REPORT

ON

NATAL BOTANIC GARDENS,

AND

Colonial Herbarium

FOR THE

YEAR 1905-1906.

BY

J. MEDLEY WOOD, A.L.S.,

Corresponding Member of the Pharmaceutical Society of Great Britain.

DIRECTOR.

DURBAN:

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1906.

Durban Botanic Society.

REPORT

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FROM

July 1st, 1905, to June 30th, 1906,

BY

J. MEDLEY WOOD, A.L.S.,

Corresponding Member of the Pharmaceutical Society of Great Britain.

DIRECTOR.

Durban Botanic Society.

President:

Sir B. W. Greenacre, K.B.

Committee:

Mr. T. W. Edmonds	Mr. M. S. Evans
Hon. R. Jameson, M.L.C.	Mr. H. H. Puntan
Mr. J. Dick	Mr. W. Butcher

Government Members:

Mr. J. S. Steel Mr. J. D. Ballance

Mayors of Durban and Pietermaritzburg, *ex officio*.

Sec. and Accountant:

Mr. G. Burgess

Treasurer:

Mr. J. Medley Wood, A.L.S.

Director:

Mr. J. Medley Wood, A.L.S.

Curator:

Mr. Jas. Wylie.

NATAL BOTANIC GARDENS.

BYE-LAWS.

The Gardens are open to the public every week-day from sunrise to sunset; on Sundays from 2 o'clock p.m. until sunset.

Children under 10 years of age, unless accompanied by competent protector, cannot be admitted.

Persons accompanied by a dog or dogs cannot be admitted.

No vehicle shall be allowed entrance, and all bicycles must be left at the gate, but upon application to the Director or Curator, invalids in wheeled chairs may be permitted.

Admission may be granted to picnic parties if permission be first obtained from the Curator.

Visitors are requested to keep to the paths, and any person sliding, running or walking up and down the grassed enbankments will be liable to be expelled from the Gardens.

Touching or handling plants, fruits, or flowers is strictly prohibited, the indiscriminate use of butterfly nets is prohibited, but permission to use such nets may be obtained from the Director or Curator, and will be available for the day of issue only. This permission will not be granted on Sundays, and may at once be withdrawn if the privilege is abused.

All games, climbing of trees, shooting of guns or catapults, throwing of stones or fruit, disorderly or indecent behaviour, are strictly prohibited.

Any person abstracting, destroying, or damaging any property of the Society shall be liable to be prosecuted.

The Director is hereby authorised to prosecute offenders under the fore-going Bye-Laws whenever found to be necessary.

The Jubilee Conservatory is open to the public as under:—

Week-days from 9 a.m. to 6 p.m., in summer; from 9 a.m. to sunset in winter; Sundays from 2.30 p.m to 5.30 p.m. in summer; from 2.30 p.m. to sunset in winter.

The public are admitted to the Nurseries and Forcing Houses on business only, during business hours, and on Sundays and Public Holidays they are closed altogether to visitors.

REPORT.

Botanic Gardens, Durban,

Berea, July, 1906.

To the President and Committee,

Durban Botanic Society.

Gentlemen,

I have now the pleasure of presenting my Twenty-fifth Annual Report on the work of the Botanic Gardens and Herbarium under my charge, and again am pleased to say that the Report is a fairly satisfactory one in I think every respect; we have not suffered from either drought or floods to any appreciable extent, and I am pleased to be able to say that the tree of *Arenga saccharifera* which was blown over by the heavy gale of May 31st, 1905, has now quite recovered and has borne flowers. Our greatest trouble has been the malaria which has been so prevalent, but which I am glad to say is now on the decline; the work done by the Durban Corporation on the flat below the Gardens has very sensibly diminished the number of the mosquitoes which were the agents for its dissemination and the cases of attacks of the disease are now much more rare In consequence of this outbreak it was thought necessary to have the pond at the lower corner of the Garden ground filled in. In the early days of the Gardens, some 50 years ago Nymphæas of several species were grown in this pond as well as some other species of acquatic plants, but since the Indian houses were placed not far from it, and its drainage interfered with by different circumstances it had become somewhat of a nuisance, besides forming a breeding place for the Anophiles mosquito, so that a contractor was engaged at a cost of £50 to fill it up with soil which with the consent of the Borough Engineer was taken from near the foot of St Thomas' Road, temporary portable rails having been laid for the purpose. It will be necessary for the completion of this work to lay a drain from the foot of the hill to the drain on the Corporation land, and this will be done in the near future. The work at the nursery was in danger of getting behind hand, consequent on one of the gardeners who was constantly employed there leaving for his home in Australia, the vacancy has now, however, been filled

