsolete toothed; stipulas linear setaceous; flowers very minute, in dense spikes; teeth of calyx nearly equal, broad; wings about equal in length to the vexillum and carina; legume ovate, rugged from lacunæ, yellowish green, one-seeded; seeds ovoid, adhering to the legume, bay coloured, rugged from dots." This plant is said to be indigenous in Barbary, Italy, and France, but it seems to spread very rapidly, wherever the climate is similar to that of Southern Europe. Australia is well adapted to its growth, and unless means be devised to prevent the evil, it will become an intolerable nuisance in this colony.

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## THE BOTANY OF ASH ISLAND.

(1862.)

ASH Island, in the River Hunter, contains about 3000 acres of land. Parts of it are low and marshy, and hence in addition to *Ægiceras fragrans* and *Avicennia tomentosa*, which grow in the salt water, and are popularly termed "Mangroves," many Chenopodiaceous plants abound in it, of which the genera *Atriplex*,

*Rhagodia*, *Salicornia*, and *Chenopodium* are duly represented. *Tetragonia*, or what is called New Zealand spinach, is also indigenous on the island, and *Portulaca*, another succulent herb, is found here, as in other parts of the colony. As a considerable portion of the island is now cleared, and under cultivation, many of the larger trees have disappeared. Three distinct species of *Eucalyptus* still remain, which appear to be identical with those growing in this neighbourhood, viz.—Flooded gum, Grey gum, and Woolly-but. The tree which gives its name to the island is a species of *Elæocarpus* (*E. obovatus*), called “ash.” This is a much finer tree than our *E. cyaneus*. *Casuarina paludosa*, or the swamp oak, *Elæodendrum Australe*, two species of *Acronychia*, two species of *Cupania*, *Achras Australis*, and *Eupomatia laurina*, grow on the island. Most of these occur in other parts of the colony, but *A. Baueri* and *C. anacardioides* belong more properly to the northern districts. The species of *Croton* appears similar to that at the Kurrajong, and the jasmine (*J. gracile*), which is so beautiful and fragrant that it cannot escape even a casual observer, is similar to the plant growing on Mount Tomah. The species of *Acacia* do not exceed three or four, and they are not different from those of the Parramatta district, but the olive (*Olea paniculata*), and an interesting myrtle, do not occur here. With respect to the latter tree, which is now very scarce on the island, I may mention that my learned friend Dr. F. Mueller has described it under the name of *M. Tozeri* in his *Fragmenta*, in honour of Mr. Tozer, of Port Macquarie, but he expresses some doubt as to whether this is really a new species, as there is a probability that that tree has already been described in Don, by the name *Nelitris psidioides*. It appears that it was found at the Brisbane by Dr. Mueller and Mr. Hill, and at the Clarence and Hastings by Dr. Beckler. Perhaps the most interesting tree on the island, botanically speaking, is a species of *Scolopia*, as it is but little known and belongs to a family not well represented in Australia. Nearly all the *Bixineæ*, belong to the hottest parts of the world, particularly the East and West Indies. In former years the red and white cedar may have flourished on the island, (*Cedrela toona* and *Melia composita*), but at the present time there are not any of much size. The Pine or *Podocarpus elongata* is a graceful tree, and the wood is much esteemed. At Manly

and in some of our creeks to the north of Parramatta, I have noticed a diminutive spreading shrub of this genus, which appears to be a distinct species. Of *Alphitonia excelsa*, or the mountain ash, I found some small trees. This occurs on the Big Hill, at the Kurrajong, and, on account of its foliage, it is well worthy of cultivation. Two species of *Melaleuca* (*M. stypheloides* and *M. genistifolia*) grow in swampy places, and the same species of *Pittosporum* that are found in the neighbourhood of Sydney; whilst I was surprised to find two species of *Morus* (*M. calcar-galli* and *M. Brunoniana*) flourishing on Ash Island, identical with those of the Native Vineyard, although it must be added that they seem somewhat stunted in the latter place. The leguminous tree *Pithecolobium pruinatum*, is a handsome plant, and as it does not appear to be in this part of the colony, it is worthy of consideration from the practical gardener. The remaining trees of the island are principally *Glochidion Australe*, *Evodia micrococca*, *Exocarpus cupressiformis*, *Dodonæa salicifolia*, a fine species of *Ficus*, and a rutaceous tree of the genus *Geijera*. With the exception of the last, these trees occur also in the Parramatta district. *Geijera* is described by Endlicher as a tropical tree not well known, but I have found it as far south as Cobbity. It is a handsome tree, with spreading branches, large lanceolate leaves, and panicles of small white flowers. Mr. Scott has remarked that the larvæ of certain butterflies are found on this tree; and on a recent occasion I noticed in the Native vineyard several trees much injured by the ravages of insects, probably similar to those observed by Mr. Scott. The papilionaceous flowers of Ash Island belong principally to *Indigofera*, *Swainsona*, and *Kennedia*; but it is reported that several which formerly flourished there have disappeared in the progress of cultivation. The native gourd (*Sicyos angulata*), a native passion flower (*Disemma Herbertiana*) and two species of the Convolvulus family (*Calystegia* and *Polymeria*) are frequently met with in the bush; whilst the beautiful *Ipomæa pendula* may be seen hanging on many of the shrubs growing near the river. This is a plant which must be familiar to many of those who visit Manly Beach, as it is plentiful near the Fairy Bower. I did not notice any Cunoniaceous plant on the island, excepting *Aphanopetalum resinatum*. This shrub, as well as *Howittia trilocularis* of the Mallow family, does not occur in the



Parramatta district, but both of them flourish at the Kurrajong. It was reported to me that the nettle tree (*Urtica gigas*), and also the native poppy (*Papaver horridum*) have been collected on the island, and *Citriobatus* is very abundant, attaining a greater size than in some other parts of the colony. The native Bignonia (*Tecoma Australis*), and *Ripogonum album* of the Smilax family, also occur. Of the latter, I have never noticed more than one place on our creeks in which it grows, and after the most diligent search, I have not succeeded in procuring flowering specimens. At Ash Island it is said to flower plentifully. *Flagellaria Indica* may also be seen climbing up trees to a considerable height. This is a plant of "doubtful affinity," being placed by some writers amongst the Juncaceæ, and by others amongst the Commely-naceæ. It is said to derive its name from *Flagellum* a thong, in allusion to the length, toughness, and slenderness of its shoots. According to the Linnæan system, this plant is placed in the class *Hexandria*, order *triqynia*. The flowers are in panicles, and the leaves are cirrhous at the apex. Endlicher mentions this as a tropical plant, and it is also placed by the late Admiral King amongst the plants common in India and South America, as well as in tropical Australia. According to some authorities, the leaves of it are astringent and vulnerary. Of the lily family, I remarked *Arthropodium*, *Dianella*, *Eustrephus*, and *Geitonoplesium*, but the species appeared to be similar to those of this district. The large white lily (*Crinum pedunculatum*) is also indigenous at Ash Island. With respect to the Orchids, the season was so far advanced that I had not an opportunity of examining them in flower, but, from the very beautiful drawings of Mrs. Forde, and Miss Scott, I ascertained that at least two species of *Pterostylis*, and five of *Dendrobium* grow on the island. *Lyonsia straminea* is very plentiful, and flowers much more readily than it does in this neighbourhood. Mr. G. Suttor has noticed this plant for the last two or three seasons on the creek at Baulkham Hills, and has cultivated it in his garden, but it never flowered until this year. Of the Loranthaceæ, or mistletoe family, there are several species of *Loranthus*, and one of *Viscum*. From the drawings of Miss Scott, Dr. F. Mueller has determined *L. Preissii* and *L. subfalcatius*. These are decidedly different from any in this neighbourhood, the species here being *L. Gaudichaudi*,

which grows principally on *Melaleuca*, *L. pendulus*, on different species of *Eucalyptus*, and *L. congener*, which is found on *Banksia*, *Acacia*, *Eucalyptus*, &c. In addition to these, I may mention *L. exocarpus*, which has been collected on the Murrumbidgee, and *Nuytsia ligustrina* (not parasitical) which has been noticed on the road to Tomah. The *Viscum* is said to be "a parasite on a parasite"—that is to say, it has been found on *Loranthus*. When this was first pointed out to me, I was under an impression that this circumstance had not been previously noticed, but I find that Dr. F. Mueller, with his usual sagacity, has alluded to it in No. 14, of the second volume of his *Fragmenta*! *Viscum incanum*, he says, is found in the branches of *Eucalyptus*, *Angophora*, and other trees, likewise everywhere parasitical on their *Loranthi*, and extending from the vicinity of Twofold Bay to the River Burnett. Of the *Viniferæ*, there are three species, two of which (*Vitis clematidea*, and *V. Baudiana*) grow near Parramatta. Of the third, I did not see either flowers or fruits, but from the general character of the plant, its climbing habit, trifoliolate leaves and reported fruit, I think it must be referred to *Vitis nitens*. These plants are generally called Kangaroo vines, or native grapes; and I see that Dr. Mueller, in some of his late works, unites with them the genus *Vitis*. One of the best species in this part of the colony is *V. hypoglauca*, the grape of which has a pleasant acid flavour, and makes good jam. This is described and figured in Dr. Mueller's work on the indigenous plants of Victoria. The pepper family is represented by a species of *Peperomia* which grows about the roots of trees to the height of two feet and more. The leaves are of an ovate shape, three nerved, ternate, and hairy. Some little time since, my friend Miss Atkinson, found *P. reflexa*, at the Kurrajong, but that species is much smaller, perfectly glabrous, and the leaves are in a whirl of four. The genus *Peperomia* has been elaborately described in the celebrated work "*Systema Piperacearum*," by Miquel, and it consists of all those plants with a simple stigma, and two stamens, which were formerly included in the genus *Piper*. Four species of the pepper family are indigenous at Norfolk Island, and Dr. F. Mueller mentions two in his botanical report of the North Australian expedition. The peppers, according to Dr. Lindley, are exclusively confined to the hottest parts

of the world, and are extremely common in Tropical America and the Indian Archipelago. The species are very numerous, and some of them difficult to define. Miguel describes nearly 200 species of *Peperomia* alone!

There is a caper plant on the island, which interested me very much, as I had never seen it in its native state before. The young plants differ so much from those more advanced, that when the unfortunate Leichhardt visited Ash Island, he thought that they were distinct species. In Sir Thomas Mitchell's Expeditions, that writer alludes to a species of caper, either identical with the one in question, or nearly allied to it. In vol. 1, page 287, he says, "On the banks of the river we found, besides the native fires, the remains of a fruit, different from any I had seen before. It seemed to be of a round shape, with a rind like an orange, and the inside, which appeared to have been eaten, resembled a pomegranate." Again, at page 314, he says, "To-day I fell in with a tree, of which I saw but a single specimen during my former journey, and I had observed only a sickly one before during this expedition. It bore a yellow flower, and fruit resembling a small pomegranate, on a hooked stalk. \* \* \* \* \*

I considered this a very remarkable tree, as well from its rare occurrence, as on account of its fruit, of which the natives appear to make some use. \* \* \* \* \*

I was surprised to find many specimens of the tree in the scrub, through which we had previously passed, without observing them. On one plant, we found some fruit apparently full grown but not ripe; and on others perfect specimens of the last year's crop, including, of course, the seeds. The fruit resembles a small lemon, but has within small nuts or stones, enveloped in a soft pulp, and the whole has an agreeable perfume. We also found some specimens of the flower, rather faded. \* \* \* My friend Dr. Lindley considers this one of the most interesting plants brought home by me." This plant has been found at the Castlereagh by Mr. C. Lowe, at the Bogan by Mr. J. Lowe, and near Warwick by Dr. Beckler. In honour of the late Sir T. Mitchell, it has been named *Capparis Mitchellii*. Several tropical species from New Holland are described, and one from New South Wales (*C. canescens*), but the last mentioned has white flowers, and the leaves are not smooth, as in the species before us.

The *Corypha Australis* flourishes on Ash Island, and grows to a larger size than it does in some parts of the colony. This is termed "the Cabbage Palm Tree," and it is used in the manufacture of hats. *Clerodendrum tomentosum* of the Verbena family grows on the island, also a species of elder (*Sambucus Gaudichaudiana*?), and a small tree with cork-like bark very similar in appearance to *Myoporum*, viz., *Duboisia myoporoides*. These shrubs are common in many parts of the colony, but as I had not an opportunity of examining a flower of the elder, I feel uncertain about the species. There is a dwarf elder in this neighbourhood, which is probably the same as that mentioned by Sir T. Mitchell, vol. 2, p. 14, as the calyx has three sepals, the corolla three petals, the stamens three, and the carpels also three. In consequence of these variations from the genus *Sambucus*, Dr. Lindley named Sir Thomas's plant *Tripetelus Australasicus* and the description of it may be seen in a note (vol. 2, p. 14). Sir Thomas compares it to the European dwarf elder, but with yellow flowers and fruit with scarcely any pulp.

With respect to the cryptogamous botany of the island, I must now add a few words, although the intense heat of the weather at the time was very unfavourable for the collecting of mosses, fungi, &c. The species of ferns are about thirteen, but, with one exception, all of them abound in this district. The genus *Pteris* is represented by the following species, viz., *P. aquilina*, *P. tremula*, *P. vespertilionis*, and the allied fern *Pellaea falcata*, the old *Pteris falcata* of Brown. In addition to these, I noticed *Nothoclæna distans* (a small fern with pinnate fronds, pubescent or hairy on both sides); *Davallia pyxidata* (a species frequently growing in company with *Platynerium*, and remarkable for its stout creeping caudex, which is densely clothed with hairy scales); *Polypodium rugosulum*; *Adiantum assimile*, or the maiden hair fern; two forms or species of *Doodia* (*D. aspera* and *D. caudata*); *Asplenium nidus* or the bird's nest fern; *Platynerium alcicorne*, or the elk's horn fern; and *Polypodium rupestre*. The elk's horn grows much larger than in the Parramatta district, and the fronds hang from the forks of trees, but after a careful examination, it appears that the species is the same. *Polypodium rupestre* is nearly allied to *P. confluens* of this district, but its name appears somewhat inappropriate, as it climbs trees rather

than rocks. I have compared this fern with some specimens of *Niphobolus serpens* from Norfolk Island, and I believe that the two are mere varieties of one species, the principal difference arising from the quantity of stellate scales or tomentum on the under surface of the frond. I find that Smith in his *Genera of Ferns* proposes to place *P. rupestre* in the genus *Niphobolus*. According to his definition the rhizome of the genus is creeping or cæspitose, and the fronds are covered with stellated, sessile, or pedicellate scales or tomentum, rarely smooth. The veins when evident are parallel, combined by transverse parallel venules, and the sori are irregular, and usually confluent. The Ash Island species is smooth, but under a lens the stellate scales may be distinctly seen, and, therefore, I think it must be referred to *Niphobolus*.

Few mosses were to be seen, as the heat of the season had killed most of them; but, judging from the elegant drawings of Miss Scott, it appears that the same species of *Hypnum*, *Dicranum*, and *Jungermannia*, prevail in Ash Island as in other parts of the colony. Of lichens, the common forms of *Usnea*, *Parmelia*, &c., occur; and of fungi, several species of *Polyporus*. Miss Scott has also discovered a *Sphæria*, which appears new and interesting. The species is certainly distinct from the New Zealand *Sphæria*, or that found near Mount Tomah by Miss Atkinson. It is to be hoped that not merely drawings, but specimens also, preserved in alcohol, may be forwarded to the great master of cryptogamous botany, the Rev M. J. Berkeley, that the *Sphæria* may be compared with those from other parts of the world.

In concluding this sketch of the Botany of Ash Island, I feel that it is in some respects deficient, as it would require several visits at different seasons of the year to give a proper list of the plants. It is highly probable that some of the species which formerly flourished in the island, have been destroyed in the process of clearing, and others (especially some composite plants not mentioned in this communication) have been introduced. However, it is interesting to notice, even from the imperfect investigation made during a short visit, that in the same spot there are plants growing together, which have a very wide, and in some instances, a different geographical range. Thus, whilst some of the plants connect the vegetation of the island, with the subtro-

pical regions of Australia, there are others which are associated with the botany of the Blue Mountains and Illawarra. Amongst the plants collected by Mrs. Forde and Miss Scott, are *Nephelium leiocarpum*, *Dodonæa angustifolia* (Sapindaceæ), *Celastrus Cunninghami*, (Celastraceæ), *Myoporum acuminatum* (Myoporaceæ), species of *Morinda*, *Opercularia* and *Canthium*, (Rubiaceæ) *Achras Australis*, (Sapotaceæ); *Panax elegans* (Araliaceæ), *Cargillia pentamera* (Ebenaceæ), *Parietaria debilis* (Urticaceæ), *Sterculia diversifolia* (Sterculiaceæ), *Deeringia celosioides* (Amarantaceæ), eight orchids, including *Sarchochilus falcatus*, twenty-three species of Grasses, and seventeen of ferns, all of which are to be found near Sydney. From a list prepared a few years since by Mrs. Forde, (after I had visited the island and examined the vegetable productions, as well as many dried specimens which had been collected and prepared by that lady and her sister), I could furnish the names of almost all the plants then growing on Ash Island, but I think it unnecessary to enumerate those species which are common in the colony.