and the work going on as usual. The fumigating house has been in constant use, and plants are invariably sent out quite free from insect pests; the house was examined by Mr. Berensberg, assistant to the Entomologist, and after some alterations had been made, it was found to be quite efficient; the nursery has also been examined by Mr. Claude Fuller, the Government Entomologist, and found to be quite free from insect pests, and he has given us his certificate to that effect.

The Refreshment Room alluded to in my last Report is now completed, and was opened to the public on Monday, April 2nd. Mrs. Malyon who has charge of it has given complete satisfaction to the public, she having had considerable experience in conducting a somewhat similar institution in Cape Colony; it is fairly well patronised by visitors, and as it becomes better known will be even more frequented than it is. The charges are moderate, and the viands supplied are the best of their kind. The building is roofed with Asbestos slate, and the interior of the working room is lined with the same material; the building is square, the working and store room in the centre, while the chairs and tables are arranged in a raised verandah 12 feet in width, so that almost complete protection can be had from both sun and wind from whichever quarter the wind may be, and the floor is well raised above the ground. A wicket gate has been opened close to the Refreshment Room, and both are opened at 10 o'clock a.m. and closed at 6 o'clock p.m. in the summer, and at sunset in the winter; a gong is sounded 15 minutes before the gate is closed for the day, but it must be clearly understood that there is no thoroughfare through the Gardens, and that coloured servants are not allowed to use the gate unless accompanied by Europeans, the Society retaining the right to close this gate to the public at any time that it may be found advisable or necessary to do so.

In consequence of great press of more important work the Durban Corporation have not been able to commence the hardening of Sydenham Road, which bounds the N.E. side of the gardens, and in consequence the fence which was to be erected as stated in my last Annual Report has not been proceeded with, and it is, perhaps better that all the soil which has to be taken from the Gardens should be removed before the fencing is done; it is hoped, however, that it will be completed before the next Annual Report is published.

On the occasion of the visit of the members of the British Association to South Africa in August last, many of the botanical members visited the Gardens, and it is a matter for regret that their time was so short, and that I was not able to give the attention to them that I should have liked; all that I met expressed their pleasure at what they were able to see

here, and every information possible under the circumstances was given to them, Guide Books were freely distributed and as freely made use of. I was especially pleased to meet with Prof. Dr. A. Engler, a botanist who is well known all over the world, and in the short time that he was in the Gardens he was good enough to give me the names of three plants which he saw growing, and which we have had many years, but of which we knew the order only, but not the names; they are, *Philodendron radiatum*, Schott, a native of Mexico, *Syngodium auritum*, Schott. from S. America; and *Rhaphidophora decursiva*, Scott. native of E. Indies, all belonging to the Order Aroideæ, a class of plants with which Dr. Engler is very familiar. It may be thought strange that in a Botanic Garden we should not know the names of the plants growing in it, but one of these plants was here unnamed when I took charge of the Gardens in 1882, another was given to us without a name by the late Mrs. Schultz, and the third was purchased at a sale also unnamed, and our Library is not yet sufficiently supplied with books to enable us to identify specifically plants belonging to this difficult order. Another plant which Dr. Engler noticed we had from the late Col. Bowker also without name, and he told me that it belonged to a new genus *Pœdilanthus*, nearly, related to Euphorbia, but the specific name I do not know, nor does the generic name appear in any book in our Library; the plant is I believe a native of Cape Colony.