## PLANTS ON THE DARLING.

IN the latter part of 1865, and the first five months of 1866, when the late E. Forde Esq., (a gentleman no less admired for his amiable disposition, than distinguished for his scientific attainments,) was engaged with a party in surveying the Lower Darling, I had the pleasure to receive from Mrs. Forde some interesting specimens of plants, which that accomplished lady had collected for me whilst accompanying her much lamented husband in his expedition up the river. Having recently seen some elegant drawings of indigenous plants from that quarter, which were executed by Mrs. Forde with a view of illustrating the "Flora of the Darling," I have been reminded of the valuable specimens forwarded to me some time since, and I propose, with

a view of placing on record the services rendered by that lady, to make some observations on the subject. The fortitude with which Mrs. Forde encountered the difficulties of the expedition, and the melancholy circumstances which deprived the colony of an able and efficient officer, attach peculiar interest to the collection; and one cannot help regretting that the breaking up of the party prevented the further prosecution of an object which had been so auspiciously commenced, and which, if perseveringly carried on during the progress up the river, would have tended to develop the vegetable resources of the Darling. Owing to the long continued drought which had prevailed, the season was rather unfavourable for collecting specimens of plants, as every thing appeared stunted in its growth, and many of the delicate species seemed to struggle for existence. The previous year (1864) had been favourable for vegetation, for whilst the dead stems of *Lavatera plebeia* of the Mallow family measured upwards of five feet, the living ones did not exceed a foot. A similar remark was applicable to other plants, nor can such a state of things be wondered at, when we are assured that at the period to which I refer, "it was quite impossible to find a moist place on the Darling, everything being dry, parched and burnt up, whilst the ground was cracked in all directions with deep fissures." This circumstance accounts for the large number of composite plants when compared with the rest of the collection, and also for the small proportion of grasses; for whilst the former can endure a great amount of heat as well as of aridity, the latter require the genial influence of moisture to render them available. Persons inhabiting cooler climates, where the fertilising showers descend in their appointed seasons, can form but little idea of the desolating results of long continued drought, especially when the thermometer has been known to stand as high as 130 degrees in the shade, and nearly 160 degrees in the sun, occasioning an evaporation of water at the rate of an inch per day. This occurred to Captain Sturt, 118 miles from the Darling. It might be imagined that under circumstances so unfavourable, vegetation would be at an end; but the fact is, that many Australian plants seem peculiarly adapted to withstand the influence of drought, and to exist by the aid of very little moisture. Thus, for instance, the beautiful "Desert pea" (*Clianthus Dampieri*),

many species of the "native fuchsia" (*Eremophila*), the simple leaved cassia, some few species of acacia, and a host of composites and salt bushes, may meet the eye of the traveller even in the driest seasons; whilst in the immediate vicinity of the river, as the late Sir T. Mitchell found on more than one occasion, many species of grass occur which are perennial and nutritious. "Grass," remarks that eminent explorer, "is only to be found on the banks of the river, and, strictly speaking, the margin only can be considered alluvial, for this being irrigated and enriched by the floods, it is everywhere abundantly productive of grass, though none appears in the back country." And again he says, "of grasses I gathered seeds of twenty-five different kinds, six of which grew only on the alluvial bank of the Darling. \* \* \*

The country was nevertheless almost bare, and the roots, stems, and seeds, the products of a former season, were blown about on the soft face of the parched and naked earth, where the last spring seemed, indeed, to have produced no vegetation, except a thin crop of an umbelliferous weed." \* These considerations will throw some light on the specimens to be examined, and serve to explain the anomaly of finding, even in such a season as 1865, objects of an interesting character to the botanist.

The leguminous plants collected during the expedition are the following:—(1.) *Papilionaceæ*: *Templetonia egena*, *Trigonella suavissima*, *Lotus Australis*, *Psoralea patens* and *P. eriantha*, *Sesbania aculeata*, *Glycyrrhiza psoraleoides*, *Olianthus Dampieri*, *Swainsona Greyana*, and *S. Placoides*; (2.) *Cæsalpineæ*: *Cassia Sturtii*, and *C. eremophila*; and (3.) *Mimoseæ*: *Acacia sentis*, and *A. salicina*. *Templetonia egena* is a tall leafless shrub, very similar to some species of *Bossia* in the neighbourhood of Sydney, and *Trigonella suavissima*, which is figured amongst Dr. F. Mueller's lithograms, is a small annual of the Trefoil kind, with minute yellow flowers

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\* Amongst the umbelliferous plants of the Darling, there are three especially mentioned by Mitchell, and one by Dr. F. Mueller (*Dimetopia cyanopetala*), but that which abounds in good seasons, and is much relished by cattle, is a species of *Didiscus*, generally called "Carrot." The common *Portuloca*, or Pigweed grows luxuriantly over some places near the frontage of the river, and the party found it a most acceptable addition to their meals. The so-called "New Zealand Spinach," (*Titray n'a expansa*) covered the whole extent of the red sand hills after the heavy autumn rains. It goes by the name of "Warregal Cabbage," among the settlers, and is undoubtedly indigenous on the Darling. The fruit of *Solanum ecuriale*, a plant nearly allied to the Kangaroo apple, is eaten by the blacks.



in sessile clusters. It is remarkable from the fact that "the perfume of the herb, its freshness and flavour," induced Sir Thomas Mitchell to try it as a vegetable, and that he found it "delicious, tender as spinach, and preserving a very green colour when boiled." Sir Thomas gathered this interesting plant in the dry bed of a tributary to the Darling, probably under circumstances similar to those in which the late survey party was placed. He regarded it as a new form of Australian vegetation, resembling that of the South of Europe, and called it "The Australian Shamrock." *Lotus Australis* is one of those plants which has a very wide distribution in Australia, and is regarded as being highly injurious to sheep and cattle. It looks very much like some of the European species, called "Bird's Foot Trefoils." The two species of *Psoralea* have small bluish flowers, and although not ornamental, they are interesting as being closely allied to the African plant *P. plicata*. *P. tenax* (collected by Mitchell) is remarkable for the extreme toughness of its flower stalks, which cannot be broken without difficulty. *Sesbania aculeata* is an erect shrub with small yellow flowers, and leaves consisting of forty or fifty pairs of leaflets. *Glycyrrhiza psoraleoides* belongs to a genus near the liquorice of commerce, and as it is well figured amongst Dr. F. Mueller's lithograms, it may easily be recognised by its small muricated pods. The "Desert pea," or *Clanthus Dampieri*, is one of our most admired flowers, and during the last dry season it was most successfully cultivated in the neighbourhood of Sydney and Parramatta. *Swainsona Greyana* is also worthy of cultivation, although, from the deleterious properties which it is known to possess, it is no great favourite with the squatters on the Darling. The flowers are large and pink, and the calyx densely cottony white, from which peculiarity it may be easily distinguished from the other species. On the Darling, this is called "the Poison Pea," and it is reported to cause madness, if not death itself, to horses. The poison seems to act on the brain, for animals affected by it obstinately refuse to cross even a small twig lying in their path, probably imagining it to be a great log. Sometimes the poor creatures attempt to climb trees, or commit other eccentricities. Mrs. Forde in writing from the Darling, says—"This plant is regarded with horror up here, but yet it is very pretty, and reminds me strongly of S.

*coronillaefolia*." *S. phacoides* is a smaller plant, with purple flowers, and occurs near Bathurst, as well as farther in the interior.

The composite plants of the collection, though not distinguished by any peculiar beauty are numerous. Many species are of a dry and course texture, and resemble what are popularly termed "everlasting flowers." It might be easily imagined that such plants can stand a great amount of heat; and that they can exist long after the grasses have perished. In a former collection from a friend residing on the Darling I received specimens of *Helipterum polygalifolium*, *H. floribundum*, *Senecio Cunninghamsi*, *S. Gregorii*, and *Myriocephalus Stuartii*, but Mrs. Forde has added many to the list, some of which, although found in other parts of Australia, were not previously noticed on the Darling. I believe the following a tolerably correct list of these plants:—*Helipterum Stuartianum*, *H. corymbiflorum*, *Helichrysum bracteatum*, *H. apiculatum*, *Craspedia Richea*, *C. pleiocephala*, *Minuarina leptophylla*, *Myriogyne minuta*, *Epaltes australis*, *Gnaphalium indutum*, *Helipterum hyalospermum*, *Angianthus pusillus*, *Helipterum moschatum*, *Calotis cuneifolia*, *C. scapigera*, *Ixiolæna tomentosa*, *Vittadinia scabra*, *Senecio Cunninghamsi*, *Rutidosia helichrysoides*, *Olearia pimeleoides*, *Myriocephalus Stuartii*. Of these twenty-one composites, only six occur on this side of the Blue Mountains—three of which are of a bright yellow colour, one is somewhat similar to plants of the daisy kind, and two, although they have inconspicuous flowers, are remarkable for the pungent quality of their leaves when bruised. Only five in the list appear amongst the composites in "Mitchell's Tropical Australia," and two (*Polycalymma* and *Myriogyne*) are elegantly figured in Dr. F. Mueller's lithograms. I find also that Gregory, when in search of Dr. Leichhardt and his party along and "near Cooper's River and its tributaries in Sub-central Australia" (1858), collected specimens of *Monencyanthes gnaphalioides* and *Senecio Gregorii*, and that in the same year Mr. Babbage, in his expedition into the North-western interior of South Australia, noticed *Myriogyne Cunninghamsi*, *Chrysocoryne angianthoides*, *Polycalymma Stuartii*, *Craspedia pleiocephala*, *Monencyanthes gnaphalioides*, *Ixiolæna tomentosa*, *Helichrysum apiculatum* and *Senecio Gregorii*, all of which appear, though with some of the names changed, in Mrs.

Forde's list. For these facts, as well as for the determination of some of the difficult species, I am indebted to the kindness of my distinguished friend, Dr. F. Mueller. To the general observer, most of these composites present very little interest, and, perhaps, a few of them are looked upon as troublesome weeds; but, regarded in a scientific point of view, they throw much light on the character of the soil where they abound, and also demonstrate their peculiar adaptation to seasons of unusual aridity.

Of the Mallow family I have the following species:—*Gossypium Sturtii*, *Hibiscus Sturtii*, *Sida petrophila*, *Lavatera plebeia*, and *Abutilon otocarpum*. The first of these, which is called "Sturt's Desert Rose," is an ornamental shrub of several feet in height, with large showy purple flowers, dark in the centre, and worthy of cultivation. It is nearly allied to the cotton of commerce, but the seeds are only sparingly and shortly woolly. The native cotton in Northern Australia belongs to another genus (*Fugosia*), and has seeds more woolly than those of Sturt's Desert Rose. Amongst Mrs. Forde's specimens were some seeds of the "South Australian Cotton" (*F. hakeaefolia*). Mitchell found this, or an allied species, (Tropical Australis, p. 64), and Dr. Mueller also noticed it near Lake Torrens in 1851. *Gossypium Sturtii* occurs as far south as the Barrier range. *Hibiscus Sturtii* is a more rigid shrub, covered with whitish tomentum. The leaves are broadly ovate, thick, and soft, and the flowers much smaller than in the preceding species, varying in colour from white to pink. *Sida petrophila* resembles, in some respects, the little *S. corrugata*, which belongs to this part of the colony as well as to the interior, but instead of being a small prostrate plant, it is a shrub three or four feet high. *Lavatera plebeia* is a shrubby plant, attaining sometimes the height of ten feet. The flowers are of a pale rose colour or whitish. According to Dr. F. Mueller, this plant can be used medicinally, and is eligible for the manufacture of paper. *Abutilon otocarpum* is similar in character to *S. petrophila*, and prevails in barren places. The flowers, however, are somewhat larger, and the petals ciliated towards the base.

The *Cruciferae* are represented by *Blennodia lasiocarpa* and *Nasturtium palustre*; the latter, which grows on the banks of the Nepean, is sometimes called "Native Cabbage;" and of the *Zygophylleae*, *Nitraria Schoberi*, *Zygophyllum Billardieri*, and *Tribulus*

*terrestris* occur. The last is a prostrate weed, common in Southern Europe, Africa, and Southern Asia. In Dr. Mueller's splendid work on "The Indigenous plants of Victoria," there are figures of *Nitraria* and *Zygophyllum*, which give a good idea of the order to which they belong. Of the *Pittosporaceæ*, Mrs. Forde collected specimens of the graceful *Pittosporum phillyræoides*, and of the *Phytolacceæ*, the rare *Codonocarpus cotinifolius*. This is mentioned by Mitchell under the name of *Gyrostemon*, and its leaves resemble horse radish or turnip in taste. The present specimen was gathered near Perry, and it was reported to be a scarce tree, only two individuals being known on the run of Mr. Carstairs. The bark is described "as very smooth, and of a pale salmon colour, the branches long and straight, and the leaves when bruised smelling like fresh turnips." A full description of this tree is given in Dr. Mueller's work on the "Indigenous Plants of Victoria," into which it seems *Codonocarpus* extends. *Glinus lotoides*, *Trianthema crystallina* (*Tetragoniaceæ*), *Haloragis glauca*, (found also by Mitchell), and *Myriophyllum verrucosum*, (*Haloragaceæ*), as well as *Ranunculus rivularis*, (of the buttercup family), and *Dodonæa attenuata* (*Sapindaceæ*), were found near Perry. The pretty little *Erythræa Australis*, is identical with that near Sydney, and the *Solanum biflorum* resembles *S. stelligerum* which grows in many parts of the county of Cumberland. *Loranthus celastroides*, one of the native mistletoes, appears different from any species near Sydney, but its structure may be understood by studying the allied species figured in Dr. Mueller's lithograms, as also may that of the little cucurbit *Zehneria micrantha*, which is an interesting plant of a very small order in Australia. The species of the *Goodenia* family appear to be *G. flagellifera*, *G. coronopifolia*, *G. geniculata*, and *Saxifraga spinescens*, and the Labiates, *Ajuga Australis* (very common in Australia), *Teucrium racemosum*, and the "Native mint," (*Mentha Australis*). To these I may add the pretty little heliotrope (*Heliotropium curassavicum*), the blue flowering *Morgania glabra*, and one of our native cherries (*Exocarpus aphylla*). But perhaps some of the most admired shrubs are those of the *Myoporum* family, viz., *M. platycarpum*, *M. dulce*, and four species of *Eremophila*, (*E. Sturtii*, *E. polyclada*, *E. maculata*, and *E. longifolia*). For a beautiful figure of *E. bignoniiflora*, we are indebted to the ability of Dr.

Mueller. By studying the parts of that flower, as exhibited in the sectional drawings of the figure in his "Lithograms," we shall understand the peculiar character of the genus *Eremophila*, and be assisted in recognising the species wherever we may see them. Of the *Euphorbiaceæ*, Mrs. Forde noticed *E. chamæsyce* and *Phyllanthus lacunarius*, and one singular Proteaceous shrub *Grevillea rigidissima*, which is also figured amongst Dr Mueller's lithograms. *Trichinium Pressii* of the *Amarantus* family, and *Muchlenbeckia Cunninghamsi*, formerly of the *Polygonum* genus, do not occur in the neighbourhood of Sydney, but *Alternanthera denticulata*, *Polygonum gracile*, *P. aviculare*, and *Rumex fimbriatus* are identical with the same species as found growing almost everywhere. (*Muchlenbeckia*, is the same as *Polygonum junceum*, which forms what are termed "lignum scrubs," and constitutes a very characteristic feature of the country.) The same remark is applicable to the little *Anguillaria dioica*, which is common in the spring of the year. *Amaryllis Australasica* and *Calostemma luteum* of the *Amaryllis* family, must appear very beautiful when growing in their native wilds. The allied plant *C. candidum* was seen near the Namoi by Mitchell, who says that the whole country was covered with it, and appeared like a flowery desert. The only cryptogamous plants which appear to have been gathered during the expedition, were the "Nardoo" (*Marsilea hirsuta*), now rendered memorable by the sad fate of Burke and Wills, and a fern (*Nephrodium molle*) procured from the Murray Cliffs near Blanch Town. A variety of nardoo may be found in marshy ground, not more than twenty or thirty miles from Sydney, but the leaves are smaller and not so hairy. The fern is evidently similar to that growing at the North Shore, although the frond is diminutive and somewhat harsher in its texture, arising from the difference of soil and temperature.

I have reserved the consideration of the salt bushes and the grasses for the conclusion of my paper, and I have placed them in connection with each other as being equally important to the grazing interests of the colony. In many parts of the interior, where from the nature of the soil or the dryness of the season, the grasses afford a very inadequate pasture for cattle, the *Chenopodiaceæ* supply the place of that order, and the species are so numerous that probably no other part of the world can produce a

more varied stock of them. The plants best known as salt bushes are *Rhagodia parabolica* and *R. hastata*, and it has been found by experiment that the leaves of them contain as much as a twentieth part of salt. On these and some allied species, sheep and cattle delight to feed, and they are not only kept in the best condition by such plants, but they are prevented from the pernicious habit of licking clay, which eventually is highly prejudicial to them. In the passage from Wentworth to Perry, the following species were collected: *Atriplex mummulariana*, *A. spongiosa*, *Kochia sedifolia*, *K. brachyptera*, and *K. lanosa*, but it is probable that other species might have been found a little further from the river, as Mr. G. Suttor forwarded to me some time since from his station a little higher up, specimens of *A. reniformis*, *A. inflata*, *K. Brownii*, *K. brevifolia*, and *Rhagodia parabolica*. In Sir Thomas Mitchell's "Three Expeditions into the interior of Australia," that writer mentions two new species of the order (*Atriplex Halimoides* and *Scelopolæna bicornis*), but in his "Tropical Australia," he refers to fourteen different species, and dwells particularly on the vast importance of such plants to the well being of sheep and cattle in the interior. I have received specimens of salt bushes from the Castlereagh and the Macquarie similar to many of those enumerated, and not very long since, eight species from one station, several of which especially *Atriplex leptocarpa*, *A. prostrata*, *Enchylæna tomentosa* and *Kentropsis cornuta*, differ from those collected during the expedition up the Darling. Notwithstanding the unfavourable state of the weather for the growth of grasses, Mrs. Forde collected sixteen species of the order, some of which were growing over the dry beds of the extensive lakes near the river, and forming a luxuriant hay crop. Of this kind, *Sporobolus pallidus*, *Panicum flavidum*, *Chloris Moorei* and *Stipa flavescens* were particularly noticed, as well as a doubtful *Poa*; but the grasses generally most nutritious, and distributed most widely on the stations were *Anthistiria ciliata* (a kangaroo grass), *Bromus Australis* (an oat grass), and *Panicum decompositum* (the umbrella grass). These, in ordinary seasons, afford excellent pasture, and one of them (*Bromus*) has been cultivated in Europe, and much admired for its nutritious properties. The other species collected were *Poa Australis*, *P. ramigera*, *P. elegans*, *Stipa elegantissima*, *Agrostis*

*œmula*, *Danthonia pectinata*, *Lappago racemosa*, *Hordeum murinum*, and *Alopecurus geniculatus*, many of which are more interesting to the systematic botanist than to the grazier.

An *Agrostis*, referred by Steudel to *Vilfa Mitchellii*, is reported to grow best during the months of December, January, and February, thriving most on the South east and East sides of the lakes, and growing very thinly on the West and North portion and centre. This grass makes good hay, which can be preserved for any length of time. It seems to be the grass called by Sir Thomas *Agrostis virginica*, (*Vilfa matrella* St.), which he saw growing in the dry bed of the Waljeers, (vol. 2, p. 65). Brown's *A. virginica* is frequently found near salt water, and sometimes where the tide comes over it.

My friend Mr. Suttor collected for me on the Darling some specimens of *Fusanus acuminatus*, (or "the Quandang"), of *Capparis Mitchellii* (or "the Native Pomegranate or Lemon"), of *Flinandersia maculosa* (or "the Spotted Tree"), and *Atalanta hemiglauca*, a tree having dense panicles of small flowers, and a peculiar seed vessel, separating into three distinct carpels, each containing a seed, and terminating in a long wing. On the *Flinandersia*, there was a remarkable *Loranthus* or mistletoe, apparently allied to *L. pendula*. He also kindly forwarded to me the fruit of an asclepiadaceous climber, probably *Leichhardtia*, which, when in a green state, is said to be eaten by the blacks. For the species of *Eucalyptus* of the smaller kind, I am indebted to Dr. F. Mueller's *Fragmenta*, vol. 2. These are *E. gracilis*, *E. oleosa*, *E. fruticetorum*, and *E. dumosa*, all of which are of a shrubby character, and form a great part of what is called "The Mallee Scrub." With respect to one species of a larger growth, which was much admired on some parts of the river near Wentworth, I have no means of ascertaining what it is, but, from the description given, I think it must be *E. rostrata* or the yarrah, which grows near rivers and attains considerable size. I cannot end this communication without expressing the high sense which I entertain of Mrs. Forde's perseverance in collecting specimens, and also of the ability which she has displayed in drawing and colouring some of the most striking flowers on the Darling; such, for instance, as *Gossypium Sturtii*, or "Sturt's Desert Rose," *Eremophila* or the "Desert Fuchsia," *Heliotropium* or the "Native

Heliotrope," &c., &c. A collection of such drawings, accompanied with brief popular descriptions, would tend to develop the resources of our flora in the far interior, and encourage persons to pursue the study of our indigenous plants. This is a consideration fully appreciated by my learned friend Dr. F. Mueller, for whilst he has been almost incessantly occupied in preparing works for the "learned" in all parts of the world, he has simplified the study of Australian botany, by the beautiful engravings published from time to time in his various writings; and it is often a matter of regret to me that these admirable illustrations of "Australian beauties," are not more widely circulated and more highly appreciated. If such figures, displaying as they do the wonderful structure and inimitable symmetry of our bush flowers, were carefully studied, they would impress the mind with a profound sense of the Creator's wisdom and lead to reflections which are calculated to advance the moral and spiritual nature of man.



## ORNAMENTAL SHRUBS AND PLANTS OF THE PARRAMATTA DISTRICT.



THE poet, in alluding to the marvellous beauties of the vegetable kingdom, sings of the flowers of the field—

*Everywhere about us they are glowing,  
Some, like stars, to tell us Spring is born;  
Others, their blue eyes with tears o'erflowing  
Stand, like Ruth, amid the golden corn.*

And truly to the inquiring mind, which searches diligently into every sequestered spot, and disdains not to examine into the minutest florets "that in earth's firmament do shine," they may be found almost everywhere. It is not merely in the dense shades of the forest or on the alluvial banks of our rivers, that we may look for gorgeous tints and matchless symmetry. The despised weed by the wayside, the humble moss springing out of the wall,



the flower that struggles for existence in the parched desert, all of them when subjected to careful examination by the practised eye, or brought to light by the powerful aid of the microscope, display their brilliancy and call forth our admiration. But, in the popular meaning of the word "ornamental," reference is generally made to plants of a larger and more showy character, such indeed as are calculated to adorn the borders of the garden, or the vase in the green-house. It is these, therefore, that I propose to enumerate on the present occasion, with a view of showing that the Parramatta district is not destitute of plants worthy of cultivation, and that neglected as they may be in the immediate neighbourhood, the elegance of some species is duly appreciated by horticulturists in other countries. Passing over the smaller plants to which I have alluded, I shall consider our ornamental species under three heads: (1) such as may be denominated small trees and designed to be useful in shrubberies, or graceful when flourishing near the water; (2) shrubs, properly so called, not merely smaller than the preceding, but with numerous branches from the base; and (3) herbaceous plants, which are, for the most part, annuals, and are propagated from bulbs or seeds.

1. The myrtle family furnishes two small trees which abound on our creeks, and are frequently termed "Australian Myrtles." The one (*Blackhousia myrtifolia*, so named in honour of the worthy Quaker who visited our shores some years ago) in favoured places, becomes an elegant tree, and in the spring of the year is covered with a profusion of white flowers: the other (*Eugenia Smithii*) has larger and more glossy leaves, and is more remarkable for the pretty appearance of its fruit, than for the beauty of its flowers. These fruits which are called "Lilly Pillies," vary sometimes in size and colour, being white and light purple, and when hanging in graceful bunches amongst the dark green foliage, cannot fail to arrest the attention of the observer. A figure of this species may be found amongst Dr. F. Mueller's Lithograms, under the name of *Syzygium brachynemum*, but it does not convey to the mind an adequate idea of the tree, as seen growing in its native soil. The "Olive Fruit Tree" (*Elæocarpus cyaneus*) of the Linden bloom family, is a tree which in some parts of Australia, attains considerable size, but in the Parramatta district it is only

a small tree, with loose racemes of white fringed flowers, which are succeeded by oval berries of an acid flavour. Perhaps the Cunoniad family affords the district more ornamental trees than any other, and at the season of Christmas, they are appropriated in the same manner here as the Holly and Mistletoe in England. That which is usually called "the Christmas bush" is *Ceratopetalum gummiferum*, a graceful tree with leaves in threes, and panicles of small white flowers, which after a time disappear and leave behind them the persistent red calyxes. When in this state, which is usually from December to February, the branches are sought after to decorate our Churches and houses during the period of the Christmas festivities. In Dr. Bennett's "Gatherings of a Naturalist," page 324, there is an elegant drawing of this tree from the pencil of Miss H. Scott (now Mrs. E. Forde), which gives a very good idea of the flowers as they appear about Christmas. The allied species *C. apetalum* and *Schizomeria ovata*, are also ornamental, and differ principally in the fruit, and the articulation of the leaves on the petiole. The fruit of *S. ovata* is a white fleshy drupe about the size of a marble, and of an acid flavour. *Callicoma serratafolia* occurs frequently on our creeks, and is remarkable as being a solitary species of a genus endemic in Australia. When in flower it has rather a showy appearance, and the leathery leaves, shining above and white with tomentum underneath, coarsely serrated and marked with prominent parallel veins, render it an interesting object. I may also mention, as being connected with the same family of trees, *Abrophyllum ornans*, which I found at the Fox Ground, near Lane Cove, a beautiful tree with leaves sometimes nine inches long. It was previously supposed that this species (the only one too of the genus) did not occur nearer than the Blue Mountains. *Aphanopetalum resinosum*, is a tall climbing shrub, with panicles of petal-less flowers, and shining leaves. It is worthy of cultivation, and can be procured near Parramatta.\* The same remark applies to two other beautiful trees of the same order, *Quintinia Sieberi* on the Blue Mountains, and *Eucryphia Moorei*, near

\* It is only within the last few weeks, that I have found *Aphanopetalum* growing in the creek, near Brush Farm. In the same place, I gathered some ripe fruit of *Eupomatia laurina*, the flavour of which resembled that of *Cherimoyer*, though far inferior to it.

Wingecarribee. From this short review of the Cunoniads, it appears that many of them merit a place in our shrubberies, as being elegant trees, both as regards the character of their inflorescence, and the richness of their foliage. Some of them I have occasionally noticed in gardens, but unless care be taken to select for them a soil resembling that from which they have been taken, and a degree of moisture similar to that to which they are accustomed on the banks of creeks, or in the shade of the mountain forests, our Cunoniads do not improve by cultivation. However, they have received much less attention, than they deserve. The species of *Pittosporum*, near Parramatta, are not so interesting as some from other parts of Australia, but they are nevertheless worthy of a place in our shrubberies, and when the capsules open and display their red seeds, they remind the observer of the pomegranate, by which name one of the species is popularly designated. *Cheiranthra linearis* of the same order, is a shrub with showy blue flowers. It is abundant near Mudgee, and at first sight, resembles some species of *Solanum*. The species of *Billardiera* have a twining habit, with pale yellow flowers, and small edible fruits. *Sollya heretophylla* with its cymes of pretty blue flowers, though frequently cultivated in Eastern Australia, belongs to Swan River and King George's Sound. Of the Rutaceæ, *Evodia micrococca*, and *Acronychia lævis*, are often trees of considerable size in other districts, but here they are diminutive, though still retaining the same character as the larger trees of the same species in more favoured places. The flowers of the first are small, but the leaves which are trifoliolate on long petioles, give the tree a marked appearance. This species could scarcely have escaped the notice of Cunningham, and was probably referred by him to *Zieria*, but it was first described by Dr. F. Mueller, in his *Fragmenta* (Vol. 1, 144). *Acronychia*, in this part of the colony, is only a small tree, but in Queensland it attains the height of 60 feet. The diminutive specimens of it, seen on the Toongabbie Creek, and also near Smithfield, have very much the character of the lemon, but the leaves are sometimes trifoliolate. It seems to me that *A. lævis* is almost out of its proper place in this district, for none of the specimens that I have noticed, grow to any size, and several that have been removed to cultivated ground, soon perished. On the creeks to the north

of Parramatta, *Synoum glandulosum* occurs sparingly, but it is an ornamental tree, and worthy of cultivation. It has flowers in dense panicles, and pinnate leaves, resembling in some respects the "Red Cedar" of the colonists,—a tree, indeed, to which it is nearly allied. *Clerodendrum tomentosum* is remarkable as being a small tree of the *Verbena* family, and long after flowering, the seed vessels with the enlarged and dark coloured calyxes, are conspicuous amongst the foliage. *Duboisia myoporoides*, or as some call it "the Cork tree," is placed by Brown in the *Solanum* family, and probably possesses deleterious properties. I have been informed by Miss Atkinson that the aboriginal natives used to prepare some stupifying liquid from it, and also that branches of the tree, when hung up in a close room, have had the effect of producing giddiness and vomiting in delicate persons. *D. myoporoides* grows on the Toongabbie Creek, but never attains any size. *Exocarpus cupressiformis*, or "the Native Cherry," is a very graceful tree, and *Elæodendrum australe*, with its bright red drupes and large oval-shaped leaves, is not unworthy of attention; but as regards their flowers, they are far inferior to some of the bright yellow and showy racemes of our Wattles or *Acacias*, which in the spring of the year form a lively contrast with the prevailing white flowers of the district. The species of *Acacia* deemed most ornamental in these parts are, *A. decurrens*, *A. pubescens*, *A. discolor*, and the varieties (?) *A. floribunda*, and *A. intertexta*, now united under *A. longifolia*, (*Flora Australiensis*, vol. 2, p. 397). *Stenocarpus salignus* is a proteaceous tree sometimes called "Beef Wood." This as it now appears growing close to our creeks, is little more than a shrub with dark glossy leaves, and as such it was described by Brown, but since the days of that illustrious botanist, *S. salignus* has been found as a splendid forest tree, 80 feet in height, the wood of which is exceedingly beautiful, and promises to be useful for veneers in cabinet work. When this tree was pointed out to me on the Mittagong Range, I could scarcely believe it to be identical with the shrub on the Parramatta Creeks, yet such I believe is the case. There are two small trees of the Epacris family that remain to be noticed, viz:—*Monotoca albens* or the "Native Beech," and *Trochocarpa laurina* or the "Brush Cherry." The first of these is abundant near the coast, and extends some distance on the banks of the Parramatta

River. The flowers and fruit are small, and the tree seldom exceeds eight or nine feet. *T. laurina*, so-called from the circumstance of the leaves being nerved like some species of Laurel, is a pretty little tree of twenty feet or more, although on our creeks, it is rather a shrub attaining only a few feet in height.

(2) The ornamental shrubs of the district are more numerous than the preceding, and contain species which have been successfully cultivated in Europe. Amongst the Proteaceæ, *Telopea speciosissima*, "the Waratah or Native Tulip," claims the first notice on account of its showy crimson flowers, which on the banks of our creeks, or amidst the wild rocks of our gullies, are conspicuous and beautiful objects. Amongst all our indigenous shrubs, this is generally the most admired, and certainly it is remarkable not only for the brilliancy of its involucre, its cylindrical follicle and winged seeds, but for the numerous florets which form its centre, as if it were a composite flower. With the exception of this species, I scarcely think that we have in the Parramatta district another Proteaceous shrub which would interest the horticulturist. It is true there are species, of *Grevillea*, *Persoonia*, and *Lomatia*, which present many points of interest to the systematic botanist, but none of them can be strictly termed ornamental. The whole order, however, is a remarkable one. The varying forms of the flowers and seed vessels, the rigid texture of the leaves, and the irregular tubular calyxes, distinguish the *Proteaceæ* from all other orders, and render it peculiarly interesting to strangers in Australia. Some of the prettiest shrubs belong to the Rutaceous order, amongst which "the Native Rose" (*Boronia serrulata*), and other species of the same genus (*B. pinnata*, and *B. ledifolia*, var. *triphyllo*) are very abundant in the spring of the year. Being of a bright pink colour, and having a strong but not disagreeable odour, they cannot fail to attract notice. *Eriostemon salicifolius* is also another shrub with delicate pink flowers, and worthy of a place in any garden. The species of *Zieria* are not very conspicuous, but two species of *Phebalium* (*P. Billardieri* and *P. correifolium*) deserve notice, the former on account of its pretty white flowers and the silvery under-surface of the leaves, and the latter as being a species limited in its range. Amongst the leguminous plants, some species of *Podolobium*, *Gompholobium*, *Bossiaea*, and *Pultenæa*,

have showy yellow or orange coloured flowers; but perhaps the most admired are the climbing *Hardenbergia* and *Kennedia*, the one with blue, and the other with crimson flowers. The *Clematis* strongly reminds one of the "Traveller's Joy" of Europe, being of the same genus, and very similar in appearance, whilst the numerous *Epacrids*, which here supply the place of the Heaths of other countries, give a tone and character to the vegetation where they abound. *Epacris purpurascens* which is so common in some of our scrubs, has been long known in Europe, and a double variety has arisen from cultivation. I have been informed by Sir William Macarthur, that this sometimes occurs even in a wild state, but I cannot say that I have ever noticed it. Some species of *Styphelia* are very beautiful, as are also those of *Leucopogon* with the bearded segments of their flowers, but Dr. F. Mueller regards our *Dracophyllum secundum*, with its wax-like tubular corolla, as one of the most interesting shrubs of the district. The sweet-scented *Marsdenia* (*M. suaveolens*), and the strong climbing *Lyonsia* (*L. straminea*), are not to be despised, where plants of such a nature are required for spreading over fences, or running up the trunks of trees. *Logania floribunda* is remarkable for its sweet-scented flowers, but can scarcely be regarded as ornamental, but two species of *Hibiscus* (*H. heterophyllus* and *H. divaricatus*) with their large showy flowers, have been collected in remote parts of the district. One of these is sometimes called "the native Hollyhock," and may be noticed in gardens. There are many species of *Hibbertia* and *Pleurandra* here, but with the exception of *H. dentata* and *H. volubilis* with their bright yellow petals, I do not suppose that any could be regarded as suitable for horticulturists, and even these owing to the fugitive nature of the petals, which drop off almost as soon as they are gathered, render them less desirable than other flowers which are more enduring. The little *Citriobatus*, or "Orange Thorn," is rare in the district, and desirable as a garden shrub.

3. The herbaceous plants of the district most suitable for cultivation belong principally to the family of the Orchids and Lilies, with a few species of *Goodenia*, *Lobelia*, &c. Of the Orchids, *Dipodium punctatum* (or the "the Native Hyacinth"), *Dendrobium speciosum* (or "the Rock Lily"), *Cymbidium suave*, *C. reflexum*, and *Thelymitra ixioides* would be the most likely

to arrest the attention of the cultivator, but many of the smaller species, from the peculiar structure of their flowers, and the rarity of their occurrence in other parts of Australia, demand some notice, especially the curious and irritable *Caleana*, the sweet scented leaf of *Glossodia major*, the fantastic labellum of *Acianthus candatus* and *Calochilus*, the edible bulbs of *Diuris*, and the helmet of the diminutive *Corysanthes*. *Comesperma volubile* of the milk-wort family is a slender little climber with pretty blue flowers, and *Lobelia gracilis* and *L. dentata* are not unknown to gardeners, whilst *Dianella cærulea* and *Thysanotus junceus*, ("the fringed Violet,") relieve the eye of the observer by their delicate tints of blue and lilac. Nor should I forget, whilst alluding to liliaceous plants, to mention the winding *Eustrephus*, and the elegant bearded filaments of *Arthropodium*. The plants of the Violet family (*Ionidium* and *Viola*) do not bear comparison with the species of England; but though destitute of scent, our Violets may serve to remind us of the copse woods of the mother country,

"Where purple Violets lurk,  
With all the lovely children of the shade."

It is probable, too, that the indigenous species may admit of hybridization, and under skilful manipulation, be rendered available for the purpose of the garden. The same remark is applicable to our "native Geranium," (*Pelargonium australe*), which decidedly improves under cultivation, and may hereafter yield interesting varieties. And when we see the numerous hybrids from the Passion Flower, it is not unreasonable to suppose that our *Disemma herbertiana*, or "the Native Passion Flower," may improve in a similar manner. *Scævola hispida*, of the Goodenia family, and *Arum orixense*, or "the Native Arum," (now called *Typhonium* on account of its acidity), deserve consideration: the first for the beauty of its flowers, and the other for its tuberous roots, which after careful preparation may be used for food. In their raw state they are poisonous, but the blacks destroy the deleterious properties by the action of fire. I have been informed also, that the leaves of the plant are likely to be employed by the homœopathist. The delicate purple *Patersonia* of the Iris Family, which is so often doomed to blush unseen in its native wilds, is not only ornamental, but it is said to grow

readily in peat and loam, and may be increased like other herbaceous vegetables. *Damasonium ovalifolium* (our Water Lily), *Vallisneria spiralis*, *Villarsia geminata*, and *Azolla pinnata*, are all aquatic plants, and available for garden ponds.