Another singular plant belonging to the same Order, from the higher districts of Cape Colony, has been presented by Mr. J. Thode, but without name; it has not yet borne flowers, nor shall we be able to identify it until the part of the Fl. Cap. including this Order is published.

I regret to have to say that we again failed to rear plants of Victoria Regia, the giant water lily; seeds were planted, some of which germinated, but the plants died before becoming large enough to be put out. I hope for better success next summer. The Nymphæas in the tank have been in flower most of the season, and a species of *Nelumbium* is doing fairly well, and it is hoped will bear flowers next summer. The gold fish which are in the tank keep it quite clear of mosquitoes or their larvæ.

I am sorry again to have to report that the behaviour of some of the younger visitors to the Gardens is far from being what could be desired, seats and plants are defaced by initials, &c., being carved upon them, labels are defaced, broken and frequently removed from their places, fruit and flowers are stolen, while the grassed banks are damaged by running or sliding down them, and this not always by children, persons who are quite old enough to know better are frequently known to do the same thing. It is difficult to detect parties who are

guilty of these offences against the Bye-Laws, but the first one that we do detect in the act will certainly be afforded an opportunity of an explanation before the Magistrate.

I regret in consequence of the distured state of the country the usual collecting trip could not be taken, so that we shall be at some disadvantage for the present in not being able to supply seeds and plants to our numerous correspondents as usual, since we shall be quite restricted to the stock on hand, which is not large.

Mr. Wylie, the Curator, and Messrs. Rutter, McAlpine and Bartlett are still with us, and deserve hearty thanks for the manner in which the work has been carried on under very serious difficulties, Mr. Wylie and Mr. Rutter have had repeated attacks of malaria, quite unfitting them at times for duty; native labour has been scarce, and at times unobtainable, and the time of some of the indentured Indians has expired; two have re-engaged, and it is quite uncertain when we shall obtain those that were requisitioned for some time ago. Under these adverse circumstances no improvements of any kind could be undertaken, nor the ground kept in the order that we should like to see it.

My hearty thanks are due to the Committee for their valuable advice and assistance in all matters connected with the management of the Gardens that have been brought to their notice.

Packets of seeds have been received in exchange during the year as under:—

Royal Botanic Gardens, Calcutta	20
,, ,, ,, Mauritius	9
Botanic Gardens, Jamacia	1
,, ,, Trinidad	1
,, ,, British Guiana	38
,, ,, Sydney	45
,, ,, Congo	1
From India, Donor unknown	60
Bureau of Forestry, Manila, P.I.	16
Department of Agriculture, U.S. America ...	34
,, ,, Transvaal ...	1
,, ,, Maritzburg ...	7
W. E. Ledger, England	1
A. Robertson Proschowsky, France	1
M. Buysman, Holland	8
Reasoner Bros., Florida, U.S.A.	4
C. Sprenger & Co., Naples	20

Max Herb, Naples	29
W. E. Dowsett, Rhodesia	12
W. George ,, ...	4
Mr. Swymerton ,, ...	2
C. E. F. Allen ,, ...	2
Geo. Thorncroft, Transvaal	4
L. F. Brady ,, ...	4
Mr. Williams ,, ...	1
Mrs. W. Saunders, Cape Colony	1
Lieut.-Col. Wales, Natal	2
S. Large ,, ...	6
Hon. R. Jameson ,, ...	4
Dr. Telfer, Zululand	3
Dr. Hyslop, Maritzburg	2
R. W. Benningfield, Durban	1
Mrs. Cooley, Durban	2
W. R. Gordon, Durban	5
Mrs. W. D. Rogers, Durban...	1
Mr. Tatham, Durban	1
J. F. Fette ,, ...	19
	372

Packets of seeds have been sent to the following persons and institutions, but in consequence of the native rebellion very few seeds have been collected.