In concluding my review of the ornamental plants of the Parramatta district, I cannot but express regret that many of them are so little appreciated by horticulturists. If we had, in the neighbourhood of the town, a garden for the exclusive purpose of raising native plants, and of arranging them systematically for the instruction of persons desirous of studying Australian Botany, the beauty of our Flora would be seen and acknowledged, and a great step would be taken towards the development of our resources. In the first place, the cultivation of the varieties of *Eucalyptus*—a genus which has hitherto been so perplexing to men of science—might lead to an accurate arrangement of the species, and to the knowledge of the variations of which they are susceptible; whilst a careful investigation might render it evident whether any of the species are exposed to hybridization. I am aware that Dr. F. Mueller is of opinion that this process scarcely extends to the genus, because fecundation of the germen takes place whilst the calyx of the flower is yet closed by the operculum; but when we see the numerous varieties of Grey Gum or Bastard Box, all of which must be referred to the same species, and hear the expressions of practical men on that subject, it seems probable that something of the kind may be effected by the labours of insects, and that by boring through the operculum, and conveying the pollen of one tree to the stigma of another, they may occasion some of the anomalies which we witness around us. A systematic arrangement of our medicinal plants also, is highly desirable, as a means of encouraging Medical Botany, and of assisting the student in his researches into the nature and properties of those species, which are likely to prove efficacious in healing the diseases of the human constitution. Such an investigation is eminently calculated to improve the minds of young men entering on the medical profession, and to obviate the necessity of sending to foreign countries for remedies which could be procured here in all their native freshness. As regards plants and trees, also, which are supposed to afford fruit or roots capable of being prepared for food, a systematic garden



is very desirable. We are supposed to have very few esculent fruits, and probably such is the case; but when we trace back some of the highly flavoured fruits of the mother country, and consider, for instance, how the numerous varieties of apple have sprung from the harsh and austere crab, it is not too fanciful to hazard an opinion that some of our native plants contain in themselves elements for improvement. Why, for instance, should not experiments be made on the "Native Grape," the "Native Raspberry," the "Illawarra Plum" (*Cargillia*), the "Quandang," or the fruit of the *Achras*? Or why should we be too proud to take a lesson from our sable brethren, and diligently examine the nourishing properties of the vegetable productions which they use as food, such as the tubers of the *Arum*, the nuts of *Macrozamia*, the bulbous stems of some species of Orchids, and the roots of certain *Cyperaceæ*? And, lastly, why should we not allure our native youth to the study of the Vegetable Kingdom, by placing before them, in gardens for the inspection of all classes, the beautiful flowers and elegant shrubs which now perhaps are wasting their fragrance on the desert air? Whilst felicitating themselves on the vast extent of their cattle runs, or the inexhaustible resources of their mines, it is to be regretted that too many of our young men are insensible to the exquisite beauties and wonderful structures that are inviting contemplation. "The lilies of the field," indeed, "with placid smile,"

"Reprove man's feverish strivings, and infuse  
Through his worn soul a more unworldly life,  
With their soft, holy breath,"

but these delightful impressions elude the grasp of the unobserving multitude; for, as in the moral world, the most precious truths are appreciated only by the humble and patient inquirer, so in the natural world, if a person wishes to understand something of the mysteries of creation and to rise from Nature's works to Nature's God, he must diligently examine the "Revelation of love" around him, and hold fast the truths which it unfolds.



## THE GENUS EUCALYPTUS.

THIS genus, which comprises the most of our forest trees, is a very remarkable one, and has long been a source of perplexity to the systematic botanist. The word *Eucalyptus* is derived from *eu* "well," and *kalypto* "to cover," in allusion to the operculum or lid which covers the calyx until the stamens are fully developed. According to the Linnean system, the genus belongs to the class *Icosandria*, order *Monogynia*, and according to the natural system, to the order *Myrtaceæ*. The flowers have no petals, and the stamens which are very numerous, are with few exceptions, white, whilst the tube of the calyx is permanent, and the capsule three, four, five, or six celled. Generally speaking, the leaves are alternate, but in some species they are opposite, and in others, they are alternate and opposite on the same tree. The arrangement of the flowers is for the most part in umbels, varying very much in size, as well as in the number of the florets, and these umbels are sometimes axillary or lateral, and sometimes corymbose or paniculate. Being evergreens, and probably lasting for many generations, the species of *Eucalyptus* undergo many changes in their appearance, for whilst some of them are wholly or partially covered with bark in their youth, and become smooth as they advance in years, nearly all of them vary in the shape and size of their leaves in proportion to their age. As a general rule, the leaves are longer and broader on the young trees, whilst in some species they are first opposite, and then alternate. Being fixed vertically, instead of horizontally, they afford but little shelter from the burning rays of the summer's sun, or from the drenching showers which sometimes overtake the weary traveller; and on the whole, an Australian forest presents a dull and unvarying aspect, uninfluenced by "the bright fresh verdure of spring, or the gorgeous and variegated tints of Autumn." And yet our *Eucalypti* are of immense importance, whether considered in reference to the value of their timber, the medicinal properties of their barks and resins, or the essential oil of their leaves; whilst

the colossal dimensions and towering height of some species are perhaps unrivalled in the world. According to a statement recently published by Dr. F. Mueller, the karri (*E. colossea* or *diversicolor*) attains in favourable spots the height of 400 feet, whilst the messmate (*E. amygdalina*) has been known to measure 480 feet. These, however, are extraordinary instances, and limited to the glens of the Warren River in Western Australia, the recesses of the Dandenong, &c. In some of the gullies in the Blue Mountains, and on the Mittagong Range, a blue gum of this colony (*E. eugenioides*), and the messmate, are known to exceed in height any of the ordinary gums in the neighbourhood of Sydney, where, notwithstanding the havoc that has been committed amongst the native forests in the process of cultivation, ironbark (*E. paniculata*), bloodwood (*E. corymbosa*), and swamp mahogany (*E. robusta*), have been ascertained to range from 100 to 150 feet. Whilst from their general appearance and usual characteristics, there is no difficulty in referring our common gums to the genus *Eucalyptus*, there is intense difficulty in dividing the genus into sections, and in determining the limits of each species. This has been felt by every botanist from the foundation of the colony, and notwithstanding the labours of Mr. Bentham and Dr. F. Mueller, as displayed in the third volume of the *Flora Australiensis*, and the second volume of the *Fragmenta Phytographiæ Australiæ*, many mysteries remain to be cleared up. It has frequently been remarked that the woodcutters in the vicinity of Port Jackson are better able to distinguish the ordinary species of *Eucalyptus*, by paying attention to their bark and the nature of their timber, than the systematic botanist can separate one species from another by dwelling upon the peculiarity of their inflorescence, or even the divisions of their seed vessels. And the reason is this, that many of the trees which differ very widely in the texture of their bark and the specific gravity of their wood, and to all intents and purposes are perfectly distinct from each other, yet agree very nearly in the ordinary characters by which species are regulated, so that a written description, especially from dried specimens, may be applied to half a-dozen different kinds of gum. This, indeed, has frequently been the case, and even amongst men of scientific attainments, as might easily be shown by referring to various works which have been written on the

natural history and woods of the colony. The first method by which botanists proposed to divide the genus into sections, was by measuring the length of the operculum or lid of the flower-buds, so that all species having the lid longer than the cupula or cup, were placed in the first section: those that have the operculum conical and equal in length to the cupula, were referred to the second; whilst the third section contained such species as have the operculum nearly conical, or hemispherical, and shorter than the cupula. To these sections were added two more divisions, in one of which, the operculum was to be hemispherical, much broader than the cupula, and in the other, the mature operculum was depressed in the centre, where it is umbonate and shorter than the cupula. But this artificial arrangement is not only defective, from the fact that the operculum, even in the same species, is not always of the same shape and size, as might be shown from specimens of the grey gum (*E. tereticornis*) and the drooping gum (*E. saligna*), but it is also open to the serious objection of separating species which, by every other mark, are nearly allied. Thus, for instance, all the ironbarks, mahoganies, and common gums should be arranged near to each other in respective sections, being not merely similar in bark, the nature of their wood and general habit, but also in the character of their inflorescence and seed vessels. And yet, if the old system be fairly carried out, we should be compelled to place some allied species in one section, and some in another, thus destroying the simplicity which would arise from judicious grouping, and in fact throwing the whole genus into inextricable confusion. I believe that this inconsistency has been the cause of much difficulty to persons studying the genus, and has induced some to give it up in despair, for although the comparative length of the operculum, as well as its shape, may be a guide in determining those species which are uniform in that organ, yet the irregularity which prevails in the opercula of other species must lead to perplexity, especially when the student is relying upon dried specimens without any knowledge of the tree in a living state. Seeing, therefore, that there is no advantage in trusting to an artificial system, which is neither uniform in its results, nor designed to connect allied species, Dr. F. Mueller, in a paper read before the Linnean Society, in 1858, suggested the expediency of grouping the species according to

the structure of the bark, and of paying due attention to the configuration and valves of the seed vessels in determining individual species. This system is exceedingly simple and natural, and one that commends itself to the practical man as well as to the botanist, but still it is not without its defects, for some species are found to be half-barked in their youth, and perfectly smooth when advancing in age, whilst others again, apparently of the same standing, are seen growing near each other in both states. Some species of white gum, and hybrid box, are instances of this kind, but, nevertheless, as the great majority of these trees are sufficiently similar in character to be recognized by the attentive observer, I am inclined to regard Dr. Mueller's system of grouping the best that has yet been devised. Its advantages are clearly seen in some of the groups, especially those of the iron barks, the stringy barks, the bloodwoods, and the half-barked blackbuts and box. Taking these well-known trees as types, it is not difficult to associate others with them, as they come under observation. One of the principal difficulties to what may be termed the popular study of the genus, arises from the different names which are given to the same species in different districts. For instance—the blue gum of one colony is the red gum of another; the woollybut of one district is the peppermint of an adjoining one; whilst in one locality perhaps the same species may be indifferently called grey gum, leather jacket, hickory, and hybrid box. With regard to the groups previously enumerated, there is much greater uniformity, for stringy bark, bloodwood, &c., retain the same names wherever they occur. In a previous paper, I have already alluded to Dr. Mueller's cortical system, but to set the matter clearly before my readers, I shall give in his own words what he modestly called an attempt to arrange the *Eucalypti* of tropical and subtropical Australia, according to the structure, texture, and shedding of their barks, accommodated to the use of the colonists. He places all the species in six groups, in the following order:—(1.) *Leiphloia*, such as have the bark smooth on every side, after the shedding of the outer layer, including the trees commonly called flooded gum-trees, white gum tees, blue gum-trees in part, red gum trees in part, and yarrah trees. (2.) *Hemiphloia*, such as have the bark in the lower part of the trunk, persistent, wrinkled, and full of clefts, in the upper part and in the branches

rendered smooth by the shedding of the outer layer, viz., Moreton Bay ash, blackbut, box, &c. (3.) *Rhytiphloïæ*, such as have the bark everywhere persistent, wrinkled, full of clefts, and solid within, such as bloodwood, peppermint in part, &c. (4.) *Pachyphloïæ*, such as have the bark everywhere persistent, wrinkled and fibrous within, as stringy bark trees. (5.) *Schizophloïæ*, such as have the bark everywhere persistent, deeply furrowed, and solid within, viz., iron-bark trees. (6.) *Lepidophloïæ*, having the bark persistent at least in the trunk, lamellate, and friable, as melaleuca gum-trees, mica trees. Mr. Bentham, after referring to the difficulty of proposing any division, which is not open to objection, alludes to the cortical system, as stated in the words of Dr. F. Mueller, and remarks, "I am totally unable to judge, nor have I any means of availing myself of the sections founded on the nature of the barks, for the specimens themselves never show the character, and a large portion of them is either unaccompanied by any notes of it, or the collectors' notes are from various causes indefinite, unreliable, or even contradictory." He then proceeds to state the plan adopted by him, as being the most expedient he could devise under the circumstances. "I have thus been compelled to establish groups upon such characters as appeared to me the most constant amongst those which are supplied by the specimens; in the first place, upon the form of the anthers, and secondly upon that of the fruit, and in some cases on the inflorescence, or the calyx." The system, indeed, is very ingenious, and one which would not have been conceived by a man of ordinary attainments, but in a colonial point of view, it is open to many objections. In the first place, there is a want of certainty in the groups, as Mr. Bentham admits that they pass very gradually into each other through intermediate forms; and in the second place, the system is too artificial and microscopic in its character to be of any utility excepting to the botanist. The gravest objection, however, is that of placing in the same group, species which in the eyes of the colonists, are always regarded as perfectly distinct from each other and also of separating, under various sections, trees which by bark, wood, habit, and general character, ought to stand near each other. To make my meaning clear, I will give a few examples of the inconsistencies which arise from grouping our gums according to the

proposed system. With the species *E. piperita*, or peppermint, which is a tree resembling stringy bark, the smooth barked mountain blue gum is associated; and with *E. pilularis*, or black-but, which is a half-barked tree, the white mahogany, with its persistent bark, is placed as a probable variety. Again, with *E. amygdalina*, or the messmate (a large tree very like stringy bark), *E. radiata*, or the river white gum, is reckoned as a variety. These apparent anomalies arise from relying too closely upon artificial distinctions; and if we look to the separation of species under the proposed system, a similar inconsistency appears. The ironbarks, which certainly should be grouped together, stand apart. *E. leucoxydon*, or the red flowering ironbark, and *E. paniculata*, or the white ironbark, are in the second series; and *E. siderophloia*, or the red ironbark, and *E. melanophloia*, or the silver leaved ironbark, are placed in the fourth. Again, the white mahogany (*E. acmenioides*) is in the first series, and *E. robusta*, or swamp mahogany, and *E. botryoides*, or the bastard mahogany, are in the fifth series, sub-series 3; whilst the red mahogany (*E. resinifera*) stands in sub-series 6. These are some of the results arising from the application of the principles laid down, so that whatever merit there may be in an artificial system by which museum plants can be named, (and I am far from denying the credit due to the illustrious botanist for his exertions in that respect) I do not think that such an arrangement will ever meet with much favour with those who are studying the living plants. As Mr. Bentham had merely dried specimens before him, and knew nothing of the species as they grow in their natural soil, it was impossible for him to appreciate the value of any system founded on difference of bark and habit. Alliances well known even to the woodcutter in these colonies, had no place in his mind, and therefore, judging simply from the material before him, he did the best for us in his power, and collected an amount of information from various sources which hereafter will greatly assist any one who may be disposed to consider the most judicious mode of grouping the species. Viewed practically, it must be admitted that Dr. Mueller's method of grouping our *Eucalypti*, according to the nature and texture of the bark, is the best system which has yet been promulgated; and whilst future observations may render it more precise by defining with accuracy

the particular group under which each species should be ranged, the basis of the system is likely to be permanent. As regards the fixing of species, and of ascertaining the amount of variation to which some are liable, other principles must be applied. Some species, indeed, are marked by the double operculum, some by winged seeds, and others by the colour of their stamens; but the shape, cells, valves, &c., of the seed vessels present very important notes of distinction, and deserve the most attentive study. Hence I believe that these considerations, when taken in connection with the cortical group to which the respective species belong, will be found most efficacious in settling many difficulties. It is true, indeed, that some seed vessels of very different trees closely resemble each other, and, consequently, without some further mark for distinction, mistakes might arise; but the difficulty is considerably lessened when the group of the tree from which the specimen was procured, is known. For instance, some species of the *Leiophloia* have seed vessels very similar to those of the *Pachyphloia*; and if a person did not know to which group they belonged, he might probably err in referring them to the wrong species. This, however, is not so likely to be the case, when he can ascertain whether they were collected from a tree with smooth bark, or from one with fibrous bark. It seems to me that a system founded on the character of the seed-vessel in connection with the bark, will ultimately fix the species of the genus, for generally speaking the fruit is subject to the least variation. Even in the grey gum or hybrid box (*E. tereticornis*), which appears more subject to variation than any gum in New South Wales, there is sufficient uniformity in the seed-vessel to mark the species. The leaves are subject to great diversity, for they may be found of all shapes and sizes—from broad ovate to narrow lanceolate; and the umbels (though the type is apparently of seven flowers on each umbel), vary considerably in number, whilst the operculum, which is usually much longer than the cupula, is sometimes equal in length to it, and sometimes shorter. But after all, if the seed vessel be considered in reference to the bark of the tree to which it belongs, it will be a safe guide to the determination of the species. It is in this gum that workmen speak so much of hybridization, as they imagine that the flowers of the grey gum are sometimes inoculated by the pollen of the



box, so that an intermediate variety springs up. And it is a curious fact, that in some districts where these trees prevail, there is a species which in appearance sometimes resembles the one, and sometimes the other. Upon careful examination, I find that whilst the young trees look very like the box, and the older approach the grey gum, the seed vessels of this tree differ from those of the box, in being usually five celled, and from the grey gum, in having the valves inserted. With respect to hybridization in this genus, the flowers of which are probably fertilized before the operculum is cast off, Dr. F. Mueller does not think that it is impossible, but that all ordinary chances are against it. "Still," he continues, "as Mr. W. S. Macleay remarked, parrots and other birds occasionally bite off the flower-buds, and, may accidentally uncover a stigma, and remove the anthers; and again insects may then finish off their work and carry pollen across from another species. But then hybrids are barren, as a general rule—and how few seedlings can spring up of such hybrids, compared with the ordinary young plants of the pure species." My own impression is, that the varieties of the grey gum, to whatever causes they may be due, are not transmissible from generation to generation, and that they do not extend beyond the individuals so circumstanced; whilst I regard one of the kinds at least, which workmen consider hybrid, as a true species, for it has a uniform seed-vessel of its own, and prevails to too great an extent to admit of the supposition that it is the result of fortuitous impregnation. The diseases and age of *Eucalypti*, are subjects also of great interest, but as yet they have received only a moderate share of attention. *E. globulus*, or "the Tasmanian Blue Gum," when removed from its native soil, is subject to the ravages of beetles, and many trees in New South Wales have perished from that cause; but the most remarkable instance of disease amongst our gums in this colony, is the fact that in some districts, whole forests of trees, covering many square miles, have sickened and died without any apparent cause. Some persons attribute the disease to drought, and some to floods, whilst again others think that during excessive rains, a grub or fungus has been generated in the low lands and gradually spread to the trees on the higher ground.\* I confess

\* Sir Thomas Mitchell mentions, that Regent's Lake, which was visited by

that I do not see any evidence of such a visitation, although it is by no means improbable, for in certain seasons, I have noticed young gum-trees infested with *Coccus* and *Cladosporium* in a manner similar to that which has prevailed in some of the orange orchards near Parramatta, though probably the insect is of a different species. The age of these trees is another matter difficult to solve, for although they grow for the most part very rapidly at first, soon forming dense scrubs on land that has been cleared and neglected, yet it is impossible to believe that any trees could attain the astonishing height of 300 or 400 feet in less than several centuries. We may imagine, therefore, that many of our primeval forests are of older standing than the sable race which was found roaming amongst them, and that in the unimproved parts of the colony, they will continue to rear their lofty branches long after the unfortunate aboriginal inhabitants have passed away. The spotted gum (*E. maculata*), the blue gum (*E. gonicalyx*), and the red flowering ironbark\* (*E. leucoxyton*),

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Mr. Oxley, and pronounced by him to be a "noble lake," was nearly dry in 1836, and that "its northern margin, and a good way within the former boundary of the lake, stood dead trees of a full grown size, which had been apparently killed by too much water, plainly showing, like the trees similarly situated in Lake George and Lake Bathurst, to what long periods, the extremes of drought and moisture have extended, and may again extend in this singular country." It is easy to account for the destruction of some species of *Eucalyptus*, which have sprung up in places occasionally exposed to the influence of floods, but it is difficult to explain, why a similar fate has befallen trees beyond the reach of the water. Sir Thomas, in his course along the Darling and Lachlan, remarked that the yarrah (*E. rostrata*) grew only on the banks of rivers, lakes, or ponds, from the water of which the roots derive nourishment; but when the trunk itself has been too long immersed, the tree dies, as appeared on various lakes, and in reedy swamps on the Lachlan. The "goborro," or dwarf box (a tree covered with a rough bark, and never exceeding the size of fruit trees in a garden), on the contrary, seldom grows on the banks of a running stream, but seems to thrive in inundations, however long their duration. In the case of the trees to which I have alluded, they are species which undoubtedly might perish from inundations, but many of them were standing on the high ground, far above the flood mark.

\* The late Miss Elizabeth Macarthur is said to have planted a red-flowering ironbark in the garden at Parramatta more than fifty years ago, and yet the tree has not made more than a foot in diameter in that time. This fact confirms the opinion I have formed respecting the age of the ironbarks in general from a careful observation of the concentric circles of the wood. To show how little some of our trees alter in the course of half a century, I may mention that the blackbut on which the late Mr. W. Lawson cut his initials with a tomahawk in 1813, still presents the letters as legible as ever. This interesting tree, so intimately connected with the first expedition over the Blue Mountains, is standing on the side of the Bathurst road at the summit of Pulpit Hill.

have been planted in the neighbourhood of Parramatta, and after having stood for more than half a century, they are still only small trees ; whilst the stringy barks which have sprung up in some of the paddocks that were cleared in the early days of the colony, are only in their youth. In some trees, the age may be ascertained by counting the concentric circles, but this is liable to much fallacy, and it can only be relied on in trees having marked separations between the circles. These circles are clear enough in some of the younger trees of our forests, but as the trees advance in age, many of them have a tendency to become hollow in the centre ; and even in those which are sound at the heart, the circles are frequently obliterated and confused. The late Professor Balfour, in referring to this mode of calculating the ages of trees, remarked that the "calculation can be made with tolerable correctness in trees of temperate and cold climates, where during the winter there is a marked interruption to growth, and thus a line of demarcation is formed between the circles ; but in trees of warm climates, this mode of estimating age may lead to error. It would appear that in these is often the appearance of numerous circles in one year. The age of 5000 years, attributed to some baobabs in Senegal, may be accounted for in this way. Even in trees of Britain, when they get old, it is found that the different circles are so blended as to make it difficult to count them accurately." The slight change, which ten or twenty years make in some of our bush trees, is incidentally noticed in "Sir Thomas Mitchell's Expeditions" (vol. 2, p. 19), where that writer assures us, that the tree which had been marked by Mr. Oxley nineteen years before, was apparently but little altered in its girth, "judging from the letters which were still as sharp as when first cut, only the bark, having overgrown part of them, had been recently cleared away a little as if to render the letters more legible." In a country, in which the seasons are irregular, and in which sometimes a long continued drought almost puts a stop to vegetation, it seems unlikely that calculations formed on the concentric circles of trees would lead to any solution of the problem regarding their longevity, even if other circumstances were favourable for such an investigation. It is more reasonable to imagine, that the notches cut in some of the gum trees by the aboriginal natives, compared with the known

age of trees which have sprung up since the foundation of the colony, would afford data for making an approximate guess at the rate of growth amongst some species of *Eucalypti*.

Instead of forming any opinion exclusively from the concentric circles, it appears to me more judicious to ascertain the space of time required for a tree to attain the diameter of a foot, and then to calculate by the rule of proportion, the number of years it would take to increase to any given size. If, for instance, in some of the quickly-growing species, the diameter of the tree should be found to measure a foot in twenty years, then the same tree would require four hundred years to attain a diameter of twenty feet, which is seven feet less than one measured by Mr. G. Robinson in the back ranges of Berwick. Or, again, if, in some of the very hard and slowly growing species, 50 years should be required for the diameter of a foot, 300 years would be necessary to produce even the diameter of six feet. No rule could be laid down for the species generally, because they differ so much in their grain and specific gravity, but it appears to me that in places where trees have sprung up since the bush was cleared in the early days of the colony, some data are afforded for calculation as to the probable ages of our gum trees. The "iron-bark" I regard as growing very slowly, and therefore I think that even a tree of three feet in diameter may be nearly two hundred years old; whilst of a "bloodwood tree," the wood of which is soft and rapid of growth, the age is considerably less. Trees, it must be borne in mind, have their youth, their prime, and their old age; and, although we may form some idea of their age so long as they continue to grow, there is great obscurity in making any estimate of the period they may endure after they have passed the time of their perfect development. Since the early days of the colony, when the bush in the neighbourhood of Parramatta was cleared, many "grey gum-trees," &c., have sprung up, varying from one to two feet in diameter, from which I infer that they are less rapid in growth than the "bloodwood." A neighbour of mine who has had much experience in colonial woods, is of opinion that the "blackbut," and especially the "blue gum," when growing on alluvial soil near the water, increase with more rapidity than the bloodwood, measuring between two and three feet in diameter in the course of thirty

years. This same species, however, under less favourable circumstances, is of much slower growth, as I have noticed "blue gums," which, as far as I have been able to judge, have not attained a diameter of two feet in fifty or sixty years. The subject is one of great interest, and opens for consideration questions intimately connected with the geological formation of the colony, and the probable period that may have elapsed since some parts of it were first covered with forests. A careful comparison of observations made in different colonies, with the express view of ascertaining the ages of our gigantic *Eucalypti*, might lead to the solution of many problems connected with the physical history of the continent, which are now enveloped in obscurity; but there are great difficulties in the consideration of a question in which so many counteracting influences are in operation. Differences of soil, the prevalence of drought, the ravages of insects, the damages arising from storms, and many other causes of an injurious character, tend to retard the progress of our gums, and to make their growth exceedingly irregular.

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### SPECIES OF EUCALYPTUS ARRANGED ACCORDING TO THE CORTICAL SYSTEM:

ACCORDING to the recent estimate of Mr. Bentham and Dr. F. Mueller, in the third volume of the *Flora Australiensis*, the number of species belonging to the genus *Eucalyptus* in Australia is estimated at 135, of which nearly 50, with numerous varieties are supposed to be indigenous in New South Wales. Future investigations will no doubt suggest many alterations in the arrangement of the species, as probably, in some instances, mere varieties are regarded as distinct species, whilst, on the other hand, some trees, which must always be deemed separate in the eyes of the colonists, have been united together. It is not

likely, however, that the number of species for this colony will be much increased, for on referring to the Catalogue of woods, forwarded to the Exhibition in 1854, it appears that only 49 specimens of Eucalyptus-wood were collected in the Southern part of Australia, and of these, several are merely varieties, of species differing apparently in the character of their grain, and in their specific gravity, according to the age of the tree, and the nature of the soil on which it grew. Thus, for instance, nine kinds of "Iron Bark" are mentioned, whereas in all probability, these were procured from three species prevailing in this colony. The reduction, however, occasioned by this view of the "Iron Barks" and other forest trees, is compensated by the addition of those species, which are merely of a shrubby character, and did not furnish any wood for the Exhibition, such for instance as *E. stricta*, which forms brushes on the more elevated parts of the Blue Mountains, and others which constitute what is termed the "Mallee Scrub" of the interior.

The species indigenous in New South Wales may be conveniently arranged, according to the plan indicated by Dr. F. Mueller, under the following groups: (1) such as have the bark for the most part smooth, of which section, "White," "Blue," "Grey," and "Spotted Gum," may be regarded as types; (2) half-barked trees, such as "Box" and "Blackbut," which have the bark fibrous and persistent on the lower part of the trunk, whilst the upper part and the branches are smooth; (3) wrinkled or furrowed-bark trees, of which "Bloodwood" and some of the "Mahoganies" are types. These have the bark persistent on the trunk and branches; (4) trees of the "Stringy Bark" kind, such as have the bark for the most part fibrous and persistent on the trunk and branches; and (5) "Iron-Barks," which have the bark hard, solid, and deeply furrowed on the trunk, and generally on the branches.

Of the smooth barked series, we have about twenty species, viz., (1) *E. stellulata*; (2) *E. coriacea*; (3) *E. radiata*, (4) *E. eugenioides*; (5) *E. gracilis*; (6) *E. hæmastoma*; (7) *E. uncinata*; (8) *E. albens*; (9) *E. goniocalyx*; (10) *E. dumosa*; (11) *E. incrassata*; (12) *E. dealbata*; (13) *E. viminalis*; (14) *E. rostrata*; (15) *E. tereticornis*; (16) *E. punctata*; (17) *E. Stuartiana*; (18) *E. saligna*, and (19) *E. maculata*.

(1.) *E. stellulata*: this is the "White Gum" of the Mountains, and the "Lead Gum" of Berrima. It seldom attains more than thirty or forty feet in height, and two feet in diameter, but owing to difference of soil and climate, the bark is subject to much variation in appearance, being sometimes white, and sometimes of a lead-colour. The wood is reported to be of no service, excepting for fuel. The leaves of this species are somewhat remarkable, some of the veins starting from near the base, and almost parallel to the midrib.

(2.) *E. coriacea* is another of the "White Gums" from the Blue Mountains, Berrima, &c., and it may be found in many parts of the counties of Camden, Argyle, &c. It sometimes attains a considerable height, and the inner bark is smooth and white, resembling in that respect the "White Gum" near Sydney, but the tree differs in foliage and seed vessel, as well as in the imperfect stamens being much fewer. The height of this gum varies from forty to eighty feet, and the wood is not much valued. The leaves are thick and sometimes very long, having the appearance of being many nerved, and in dry seasons are eaten by cattle and horses.

(3.) *E. radiata* is regarded by Mr. Bentham as a variety of the "Messmate" (*E. amygdalina*), a tree abounding on the Mittagong Range, &c., and so very much like "Stringy Bark" in appearance, that it is frequently mistaken for that species. *E. radiata*, however, or "the River White Gum," growing on the banks of the Nepean, &c., is a smooth tree with the bark generally hanging from the upper branches in long strips, and the trunk nearly white. The flowers are much more numerous than in the "messmate," and the leaves are sometimes opposite, and sometimes alternate on the same tree, varying in shape from ovate-lanceolate and stem-clasping, to lanceolate and petioled. *E. radiata*, as far as I have observed, never grows far away from rivers, but the messmate is a sub-alpine species. The River White Gum seldom attains a greater height than fifty or sixty feet, and the timber is not valued by the settlers.

(4.) *E. eugenioides* or "the Mountain Blue Gum," is placed by Mr Bentham as a variety of the "Peppermint." There is certainly a great similarity in the flower buds, though they are larger and broader than those of the "Peppermint," but the

trees are perfectly distinct, the one having a smooth bark, and the other a fibrous one, similar to that of "Stringy Bark." Fraser reported this tree as attaining the height of 100 feet on Bathurst Plains, but in some places between the Kurrajong and Tomah, it appears much higher. There is a difference between the seed vessel of this Blue Gum and that of the Peppermint, the latter inclining more to an ovoid shape. The wood of *E. eugenoides* is much used by wheelwrights and carpenters, but it is inferior to the Blue Gum of Cumberland (*E. goniocalyx*).

(5.) *E. gracilis* is Dr. F. Mueller's *E. fruticetorum*, a small tree or shrub from the desert of the Murray and the Darling, but in different varieties, it is found in the other Australian colonies.

(6.) *E. hæmastoma* is generally called "White Gum," but in some districts, in which the bark is marked with grey patches, it is known as "Spotted Gum." This species sometimes appears half-barked, as the "Blackbut" and "Box," but in most instances the bark is smooth and white. The tree varies very much in size, being somewhat stunted near the sea, but becoming larger in the interior. In the neighbourhood of Sydney, the flowers and seed-vessels are much larger, than they are farther inland, and this difference led the earlier botanists to make two species, the inland one being called *E. micrantha*. I had the pleasure of forwarding specimens of both varieties for the *Flora Australiensis*, and I am happy to find that Mr. Bentham adopts my view of the species. The specific name of this gum was derived from the fact that the rim of the seed vessel is of a dark red colour. This, in some cases, is a guide to the species, but not an infallible one, as some varieties of "Stringy Bark" have a similar rim. The wood of the "White Gum" is very little esteemed, either for practical purposes or for burning. *E. hæmastoma* was described by Wildenow, and in all probability, it grew on the spot where Sydney now stands.

(7.) *E. uncinata*, or Dr. Mueller's *E. oleosa*, is one of those shrubby species which constitute what is termed the "Mallee Scrub" of the interior. Dr. Mueller says that this shrub is very useful to travellers and especially to the aborigines, since the root runs along for a considerable space, and retains a copious supply of pure water.



(8.) *E. albens* is one of the "White Gums" of the interior sometimes attaining the height of eighty feet. The wood is not valued.

(9.) *E. goniocalyx* is one of the most useful trees we possess, and in some districts is called "Flooded Gum," and in others "Blue Gum." It generally grows near rivers or creeks, but it frequently occurs as a forest tree. One mark of this species is the angular calyx, and another is the short flat peduncle with an umbel of about seven flowers on short thick pedicels. In some parts of the colony, this tree attains eighty feet or more, and a diameter of seven feet, and although the wood varies according to the soil, yet it is considered highly valuable. Several of the woods marked "Blue Gum" by Sir William Macarthur, belong to this species, and the "Flooded Gum" from the Clarence and other parts must be referred to the same. Mr. Moore mentions the timber as being extensively used for building purposes, such as scantling, battens, flooring boards, posts and rails, and ships' planks. I may also add that it is excellent for the naves and felloes of wheels, and Mr. M. says many trees yield from 6000 to 7000 feet of timber, which is worth 18s. per hundred feet. It grows rapidly, and its specific gravity is reported to be less than that of any other gum. Through some mistake, specimens of this gum appear to have been mixed with those of the "Bastard Mahogany," which Mr Bentham places next to it, though according to the appearance of the trees, their bark and wood, as well as their habit, they are perfectly distinct. The Blue or Flooded Gum generally indicates a good soil.

(10.) *E. dumosa* is a shrubby species in the interior. Sir Thomas Mitchell speaks of it as "a dwarf species," prevailing between the Lachlan and the Darling, and growing in such a manner, as to render it almost impossible to push horses through it, except in a very sinuous manner. He regarded it as "the most unpleasing of shrubs to a traveller," and describes it "as a lofty bush with a great number of stems, each two or three inches in diameter," "and the bushes" he adds, "grow thickly together, having between them nothing but the prickly grass in large tufts."

(11.) *E. incrassata*, is another of the small species, constituting part of the "Mallee Scrub" near the Murray.

(12.) *E. dealbata* is one of the so-called "White Gums," from the neighbourhood of Bathurst and Mudgee. Its average height is about fifty feet without any branches, but on the upper part, the foliage is rather thick, and presents a whitish or glaucous appearance, the leaves being covered with a powdery substance which can be rubbed off. The bark varies in colour according to the age, being white or of a purplish tinge when young, and getting brownish when old. It is reported to shed its bark only once in three years, and the wood is of a light colour, and too soft to be of much use.

(13.) *E. viminalis* is the "Manna," "Drooping," or "White Gum" from Bathurst, Mudgee, &c. It is one of those species which yields a peculiar substance termed "Manna," and is remarkable for its elegant appearance. This tree is sometimes 150 feet in height, and eight feet in diameter, but the wood is not much esteemed. Some of the specimens referred to this species belong to one of the Grey Gums (*E. saligna*), and others to the Camden Woolly-but, which according to the cortical system, must be placed in separate sections.

(14.) *E. rostrata* is a large tree, growing for the most part on the banks of rivers in the interior, and frequently called "Flooded Gum," but sometimes "Red Gum" or "White Gum." By the aboriginal natives, it is known as the "Yarrah," (though that name is applied to almost any tree), and on the Darling and Lachlan sometimes exceeds 100 feet in height. Sir T. Mitchell says, "Its huge gnarled trunks, wild romantic formed branches often twisting in coils, shining white or light red bark, and dark masses of foliage, with consequent streaks of shadow below, frequently produced effects fully equal to the wildest forest scenery of Ruysdael or Waterloo. Often as I hurried along, did I take my last look with reluctance of scenes forming the most captivating studies. The "yarrah" is certainly a pleasing object in various respects, for its shining bark and lofty height inform the traveller of a distant probability of water, or at least of the bed of a river or lake; and being visible over all other trees, it usually marks the course of rivers so well, that in travelling along the Darling and Lachlan, I could with ease trace the general course of the river, without approaching its banks, until I wished to encamp." When Mrs Forde was in the neighbourhood

of Wentworth in 1865, that lady mentioned this species of *Eucalyptus* as appearing perfectly beautiful on the banks of the Darling. The trees seemed largely and nobly proportioned, whilst the leaves had a drooping habit, and the flowers were very small. It is said that the yarra of South Australia is impervious to the White Ant and *Teredo navalis*, and that a large quantity of it has been used on railways. The wood, however, does not always bear so good a character. The specific gravity varies from 0.858 to 0.923 (Catalogue of the Victorian Exhibition 1861). From the circumstance of this tree being called "Flooded Gum," it has sometimes been confused with the "Flooded Gum" of the Clarence, &c., (*E. goniocalyx*), but the species are perfectly distinct.

(15.) *E. tereticornis*, sometimes called "Grey Gum," sometimes "Red or Blue Gum," and sometimes "Bastard Box," is one of the most variable species we have. The leaves and flower-buds are subject to great diversity in shape and appearance, and the seed vessels differ very much in size. The type of the species has an umbel of seven florets, but sometimes, especially in damp or low ground, the florets are smaller and more numerous. Notwithstanding the irregularity of inflorescence, the seed vessel is uniformly of the same character, having a broad rim, and the valves of the capsule protruding. The wood is more prized in some districts than in others, but where Iron Bark cannot be procured, it is always considered suitable for rails and posts, as well as for fuel. In some respects, this species resembles *E. goniocalyx*, and over the mountains the variety *brevifolia* or Red Gum is not merely prized for ordinary purposes, but it is said to have a beautiful grain, similar to English oak, and to bear a polish. It is very durable, whether exposed or not.

(16.) *E. punctata*.—Under the varieties of the preceding, Mr. Bentham places *E. punctata*, or what is frequently termed "Hickory or Leather Jacket." The flowers and seed vessels of this tree so closely resemble those of the "Red Mahogany," that Mr. Bentham has evidently regarded them as belonging to the same species, whereas the trees differ so much in wood, bark, and habit, that they must be referred to separate sections. The "Hickory" attains about the same height as the preceding

species, but it frequently has a more spreading habit. It is a good wood for fencing and burning, and is exceedingly tough and durable. I have seen posts of this tree perfectly sound after having been half a century in the ground, and I believe that next to Iron Bark, there is no wood in this part of Australia, more suitable for railway sleepers. The seed vessel of the Hickory is very similar to that of the Grey Gum (*E. tereticornis*), but the rim is not so broad, nor are the valves so prominent. In the swamps at Manly Beach, I have noticed a variety of the Hickory with seed vessels half an inch long and two thirds of an inch in diameter. This bears the same relation to the ordinary forms, as the variety *grandiflora* of the Red Mahogany, does to *E. resinifera*, or the larger forms of *E. hæmastoma*, to *E. micrantha*.

(17.) *E. Stuartiana*, in its variety *longifolia*, is the "Yellow Gum" of Wingecarribbee and other parts of the interior. Sir William Macarthur states that it does not exceed eighty feet in height, and that the timber is "said to be good." This gum bears some resemblance to the Grey Gum and Hickory of the county of Cumberland, but the leaves are generally longer and more coriaceous, whilst the valves of the seed vessel are not so prominent. I believe the wood is not suitable for any purpose, excepting for fencing or burning. "The Bastard Box" near Bathurst differs in some respects from the preceding variety, but it is regarded as one of the very worst woods, for it decays very soon after it has been cut, if exposed to the air. It attains a considerable size, though not so large as some of the *Eucalypti* of that district. The bark is very rough and brown, but it appears subject to some variation, being sometimes coriaceous, and sometimes fibrous. The Berrima variety inclines to the former, and that of the mountains to the latter. A friend of mine states that this gum is frequently destroyed by wet seasons. It seems highly probable that under the name of *E. Stuartiana*, two distinct species are included, which hereafter must be referred to separate sections.

(18.) *E. saligna* is a Grey or Flooded Gum with rather a drooping habit, and is remarkable for the variation in the shape of the operculum, which is sometimes conical and sometimes hemispherical. In the neighbourhood of Parramatta, this tree

does not attain a great size, and grows principally in low grounds near the salt water. It occurs also between Parramatta and Liverpool, and in the neighbourhood of Richmond, as well as in the county of Camden. In the latter district, it sometimes is found 100 feet in height, but although a fine looking tree, the wood is much inferior to that of the Grey Gum (*E. tereticornis*).

(19.) *E. maculata*, or the Spotted Gum, is very well known by the spotted or mottled appearance of the bark, and is one of our handsomest gums, attaining the height of 100 feet and upwards. This species is well defined by its double operculum and urn-shaped seed vessel. Very opposite opinions are expressed respecting the value of its wood, some asserting that in point of utility, it is nearly equal to English Oak, whilst others affirm that it is only serviceable as firewood. Sir William Macarthur described the Spotted Gum, as "a good timber tree, with lofty straight bole, in increasing reputation for ship-building, but not to be compared for strength and durability with the best description of Gums." Mr. Backhouse gives a more favourable opinion, and practical men say that it may be used for the staves of casks, and the upper parts of railway bridges. It is not a favourite wood for fencing, as the rails and posts are reported to decay very soon, but this want of durability probably arises from not removing the sap wood. It seems very likely that the Spotted Gum varies according to the age of the tree, and other accidental circumstances, whilst the prevalence of this tree in any particular district generally indicates a poor soil.

The half-barked trees may be considered under the following species: (1) *E. virgata*; (2) *E. obtusiflora*; (3) *E. pilularis*; (4) *E. bicolor*; (5) *E. hemiphloia*; (6) *E. brachypoda*; (7) *E. longifolia*; (8) *E. diversifolia*; and (9) *E. oleosa*.

(1.) *E. virgata* or the Mountain Ash is a fine tree, sometimes 120 feet in height, and usually growing in rocky situations on the Blue Mountains, near Berrima, &c. The lower part of the tree is covered with a fibrous bark, whilst the branches are smooth. It is said that the wood makes better staves for casks, than the Spotted Gum does, and that it may also be advantageously employed for shafts, rough carpenter's work, and fencing.

(2.) *E. obtusiflora* is an inferior kind of Box or Blackbut,

resembling some of the half barked varieties of the White Gum (*E. hæmastoma*), but having larger flowers and an ovoid-truncate seed-vessel, sometimes more than half an inch long. Mr. Backhouse procured flowering specimens of this gum in Bargo Brush, and from the same quarter Sir William Macarthur obtained specimens of the wood. The wood is of very little value, being similar in character to that of the White Gum. If it were not for the different shape of the seed vessel, I should regard *E. obtusiflora*, as a mere variety of *E. hæmastoma*. This gum occurs on the Blue Mountains.

(3.) *E. pilularis* or Blackbut is one of the largest and most valuable species of the genus. At Bulli, a Blackbut was recently found to be more than forty-six feet in circumference at five feet from the but, and 150 feet to the first branches. The wood is excellent for house carpentry, ship-building, and indeed for any purpose where strength and durability are required. From experiments made at the Universal Exhibition, held in Paris in 1855, it was ascertained that the specific gravity of Blackbut is 0.897, and that next to the "Rough barked Iron Bark," no species of *Eucalyptus* is known to bear a greater crushing strain in the direction of the fibre. This tree prefers a good soil, and is rapid in its growth. Mr. Bentham places the "White Mahogany" (*E. acmenoides*) with the Blackbut, expressing, however, some doubt as to the propriety of regarding the former as a mere variety. The White Mahogany has a persistent bark similar to Stringy Bark, though not so fibrous, and by some collectors, it has evidently been mistaken for that tree. No one who has had an opportunity of seeing the Blackbut and White Mahogany growing in proximity to each other, would regard them as allied species, for they differ in bark, foliage, and inflorescence, whilst the wood varies in grain and colour.

(4.) *E. bicolor* comprises several varieties of what workmen call "Bastard Box" or "Yellow Box." There is a great similarity between the flowers and seed vessels of this species, and those of the narrow leaved variety of Iron Bark. Hence it is not surprising to find that Mr. Bentham associates some of Caley's specimens of Iron Bark with the Bastard Box. I suppose this species derives its specific name from the grey and white patches on the bark, which in some places, give it the appearance of a

White Gum, and in others of a Grey Gum. In swampy places in the Cabramatta district, this is a very large tree reaching 80 or 100 feet in height. When young, the upper branches are smooth, and the lower part of the tree is half-barked like the Box. As it gets older, nearly all the bark falls off. Workmen suppose the Bastard Box to be a cross between the Box and the Grey Gum, as in its youth, it has the appearance of the former, and in its old age, of the latter. The wood is very hard, good for fencing, shafts, poles, cogs, &c., and it is exceedingly durable. Sometimes it grows in company with Grey Gum and the Box, but in some parts of the country, it stands alone. The leaves resemble some forms of the Grey Gum, but the seed-vessel is more hemispherical and has the valves inserted, resembling in that respect the true Box, though the capsules are not so deeply sunk. The little umbels of flowers are either simple, or in axillary or lateral racemes on the upper branches, having the petiole longer than the peduncle, and the operculum much shorter than in the Box or Grey Gum. The leaves vary in shape, but generally they are lanceolate, two or three inches long, with the nerve removed from the margin, so as sometimes to give the appearance of being three nerved at the base. On this side of the Blue Mountains, the seed vessel is more frequently five celled, but the Yellow Box near Bathurst differs slightly in that respect. The trees, however, appear to belong to the same species, and the wood of the Mountain variety is also reported to be excellent. It is very hard and heavy, and exceedingly durable, being well adapted for posts, but not so well for rails, on account of the difficulty in splitting it. I think that Sir William Macarthur's "Bastard Box," No. 13, must be referred to the same species. He remarks, "It is an excellent timber, but the tree is of most unsightly appearance, and almost invariably hollow or decayed at heart before attaining full stature. The wood is greatly prized for plough-beams, poles and shafts of drays and carts, spokes of wheels, &c." In the Mudgee district, there is another variety called "Slaty Gum," which is useful for weather boards, fencing, and wheelwright's work. It is reported to be next to Iron Bark in durability, and does not crack from exposure to the sun.

(5.) *E. hemiphloia* is the tree well known to the colonists as "Box," and in many parts of Australia, is widely diffused and

generally indicates a good grazing country. The specific name of this tree is rather unfortunate, as many other species are also half-barked. In the Illawarra district, the Box sometimes rises to the height of 180 feet, with a diameter varying from 48 to 72 inches, and the timber is reported to be of first rate quality for size, hardness, toughness, and durability, (Sir. W. Macarthur.) It is also "an excellent wood for domestic use, as it burns with great brilliancy, and emits a large amount of heat," but it does not stand long in the ground, as it suffers from dry rot and white ant. The specific gravity is 1.129. Dr. F. Mueller applied the name *leucoxyton* to this species of *Eucalyptus*, and in the Report of the Victorian Exhibition (1861), the Box is always called *E. leucoxyton*. From a remark in the *Fragmenta Phytographiæ Australiæ*, vol. 2, p. 175, it seems that the Doctor intended to separate from the species, those varieties of Iron Bark, which from similarity of flowers and seed vessels, he had previously associated with it. In the *Flora Australiensis*, the red flowering Iron Bark is referred to *E. leucoxyton*, and our Box to *E. hemiphloia*, but certainly if we regard the colour of the wood, the term *leucoxyton* is more applicable to the Box than to the Iron Bark.

(6.) *E. brachypoda* is a small tree probably the same as that called "Goborro, Coorkaroo, or Dwarf Box." Sir T. Mitchell, vol. 2, p. 54, remarks, "The small kind of *Eucalyptus*, covered with a rough bark, and never exceeding the size of fruit trees in an orchard, and called, I believe, by Mr. Oxley, "the dwarf Box," but by the natives, "Goborro," grows only on plains subject to inundation, and it usually bears on the lower part of the trunk, the mark of the water by which it is at times surrounded\* \* \* The "Goborro" seldom grows on the banks of a running stream, but seems to thrive in inundations, however long their duration."

(7.) *E. longifolia* is usually called "Woollybut," though in some districts, it is called "Peppermint" or "Bastard Box." Probably the name "Peppermint" was given to this tree from the fact of the leaves containing a great quantity of volatile oil with the flavour of Peppermint. It is a very fine tree with leaves exceeding a foot in length. The flowers are rather large, and usually in threes, although a variety sometimes occurs with the flowers smaller and in greater numbers. There is no species of *Eucalyptus* near Sydney with a better defined seed-vessel. When



fully developed, it measures more than three quarters of an inch in length, and two-thirds of an inch in diameter, being four-celled, with the valves not protruding beyond the broad oblique rim. The volatile oil of the leaves possesses remarkable properties, but the wood is not much esteemed, excepting for firewood. It is sometimes split for fencing, and rough carpenter's work, although the timber is by no means durable. Sir William Macarthur states that the Woollybut of Illawarra is in very high repute for wheelwright's work, and Dr. F. Mueller, in referring to the same species in Gippsland, not only confirms the previous statement, but says that it has a high character for durability when used for fencing purposes. The difference of the wood may probably arise from some peculiarity of the soil. It is stated that the fibre of the bark is adapted for packing paper.

(8.) *E. diversifolia*. I have ventured to separate the "Camden Woollybut" from "the Manna Gum" (*E. viminalis*), with which it has been associated, because the trees differ so much from each other in bark, habit, &c. The Camden Woollybut resembles in some respects the Woollybut of other districts, having the lower part of the tree covered with fibrous bark, and the upper branches smooth. The inflorescence, however, and the leaves are very different, being sometimes narrow-lanceolate and alternate, and sometimes cordate or ovate-acuminate, sessile, and opposite. The buds and seed-vessels are small, generally eight in each axillary or lateral umbel. This species is common in the neighbourhood of Berrima, and attains the height of 80 feet, but beautiful as the form of the tree is, the wood is said to be indifferent.

(9.) *E. oleosa* is a shrub or small tree, the bark of the trunk rough and persistent, that of the branches smooth, (*F. Mueller*). It occurs principally in the desert of the Murray, and forms a considerable portion of what is termed the "Mallee Scrub." This species bears some resemblance to *E. dumosa*, but according to Mr. Bentham, it is well distinguished by the longer pedicels, the shape of the calyx, the thinner operculum, and the shape of the fruit.

The section of the *Rhytiphloia*, or the trees with wrinkled, furrowed, and persistent bark, comprises the following species:

(1.) *E. microcorys*; (2.) *E. polyanthemus*; (3.) *E. pulverulenta*;

(4.) *E. cinerea*; (5.) *E. acmenioides*; (6.) *E. robusta*; (7.) *E. botryoides*; (8.) *E. resinifera* and var. *grandiflora*; (9.) *E. corymbosa*; and (10.) *E. eximia*.

(1.) *E. microcorys* is a tree of the Mahogany kind, growing at Port Macquarie, and in the North-Western Interior. The flowers resemble those of the White Gum (*E. hæmastoma*), but the bark is altogether different. Not having seen this species in a living state, I feel uncertain about the place it should occupy in the cortical system, but from the fact of its having bark and foliage similar to the White Mahogany, I am inclined to regard it as a variety of *E. acmenioides*. It is probable that *E. microcorys* is of the same kind as that collected at Brisbane Water for the Paris Exhibition (No. 45, see Catalogue.)

(2.) *E. polyanthemos* is a tree of moderate size, occurring on the banks of the Nepean, and other parts of Eastern Australia. It is called "Lignum vitæ," "Poplar-leaved Gum," or "Bastard Box." It has a thick rough bark, and the wood, which is of a brown colour towards the centre, is very hard and tough.

(3.) *E. pulverulenta*, and (4.) *E. cinerea* seem to be two varieties of the small tree usually called "Argyle Apple." It is similar in appearance to *Angophora subvelutina* or the "Apple" of the colonists, as the leaves are opposite, and the bark furrowed and wrinkled, but the seed-vessel is very different, being sub-globose truncate, not contracted at the orifice, and not marked by any prominent ribs. In the neighbourhood of Berrima, this tree grows on rocky or stony places of the sandstone formation.

(5.) *E. acmenioides* is arranged by Mr. Bentham, as a variety of *E. pilularis* or the "Blackbut," but at the same time he expresses an opinion that it may probably be a distinct species. There can be no doubt as to its being perfectly distinct from *E. pilularis*, as the trees belong to different sections of the cortical system, and the flowers, leaves, and seed vessels of *E. acmenioides* or "the White Mahogany," are smaller than those of the "Blackbut." This species approaches nearer to the "Stringy Bark," and indeed, is sometimes mistaken for it, but the bark is not so fibrous, nor are the leaves so oblique, whilst the specific gravity of the wood is much greater. "White Mahogany" is plentiful to the north of Parramatta, and in many parts of Eastern Australia, near the coast. The timber is useful for building purposes,

palings, &c., and when nicely planed has an ornamental appearance.

(6.) *E. robusta*, or the "Swamp Mahogany," is a very large tree, sometimes more than 100 feet in height and five feet in diameter, growing generally in low and marshy places. It is common in the neighbourhood of Sydney, but in the process of cultivation, the larger trees have nearly disappeared, excepting from such places as the Manly Swamps, &c. The same species, however, occurs in other parts of the colony. The flowers of this tree are large, and the seed-vessel sometimes more than half an inch in length, with the capsule deeply sunk. In the young trees, the leaves are large and glossy. The wood is not so much valued as that of many *Eucalypti*, as it is not considered durable, but, nevertheless, it may be used for rough furniture, and inside works. Opinions respecting its durability when placed in the ground, are rather conflicting.

(7.) *E. bôtroyoides* is the "Bastard Mahogany," or "Bangalay" of workmen, and as far as I have observed, grows only in sandy places near the sea. It has a gnarled appearance, being usually of crooked growth, and never attaining any great height. The flowers are nearly as large as those of the preceding species, and are sessile on the branchlets. This tree is plentiful at Manly Beach, and the wood is not only used for firing, but also for the knees and crooked timbers of vessels.

(8.) *E. resinifera* is sometimes called "Red," and sometimes "Forest Mahogany," the first name being taken from the colour of the wood, and the second from the fact of its being found as a forest tree some distance from the coast. I believe that the specific name was originally applied to that species of Iron Bark which produces "Botany Bay Kino," but from circumstances of a technical nature, Mr. Bentham has now limited it to the Red Mahogany. The fact is, that the flowers of the "Red Mahogany," "Red Iron Bark," and "Leather Jacket," are so much alike, that it is exceedingly difficult to distinguish them, although the three species are quite distinct and must stand in different sections. In the Parramatta District, the flowers and seed-vessels of the "Red Mahogany" are small, but in the Swamps at Manly, I have noticed a variety with large flowers, and a seed-vessel half an inch in diameter. The wood of this species is very strong and durable, and is extensively used for fencing, beams, rafters, and

rough work. It may be mentioned as a remarkable instance of its durability, that some rafters of it which were placed in St. John's Church, Parramatta, (the Church of the Rev. Samuel Marsden), in 1798, were found in a perfect state of preservation in 1852, when the Church was pulled down. Some portions of these rafters were dressed up and forwarded to the Paris Exhibition in 1855.

(9.) *E. corymbosa* is another species common near Sydney, and is usually called "Bloodwood" from the blood-like resin which exudes from the concentric circles of the tree. Near Port Jackson, the trees appear stunted, but farther inland, they sometimes attain the height of 120 feet, and afford material for fencing and firewood. As the tree is rapid in growth, the wood is usually soft, especially in the younger trees, but as they attain greater age, it becomes much harder, and is said to stand well in damp ground. Sir William Macarthur states that it is a useless sort of timber, but Mr. Moore, in referring to specimens from the Clarence and Richmond Forests, says that the timber is of great strength, and very durable, both in and out of the ground, and that it is used principally for posts and beams. The seeds of this species are winged.

(10.) *E. eximia* is the "Mountain Bloodwood." I regarded it simply as a variety of the species near Sydney, but in the late review of the genus by Mr. Bentham, that eminent Botanist, judging from some specimens which I had collected near the Grose, has determined it to be a distinct species, more nearly allied to *E. maculata*, "Spotted Gum," than to the Port Jackson "Bloodwood." The flowers are large and corymbose, and the operculum is double, whilst the seed-vessel is of an urn-shape, nearly an inch long with the capsule deeply sunk. At the Clarence and Richmond Rivers, the "Bloodwood" prevails to a great extent, and the workmen reckon two kinds, the one with smooth, and the other, with rough bark, but Mr. Moore regarded them as mere varieties of one species. It seems probable that the Mountain "Bloodwood" which overhangs the valley of the Grose, is different from the Bloodwood of the North.

The fourth section comprises those species of *Eucalyptus*, which have the bark fibrous, and persistent, for the most part, on the trunk and the branches. Of this kind, the common "Stringy

Bark may be regarded as the type, but the section will also include the "Messmate," "Peppermints," and probably the fibrous variety of the Mountain "Bastard Box." The species enumerated by Mr. Bentham, are; (1.) *E. amygdalina*; (2.) *E. obliqua*; (3.) *E. dives*; (4.) *E. capitella*; (5.) *E. macrorhyncha*; (6.) *E. piperita*; (7.) *E. stricta*; and probably, the rough barked *E. Stuartiana*.

(1.) *E. amygdalina*, or the Almond-leaved *Eucalyptus*, is the "Messmate," a tree very like "Stringy Bark," but having the upper branches smooth. This tree grows on the Mittagong Range, and attains nearly 200 feet in height. Its wood is not much valued. A friend of mine says "that this is the most troublesome tree that the settlers in that quarter have to do with, as the bole is so very irregular, being deeply indented, and forming clefts or "pockets," as the settlers term them. These are caused by the form of the roots, extending a long way upwards, something like the fig. The settlers have to erect stages when they "ring" the larger trees, so as to get at a more even surface. They find it impossible to follow the indentations, so as to cut through the bark in the hollows." The free selectors on the Range find great difficulty in clearing the ground where the "Messmate" prevails, and when the trees are very large, they adopt the system I have mentioned of cutting the bark as near the but as possible with a view of killing those which they cannot fell. I think that this species has been confused with the "Stringy Bark" (*E. obliqua*), a tree which prevails to a much greater extent in New South Wales, and which was amongst the first noticed and described by the early Botanists (*Willdenow*). It was probably found on the spot where Sydney now stands, but the "Messmate" is a sub-alpine species, and does not occur in the county of Cumberland. In the "Messmate," the leaves are not so thick as in the Stringy Bark, nor are they so oblique at the base. The flower buds are smaller, the operculum more hemispherical in shape and somewhat mucronulate, whilst the seed-vessel is more globose. In a dried specimen, there is much difficulty in distinguishing between the true *E. amygdalina*, and the River White Gum (*E. radiata*), which Mr. Bentham has united with it. The flower buds, however, of the River White Gum are much more numerous, and the leaves are sometimes opposite. No one who has had an oppor-

tunity of examining both trees in a living state, would suppose them to be allied, as they vary so much from each other in bark and habit.

(2.) *E. obliqua*; (4.) *E. capitella*; and (5.) *E. macrorhyncha*, are, I believe, different forms of "Stringy Bark," varying according to the soil and elevation in which they grow, and according to their proximity to the sea-coast. Sir William Macarthur forwarded to the Exhibition four varieties of the wood from trees ranging between 100 and 120 feet in height. Some of these woods were reported to be excellent for house-carpentry, such as flooring boards, battens, &c., whilst others were considered inferior in quality. In some parts of the colony, the "Stringy Bark" is valued for fencing purposes, and according to Dr. Mueller, it "constitutes the main mass of the forests of our more barren mountains, the height of trees of greatest size ranging from 300 to 400 feet." The Doctor also states, "the paper prepared from the bark of this tree is not merely suited for packing, but also for printing, and even writing. It may also be employed for mill and paste boards. The pulp bleaches readily. I regard it as the most important material drawn on this occasion into use, for be it remembered that this tree covers many of the barren ranges from St. Vincent's Gulf to Gipps-land, and that it equally abounds in Tasmania. Its bark, as is well known, is extremely thick and bulky: it moreover, separates with the utmost facility, and is hence universally used for thatching rural dwellings in or near the ranges. Indeed, the supply is available by millions of tons. \* \* \* \* It yields readily to mechanical appliances on account of its lax and loose texture, and is also easily acted on by caustic soda for conversion into pulp." In addition to the ordinary purposes to which the Stringy Bark is applied in these colonies, I may mention that it has been successfully manufactured into door-mats. The flower buds and seed-vessels are subject to considerable variation, the former being sometimes hemispherical and sometimes conical; and the latter being sometimes pedicelled and sometimes sessile, those near the coast being much larger and inclined to a globular shape.

(3.) *E. dives*, and (6.) *E. piperita*, are two of the species called "Peppermints," the first being a small tree with opposite or alternate leaves, and the latter a very large one resembling

“Stringy Bark.” *E. dives* occurs on the Blue Mountains, and the Mittagong Range. The leaves vary very much in shape and size, being either sessile, opposite and cordate, or ovate-lanceolate, on the same tree, whilst the seed-vessel is globose-truncate, about two lines in diameter, four-celled, with a broad rim, and the capsule sunk, the valves scarcely protruding. *E. dives* does not exceed ten or twelve feet in height, and the wood is not esteemed. *E. piperita* is a large tree growing near Sydney, on the Blue Mountains, &c., &c., and the bark is fibrous and persistent, excepting on the upper branches. The flower buds and seed-vessels are small for so large a tree, the latter being somewhat of an ovoid shape not exceeding three lines in diameter. This species yields an agreeable volatile oil, though not to the same extent as the Woollybut (*E. longifolia*). The wood and bark are inferior to those of the “Stringy Bark.”

(7.) *E. stricta* is a shrubby species with linear-lanceolate leaves of a leathery texture, and the veins scarcely visible. It forms brushes in the elevated parts of the Blue Mountains, and is the *E. microphylla* of Cunningham.

To this section, the fibrous species mentioned under *E. Stuartiana*, must be added. It is a tree resembling the “Peppermint,” or the “Messmate,” but called “Bastard Box,” though differing widely from the species more generally known by that name amongst workmen, and not remarkable for the hardness of the wood. The last section comprises those species which have the bark hard, solid, and deeply furrowed. The following are enumerated by the learned authors of the *Flora Australiensis*: (1.) *E. leucoxylo*; (2.) *E. paniculata*; (3.) *E. crebra*; (4.) *E. siderophloia*; and (5.) *E. melanophloia*.

(1.) *E. leucoxylo* is the tree known as the “Red-flowering,” or “Black Iron Bark,” and although not so much esteemed as two other species of “Iron Bark,” it is nevertheless a very fine tree, and exceedingly interesting from the colour of its flowers. There has evidently been some misunderstanding respecting the specific name, as it implies a tree with white wood, whereas the species in question is remarkable for the dark colour of its wood. It seems to me that *E. leucoxylo* was intended for some tree of the Box kind, and that in all probability the Red-flowering Iron Bark should be referred to *E. melliodora*. I am led to this con-

clusion from having noticed the delicious honey-like odour of the flowers, and also from the fact mentioned by Mr. Bentham, that the Cumberland variety of the species seems almost to pass into *E. melliodora*. The flowers are large, and resemble those of the peach, and the seed-vessel, which is of a globular-truncate shape, is usually six-celled. This tree may be found between Liverpool and Parramatta, and at the South Creek, but some of the finest trees occur beyond Mudgee and other parts of the interior, as Cunningham and Fraser noticed many years ago. Sir William Macarthur, judging from the specimens seen near Fairfield, reported the species as not exceeding 60 feet in height, and 18 to 30 inches in diameter, and scarcely to be considered valuable for timber. I am assured, however, by friends residing in the neighbourhood of Mudgee, that the trees attain a much greater size in that locality, and that they afford a most excellent timber for fencing. Within thirty miles of Mudgee, there is a variety of this species with *white* flowers, and leaves more glaucous and coriaceous than in the preceding. The same Iron Bark also occurs on the Lachlan.

(2.) *E. paniculata*, and *E. crebra*: These are mere varieties of the "White Iron Bark," one of the most valuable trees in the colony. The specific gravity of the wood is 1.016, and the breaking weight or transverse strain, beam four feet between bearings,  $1\frac{7}{8}$  square, 4519 lbs. Sir William Macarthur reported that the White or Pale Iron Bark from Illawarra, was the most valuable of all the Iron Barks, remarkable for its smooth uniform outer bark, and its very hard, tough, inlocked strong wood. This is the general character of the species, although the wood is subject to some variation. The wood is highly esteemed by coachmakers and wheelwrights for the poles and shafts of carriages, and the spokes of wheels, and a great quantity has lately been used for piles in constructing wharves, and also for sleepers on railways. In former years, some large trees of the Pale Iron Bark flourished near Parramatta, rising to 150 feet in height, and measuring 16 feet in circumference. The presence of Iron Bark generally indicates a poor and indifferent soil. I feel no hesitation in uniting *E. paniculata* and *E. crebra* as one species, although there is an occasional difference in the quality of the wood, and in the size of the flower buds, as well as in the texture of the leaves,



In the form *angustifolia*, the flowers are very small, and bear a great resemblance to those of *E. bicolor* or the "Bastard Box." The operculum, in some varieties, is obtuse and hemispherical, and in others, conical, but the seed-vessel is uniformly of the same shape, though differing in size.

(4.) *E. siderophloia* is the "Red," or "large leaved Iron Bark," formerly called *E. resinifera*, because it yields the brown gum, or Botany Bay Kino, which is the inspissated juice of the tree. The wood of this species, though not so tough as that of the preceding species, is considered one of the strongest and most durable timbers of the colony. According to Sir William Macarthur, there are two distinct varieties of *E. siderophloia*, one of them being distinguished by its "very rough bark, in broad, deep, longitudinal furrows, its very broad leaves, its smooth bark on the young branches, and the different grain of the wood." Both of them vary from 80 to 120 feet in height, and from 24 to 48 inches in circumference. The specific name is rather unfortunate, as it is applicable to almost all the "Iron Barks." In a dried specimen, it is difficult to distinguish this species from the "Red Mahogany" and the "Leather Jacket," as all three of them have the operculum longer than other species, and there is a similarity in the shape of the seed-vessels. They are, however, easily distinguished by the bark. The wood of *E. siderophloia* is of a darker colour than that of *E. paniculata*, and the leaves are uniformly larger.

(5.) *E. melanophloia* is the "Silver-leaved" or "Broad-leaved Iron Bark" of the northern parts of this colony. It occurs on Liverpool plains, on the Dawson, Gilbert, and Burnett rivers &c. This is a much smaller tree than any of the other Iron Barks, and is readily distinguished by its sessile, opposite leaves, which are glaucous or mealy white. Mr Bentham regards this as being very nearly allied to *E. crebra*, of which he supposes it may prove an opposite leaved variety. Although there is some similarity in the trees, they differ not only in foliage but in habit, and whilst the wood of the one is highly esteemed, that of the other is not valued by practical men. Sir T. Mitchell noticed this "Iron Bark" growing on the Narran, and supposed it to be allied to *E. pulviger*, or the "Argyle Apple," and it is not a little remarkable, that Mr. Bentham mentions its resemblance to *E. cinerea*, a species which Dr. F. Mueller associates with the same.

The two trees, however, are perfectly distinct, and according to the cortical system, must stand in separate sections.

In my remarks on the species indigenous in New South Wales, it is probable that I may have omitted a few of the species which approach Victoria on the one side, and Queensland on the other, but with the exception of *E. odorata*, which from imperfect specimens forwarded to me, appears to exist on the Lachlan, I am not aware of having passed over any *Eucalyptus* of much importance either to the practical or the commercial man. There is no doubt immense difficulty in fixing the limits of the species, especially those which are subject to much variation, and are not so well known as the trees that have long been observed in the settled parts of the colony. The publication of the third volume of the *Flora Australiensis* has cleared up many difficulties for us, and although there are certainly some inaccuracies in the grouping of the species, and in the amalgamation of species which must be regarded as distinct, yet we are now enabled to arrange systematically many of the trees which were only known previously by their popular names. It is satisfactory to determine from Mr. Bentham's descriptions the species collected in the early days of the colony, most of which probably flourished on the spot where Sydney now stands, and which, until the arrival of the *Flora Australiensis*, were called by different scientific names according to the taste of different authors. In the "*Species Plantarum*," published by Willdenow, in 1799, twelve species of *Eucalyptus* are described, but the descriptions are so short and inadequate, that persons studying the genus could derive very little information from them without some knowledge of the respective trees, and the bark with which they are clothed. These species are arranged according to the shape of the operculum, six being placed in the section "*operculo conico*," and six in that of "*operculo hæmisphærico*." This method of grouping appeared the best to the early Botanists, but as I have already shown, it does not meet every case, as some trees vary considerably in the shape of the operculum, even on the same individual. In Willdenow's first section, the species are (1.) *E. robusta*, or "Swamp Mahogany"; (2.) *E. pilularis*, or "Blackbut"; (3.) *E. tereticornis*, including "Grey Gum," "Hickory," and "Bastard Box" (4.) *E. resinifera*, originally applied to the "Red Iron Bark," but now given to the

“Red Mahogany”; (5.) *E. capitella*, the stunted variety of “Stringy Bark” growing near the sea-side; and (6.) *E. saligna*, a “Grey” or “Flooded Gum” with rather a drooping habit. The second section comprises, (1.) *E. botryoides*, or the “Bastard Mahogany”; (2.) *E. hæmastoma*, or the “White Gum,” some forms of which are remarkable for the broad red margin of the seed-vessel; (3.) *E. piperita*, or the “Peppermint”; (4.) *E. obliqua*, or the “Stringy Bark,” not specifically distinct from *E. capitella*; (5.) *E. corymbosa*, or “Bloodwood”; and (6.) *E. paniculata*, or the “Pale or White Iron Bark.” Specimens of these trees were first taken to Europe by Dr. White (the author of “White’s Voyage to New South Wales,”) and others who visited Port Jackson shortly after the foundation of the colony, and the descriptions are intimately connected with our early history, as being intended to make known in Europe the species which formerly grew where Sydney now stands. The same species, notwithstanding the havoc that has been committed amongst our *Eucalypti*, may still be found within a few miles of our capital. In the early days of the colony, it was too much the practice to clear and burn off indiscriminately, and that not merely in the immediate vicinity of Sydney, but on most of the grants of land on which Europeans settled. It was the custom to employ gangs of prisoners on this work, and farms may be seen in the county of Cumberland, on which scarcely a tree has been left. I have heard some of the older settlers lament the destruction of the gum trees, and express an opinion that many of the *Eucalypti* which were destroyed so inconsiderately in the process of clearing the ground, should have been preserved,—or at all events, those kinds which are adapted for the purposes of building. As railroads extend into the country, facilities will be afforded for the transmission of timber to Sydney, and settlers will see the policy of saving the most valued of their trees, not merely for affording a shelter for their cattle from the scorching rays of the sun, but in the hope of realizing a good price for those woods which are becoming scarce near the metropolis. The genus, indeed, is one of immense interest, not only to the systematic Botanist, who is aiming at the best method of distinguishing the species, but to the practical man who desires to turn our noble forests to the most profitable account. It is only of late years

that some of the species have obtained favourable notice in Europe for the strength and durability of their timber, and whilst much remains to be developed with regard to their adaptation to the purposes of the artisan, the observations of scientific men will render more evident the inexhaustible resources our Gum trees afford to medicine and the arts. The astringent properties of the bark and resins of some species have already been acknowledged in the Pharmacopæia, and recent experiments have proved that the volatile oils contained in the leaves are highly valuable, whilst the wood yields "charcoal, crude wood, vinegar, tar, and incondensable gases."\* In fact, the consideration of the genus opens questions of intense interest, whether viewed practically or scientifically, and as our knowledge of the species increases, many of the gum trees which at present are little esteemed, will be regarded amongst the most valued of our vegetable productions, and afford abundant resources for the employment of labour and capital.

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\* For some interesting particulars respecting the value of our Gum Trees, we are indebted to the "Documents relating to the Intercolonial Exhibition 1866-67, by Dr. Ferdinand Mueller, F.R.S."

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## NOTES.

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### PAGE 3, LINE 28.

According to the recent arrangement of the species of *Eucalyptus*, in the third volume of the *Flora Australiensis*, *E. resinifera* is applied to the Red or Forest Mahogany, and *E. rostrata* to a species not found in the Parramatta District. The Iron Bark and Blue Gum, therefore, to which allusion is made, are *E. paniculata* and *E. siderophloia*, "the White and Red Iron Barks," and *E. goniocalyx*, the Blue Gum.

## PAGE 85.

Dr. F. Mueller has kindly furnished me with the following note to my article on Ferns: *Grammitis Muelleri* (Crocodile Creek, Bowman); *Lycopodium laterale* (Rockingham Bay); *Schizæa bifida* (Rockingham Bay); *Acrostichum aureum* L. (Richmond River, N.S.W., Henderson); *Lomaria articulata*, which was supposed to be a new species, proves identical with *L. euphlebica*, an Indian fern described in the *Species Filicum* (vol. 3, p. 20). *Grammitis decurrens* is the true Indian plant, but in the Kew Museum, it has been ascertained that it is identical with *G. elliptica* (Thunberg). *Lomaria Patersoni* (George Bay, Tasmania, Bissell). *Ophioglossum pendulum* (Rockhampton on *Platyserium*). A friend informs me that on the Clarence, some of the fronds of *Asplenium nidus* are seven feet long and one broad!

At page 177, the Rubiaceae shrubs to which reference is made are *Canthium coprosmoides* and *Coprosma hirtella*. The *Rubiaceæ* are not numerous in New South Wales, but in the northern parts of Australia, the species occur frequently. In the *Flora Australiensis*, the genera are arranged in the following order: (1) *Sarcocephalus*; (2) *Hedyotis*; (3) *Dentella*; (4) *Ophiorrhiza*; (5) *Gardenia*; (6) *Randia*; (7) *Webera*; (8) *Diplospora*; (9) *Ixora*; (10) *Timonius*; (11) *Scyphiphora*; (12) *Antirrhæa*; (13) *Guettardella*; (14) *Guettarda*; (15) *Hodgkinsonia*; (16) *Canthium*; (17) *Morinda*; (18) *Cælosporium*; (19) *Lasianthus*; (20) *Psychotria*; (21) *Coprosma*; (22) *Nertera*; (23) *Opercularia*; (24) *Pomax*; (25) *Eleutheranthes*; (26) *Knoxia*; (27) *Spermacoce*; (28) *Asperula*; and (29) *Galium*. To these must be added two very remarkable plants recently discovered at Cape York, by Captain Nares of H.M.S. Salamander. viz., *Myrmecodia armata*, and *Hydnophytum formicarum*, which were previously supposed to be indigenous only in Java, the Moluccas, Sumatra, and Nusa-Kambangan. Ants form nests in the tubers and roots of *M. armata*, and in the trunk or irregular tubers of *H. formicarum*.

## PAGE 181.

In referring to the plants from the Kurrajong, *Hedyocarya Pseudomorus* (probably the same as *H. Cunninghamsi*) is abundant. Some persons call this tree "the Native Mulberry." It is a tree of the *Monimiaceæ*, and resembles another of the same order,

*Wilkiea calyptrocalyx*, which I have found at the Fox Ground near Lane Cove. The genus *Wilkiea* was established by Dr. F. Mueller, and it differs from *Hedycarya* in operculate female flowers. In the Doctor's work on the "Plants Indigenous to the colony of Victoria," there is a good figure of *H. pseudomorus*, as well as of *Howittia trilocularis*, a shrub of the Mallow Family, with purple flowers, and a three celled capsule, resembling some species of *Solanum* in appearance. Of the *Goodenia* Family, I have referred to several species on the mountains, which do not occur near Parramatta, viz., *Dampiera purpurea*, *D. ovalifolia*, *Goodenia decurrens*, and *Velleia perfoljata*. I have also collected *G. barbata* at Monkey Creek in the county of Camden, and I dare say it extends to the Mountains. The *Goodeniaceæ*, of which there are many species in the immediate neighbourhood of Sydney, may generally be distinguished by the fleshy, undivided, or two lobed stigma, which is surrounded by a membranous cup. The species of *Goodenia* are usually yellow, and those of *Dampiera*, purple. Of the *Papilionaceæ* at the Kurrajong, may be mentioned *Bossiaea rhombifolia*, *Daviesia mimosoides*, and *Podolobium staurifolium*, the second of which is of frequent occurrence on the Mittagong range, and possesses, as I have already remarked, a bitter property very agreeable to horses. *Rubus Moorei*, (a plant of the Raspberry kind), grows at the Kurrajong, and also on the creeks at Lane Cove. It is nearly allied to the New Zealand species *R. australis*. The composite flower *Helichrysum elatum* is common on many parts of the Blue Mountains. This is the finest species of the genus in this part of the colony, and is remarkable for its large flowers, the bracts of which are white and like petals.

Two of the rarest composites in the Parramatta district, are *Leptorhynchus linearis* and *L. squamatus*, plants occurring also in Victoria and Tasmania. The genus to which they belong, is, in the opinion of Mr Bentham, scarcely different from *Helichrysum*, excepting "in the involueral bracts with more thinly scarious tips, neither spreading, nor petal-like, nor opaque, and in the contraction of the achene at the top." I am not aware whether *L. linearis* has been collected on the Mountains, but *L. squamatus* occurs there, and also near Bathurst.

*Tetrateuca thymifolia* is a small under-shrub with purple flowers.

by some botanists it is regarded as a variety of *T. pilosa*, which occurs near Sydney. Of the Dilleniaceæ, *Pleurandra bractenta* and *Hibbertia saligna* are frequent, whilst *Alphitonia excelsa* of the Rhamnææ (a tree with large leaves generally smooth on the upper surface, and white with tomentum beneath), and *Ehretia acuminata* (a small tree with bunches of white flowers and brittle wood), are common to the Blue Mountains and the neighbourhood of Cabramatta. *Alania Cunninghamsi* is a small plant of the Lily family, first noticed by Allan Cunningham in 1818. It has grassy, dry leaves, dilated at the base, and minute flowers. This plant does not appear common, and as far as I am aware, has not been found in the low country. *Symphyonema montanum* is also a rare Proteaceous herb with tripartite leaves and spicate flowers. *S. paludosum* occurs at Illawarra, and is nearly allied to the preceding species. These plants are seldom seen in collections. *Jussiaea repens*, a marsh plant of the *Onagrariææ*, may often be seen in the neighbourhood of Richmond. The composite *Enhydra paludosa* also grows in water, but I have never found it far from the coast. In wet seasons, *Sphagnum obtusifolium*, (the moss which is identical with that which affords much of the material for peat-fuel in Europe) may be found abundantly in marshy places. I have lately received some specimens of *Psoralea adscendens* from the Mittagong Range. This leguminous plant is reported to be injurious to cattle.

## PAGE 196.

*Gnaphalodes uliginosum* does not occur amongst the composites which I received from the Darling, but it has been collected there, and I have also had specimens of it from the Lachlan. Introduced composites seem to be spreading very much in some parts of the colony. The Mexican plant *Gymnosperma glutinosum*, has appeared again this season in an orchard at Parramatta, and *Soliva anthemifolia*, which Mr. Bentham regards as an introduced plant, appears to have established itself in the county of Cumberland. This composite was noticed at an early period of the colony's history. I have not found *Symphyonema* near Parramatta, and, indeed, the Proteaceous plants of our district are not very striking. This family is divided into (1) *Numentaceæ*, or nut-producing; and (2) *Folliculares*, or having a follicle; i.e. a one-valved, one-celled capsule opening lengthwise. Of the first

division, we have near Parramatta three genera, (1) *Isopogon*, (2) *Conospermum*, and (3) *Persoonia*; and of the second, eight genera, viz. (1) *Grevillea*, (2) *Hakea*, (3) *Lambertia*, (4) *Xylomelum*, (5) *Telopea*, (6) *Lomatia*, (7) *Stenocarpus*, and (8) *Banksia*. With the exception of *Conospermum*, which has only three anthers, they all belong to the class *Tetrandria*, order *Monogynia* of Linnæus.

(1.) *Numentaceæ*

(1.) *Isopogon* is so called from *isos*, equal, and *pogon*, a beard, in reference to the comose nature of the strobilus or cone. Our species is *I. anemonifolius*, but *I. anethifolius* belongs also to New South Wales.

(2.) *Conospermum*. This plant derives its name from the somewhat conical shape of its seeds, (*Conos*, a cone, and *sperma* seed). *C. longifolia* is common near Parramatta.

(3.) *Persoonia*, named after C. H. Persoon, has edible fruits. The species here are *P. pinifolia*, *P. salicina*, *P. ferruginea*, *P. lanceolata*, and *P. oblongata*.

(2.) *Folliculares*.

(1.) *Grevillea* is a large genus of which 38 species were known to R. Brown. It was named after the Right Hon. Charles Greville. Our species are *G. linearis*, *G. sericea*, *G. mucronulata*, and *G. juniperina*.

(2.) *Hakea* takes its name from Baron Hake of Hanover. We have three species *H. acicularis*, *H. saligna*, and *H. dactyloides*. The follicles are hard and woody, each containing two winged seeds.

(3.) *Lambertia*. The species near Sydney and Parramatta is *L. formosa*. Some people call it "Honey-flower," as they are in the habit of sucking the honey-like liquid from the corolla. It is named after A. L. Lambert, Esq., F.R.S.

(4.) *Xylomelum pyriforme* is the far famed Wooden Pear, from *Xylon*, wood, and *melon*, an apple.

(5.) *Telopea speciosissima*, is the beautiful Waratah or Native Tulip, of which I have already made mention.

(6.) *Lomatia* derives its name from the winged edge of the seeds (*loma*, an edge). The species are *L. salafolia*, and *L. longifolia*. The first of these is rather ornamental, with white flowers and leaves bipinnatifid.



(7.) *Stenocarpus* (from *stenos*, narrow, and *carpos*, fruit) has *S. salignus* common on the sides of creeks to the north of Parramatta. Some of the most beautiful of the order, such as *Grevillea robusta*, *Stenocarpus Cunninghamsii*, &c., occur in the northern parts of New South Wales, but with the exception of *Telopea*, none of our species are ornamental.

(8.) *Banksia* is named after the distinguished naturalist Sir Joseph Banks. We have *B. serrata*, *B. integrifolia*, *B. ericifolia*, *B. amula*, and *B. spinulosa*. The first two are trees, the wood of which is used for the knees of boats, and the others, shrubs.

PAGE 203, LINE 23.

The Myrtaceous tree to which allusion is made, was named *Backhousia myrtifolia* after Mr. Backhouse, who visited these colonies about thirty years ago in company with Mr. Walker. Mr. Backhouse is well known as an enterprising traveller and philanthropist, and the work which he published on his return to Europe, bears testimony to his botanical knowledge.

PAGE 208.

In my article on ornamental plants, I have alluded to the Epacrids, as affording some species worthy of cultivation. The family of Epacrids, which in this country takes the place of heathworts, is peculiar to the Indian Archipelago, Australasia, and Polynesia. The word "*Epacris*"—the type of the order—is derived from *epi* upon, and *acros* the top of a thing, because in New Zealand, the species grow on the top of the mountains. This, however, is by no means the case in New South Wales, for they are found in various situations, some growing in the sand by the sea-side, some in the bush under the shade of the *Eucalypti*, and others again amongst the rocks by the side of creeks. There is a marked resemblance between Heathworts and Epacrids, and it is worthy of notice that few heathworts are found in countries occupied by Epacrids. The main difference between the two orders is in the anther, the Epacrids having it one-celled without any appendages, and the heathwort "two-celled, the cells hard and dry, separate either at the apex or base, where they are furnished with some kind of appendage, and dehiscing by a pore." Nearly all the genera of the *Epacris* family belong to the class Pentandria, order Monogynia of Linnæus, and the filaments arise from the corolla, or they are hypogynous. The

berries of many species, though small, are edible, and the order does not contain any poisonous or acrid properties.

Botanists divide the genera into two classes, viz. :—(1.) Those that are one-seeded, and (2.) those that are many-seeded. Of the first division we have in the neighbourhood of Parramatta, species of the following genera: (1) *Styphelia*, (2) *Astroloma*, (3) *Stenanthera*, (4) *Melichrus*, (5) *Lissanthe*, (6) *Leucopogon*, (7) *Acrotriche*, and (8) *Trochocarpa*: and of the second division (1) *Epacris*, and (2) *Dracophyllum*. Regarding the order as peculiar to this part of the world, we may feel some surprise that so few genera, comparatively speaking, are found near Parramatta, and that scarcely any, with the exception of *Astroloma* or “groundberry,” *Styphelia* or “five corner,” and two or three species of *Leucopogon* afford any esculent fruits.

The species of *Styphelia* are *S. viridiflora*, *S. triflora*, and *S. tubiflora*. Two other species occur nearer the coast, and one with red flowers on the mountains. *Astroloma humifusum* is the Ground Berry of the colonists, *Stenanthera pinifolia* is similar to it, and *Melichrus rotatus* has inconspicuous flowers with five glands containing a honey-like liquid. *Lissanthe* is represented in the Parramatta district by *L. strigosa* and *L. daphnoides*. *L. sapida* occurs in the Mountains, and *L. subulata*, which some regard as a variety of *L. strigosa*. *Leucopogon* has *L. lanceolatus*, *L. juniperinus*, *L. ericoides*, *L. virgatus* and *L. amplexicaulis* within a few miles of the town. Here is also *Acrotriche divaricata*. *Trochocarpa laurina* is larger than any of the preceding species, and although extending to the Parramatta district, is not so fine a shrub as some of the same kind growing near the coast. Of *Epacris*, we have *E. purpurascens*, *E. riparia*, and *E. obtusifolia*, and of *Dracophyllum*, *D. secundum*. In the neighbourhood of Sydney, at the North Shore, &c., *Leucopogon microphyllus* is very common, and I have collected *L. biflorus* on the Mountains. *Monotoca albens* occurs frequently near the coast, as well as *Lysinema pungens*, *Ponczetia sprengeloides*, and *Sprengelia incarnata*. Perhaps the most admired species is *Epacris grandiflora*, of which there is a marked variety, with white flowers, and *E. crassifolia* and *E. microphylla* may be frequently seen on the rocks near the sea. Since the days of ROBERT BROWN, so many species have been added to the order of the Epacrids, and their structure

seems to be so much better understood than formerly, that a revision of the genera has long been required. Influenced by these considerations, Dr. F. Mueller determined to review the whole order, and to make those alterations in the arrangement of the genera, which recent discoveries have rendered necessary. This was a work of great labour, which, indeed, the Doctor states "was one of the most difficult tasks he had ever accomplished." The complete investigation of all the species, with a view of throwing them into new generic forms, required not merely intense application, but an amount of experience, which few botanists possess. Dr. Mueller, however, has effected the object he had in view, and in the last number of his *Fragmenta*, he has proposed to unite thirteen genera with *Styphelia*, thus establishing a large genus of not less than 100 species, and regarding the others as the representatives of sections. The genera thus amalgamated are *Astroloma*, *Stenanthaera*, *Melichrus*, *Cyathodes*, *Lissanthe*, *Leucopogon*, *Acrotliche*, *Fræbelia*, *Soleniscia*, *Stomarrhena*, *Androstoma*, *Pentataphrus*, and *Lobopogon*. An arrangement of this kind will have many advantages in facilitating the study of the order, and in removing the anomaly of separating allied species. The remaining genera are disposed in the following order: *Brachyloma*, *Conostephium*, *Michiea*, *Monotoca*, *Trochocarpa*, *Needhamia*, *Oligarrhena*, *Prionotes*, *Epacris*, *Lysinema*, *Sphenotoma*, *Dracophyllum*, *Richea*, *Cosmelia*, *Sprengelia* and *Ponceletia*. The beautiful order of Epacrids deserves attention from the horticulturist, as it affords many ornamental plants, which, Dr. Mueller observes, "are still so rare in our gardens." The species are interesting too as supplying the place of Heathworts, only one of that order, I believe, (*Gualtheria hispida*) being known in New South Wales. Of this plant, I have had specimens from the Tumut, and according to Dr. Mueller, it generally indicates spots on which snow lodges for some of the winter months. It appears from the Doctor's work on the vegetation of the Chatham Islands, that *Dracophyllum scoparium*, *Cyathodes acerosa*, and *Leucopogon Richei* are indigenous there. "The last," he remarks, "is one of the few plants common to Australia and the Chatham group. yet not known as existing in New Zealand."

PAGE 208, LINE 33.

The little "Orange Thorn" is abundant at the Native Vine.

yard near Cobbity. This spot is also remarkable for the occurrence of many plants which do not grow any where in the adjacent bush. Amongst these are *Geijera salicifolia*, a moderately sized tree of the Rutaceæ, *Nephelium leiocarpum*, *Cupania semiglaucæ* of the Sapindaceæ, *Alphitonia excelsa* of the Rhamnaceæ, *Cargillia australis* of the Ebenaceæ, *Morus Brunonia* and *M. calcar-galli* (Moraceæ), and three small trees of the Euphorbiaceæ, viz., *Croton Verrauxii*, *Claoxylon australe*, and the very curious *Cælebogyne ilicifolia*, of which the female only is known, and yet it produces ripe and perfect seeds! On the banks of the Nepean, *Hymenanthera dentata* of the Violet-Family occurs frequently, and in a gully near Bent's Basin, are *Styloidium laricifolium*, *Commerstonia Fraseri*, *Leucopogon collinus* and *Goodia lotifolia*. With regard to the little "oasis" called the Native Vineyard, and some of the shrubs growing there which belong to the northern parts of New South Wales, there is great peculiarity arising probably from the geological formation of the place, and its sheltered situation. After passing through a forest of uninteresting *Eucalypti*, it is quite refreshing to meet with a spot so highly favoured by nature, where some scores of beautiful shrubs, apparently conveyed from distant places, are strangely associated together. The "Vineyard," as it is called, contains only a few acres, and is almost in sight of the Rev. T. Hassall's residence at Denligh. It has the appearance of a cultivated shrubbery, rather than that of a collection of plants formed by natural causes. The vines and climbing plants of this interesting place, are *Aphanopetalum resinosum*, *Tecoma australis*, *Vitis Baudiana*, *Eustrephus latifolius*, *Geitonoplesium corymbosum*, *Sicyos angulata*, *Tylophora barbata*, *Clematis aristata*, two species of the *Convolvulus* family, *Passiflora Herbertiana*, *Stephania hernandiæfolia*, *Sarcopetalum harveyanum*, *Marsdenia rostrata*, and *M. flavescens*. Not far from the Vineyard, *Lyonsia straminea*, and a narrow leaved form of *Marsdenia viridifolia* may be seen. The latter is remarkable for its tuberous roots, which are called "Native Potatoes," and were eaten by the Blacks of former days.

PAGE 224.

The Rev. G. A. C. Innes, during a late trip to the Bogan, noticed some fine Iron Bark trees on the sand-stone ranges near Gundong (Quandang?) Creek. These trees were from two to

three feet in diameter, and about eighty feet high, affording excellent material for fencing and rough buildings. From the specimens which he kindly procured for me, I feel no hesitation in referring them to the white-flowering variety of *E. leucoxyton*, similar to that which is found on some parts of the Lachlan, and also about thirty miles from Mudgee. This is, in fact, what Fraser and others have called "the common Iron Bark of the interior," and although differing sometimes in the colour of the flowers, the quality of the wood, and in the texture of the leaves, it is nevertheless a well defined species, perfectly distinct from the Red and White Iron Bark near the coast (*E. siderophloia* and *E. paniculata*). Not far from the spot where the Iron Bark was growing, Mr. Innes collected a specimen of *E. dealbata*, a tree with glaucous, white foliage, sometimes called "River Gum," and sometimes "Grey Box." This species is found in rocky situations in the interior, and Dr. F. Mueller thinks it may prove a variety of *E. viminalis*. The anthers are certainly very similar, but in the latter, the flowers are more distinctly pedicellate, and the leaves narrower and longer, whilst the fruit is larger and not hemispherical. According to the Report of the Victorian Exhibition of 1861, the wood of *E. dealbata* is almost as good as that of the true Box (*E. hemiphloia*); but as opinions vary as to the quality of the timber, it is not improbable that the Victorian tree is either a distinct species, or a marked variety. The same report also states that *E. oleosa* (*E. uncinata*, Bentham), covers the vast tracts of level country towards the N.W. of Victoria, forming with the species *E. dumosa* and *E. socialis* (*E. oleosa*, Bentham), the dense masses of vegetation known as Mallee Scrub. The dimensions of *E. uncinata* require it to be ranked as a shrub, as it rarely exceeds twelve feet in height; but from the circumstance that the individuals of the species are clothed with foliage to the ground, and often grow so closely together, as to form impenetrable masses of vegetation, an exceedingly large quantity of the leaves (which contain an essential oil of the greatest importance) can be procured in a short space of time. (See Report of Victorian Exhibition, p. 32).





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