Bureau of Forestry, Manila	28
U.S. Department of Agriculture	3
Conservator of Forests, Maritzburg	2
S. E. Large, Mid Illovo	1
Geo. E. Hind, Durban	28
J. Burtt Davy, Pretoria	3
	65

The following plants have flowered for the first time:—

Bauhinia sp., Rhodesia.
Tulbaghia violacea, Mrs. Todd, Maritzburg.
Nicotiana Sanderiana, Sander & Sons, St. Albans.
Ceropegia sp., Geo. Thorncroft, Barberton.
,, ,, ,, ,,
,, ,, Zululand, collected.
Dendrobium Findlayanum.
Oncidium splendidum.

Plants, bulbs and cuttings sent away :—

Bureau of Forestry, Manila, 1 box, 12 plants.
Conservator of Forest, Maritzburg, 4 tins, 100 plants.
Govt. Experiment Farm, Winkle Spruit, 4 plants.
" " " Cedara, 1 sack Agave rigida, var. sisalana.
" " " " 10 varieties Cassava.
" " " Empangeni, 4 plants.
J. Burtt Davy, Pretoria, 1 bag Stenotaphrum glabrum.
" " 1 " Fourcroya gigantea.
Messrs. Thorne, Rogers & Wilson, Zululand, 200 Agave sisalana.
John Gordon, Noodsberg, 6 varieties Cassava cuttings.
Mr. MacKenzie, Dundee, 6 " " "
S. E. Large, Mid Illovo, 24 roots Ramie.
" " 24 " Rumex hymenosepalus.
E. L. Acutt, Hill Crest, 24 " " "

Plants and bulbs received :—

Royal Botanic Gardens, Mauritius,	55 plants,	7	species.
Sander & Sons, St. Albans	96 "	61	"
" "	144 tubers,	4	"
Geo. Thorncroft, Transvaal	11 "	2	"
H. G. Williams "	2 plants,	1	"
L. F. Brady "	4 "	3	"
Dr. Marloth, Cape Colony	2 "	2	"
Mr. Hawkesworth, Natal	1 "	1	"
Major Silburn "	3 "	3	"
Mrs. Trotter "	3 "	1	"
Mrs. Todd "	2 "	1	"
Mr. Hare "	1 "	1	"
Miss Ritchie "	1 "	1	"
Mr. Goldsworthy "	33 bulbs,	1	"
Mrs. McCord "	1 "	1	"
	359	90	

382 packets of seeds and 549 plants were received during the year 1904-5, with the following results :—

Plants.		Seeds.	
Dead on arrival ...	50	Failed to germinate ...	80
Died afterwards ...	65	Germinated, but died afterwards	45
Still in pots	160	Still in pots	130
Planted in Gardens ...	250	Annuals and vegetables	60
Previously in stock ...	24	Not suitable for climate	20
		Duplicates	47
	549		382

The following free grants have been made:—

Durban Home, plants ...	£1	1	0
,, ,, ,, ...	2	17	6
Convalescent Home, plants ...	3	12	6
Government Asylum	3	15	0
Durban Corporation	5	0	0
,, ,, ...	17	0	0
,, ,, ...	1	10	0

Coffee and the Hemileia.

As it frequently comes to my notice that in spite of what has already occurred in Natal and other places, by the almost complete ruin of coffee plantations by the destructive fungus *Hemileia vastatrix*, some persons still cling to the idea that coffee may still be successfully grown in the Colony and in the Transvaal also, I think that it will not be out of place to give some information as to what occurred here before the introduction of this pest into the Colony, and to state the conclusions at which scientific men have come in the matter. In the year 1880 the Hemileia was not known in Natal, or at any rate it had not been observed by planters or others, but in consequence of other diseases or attacks of insects a Commission was appointed by Government to look into the matter, and the correspondence in connection with this Commission is in my charge here, but I did not receive it until some years afterwards. In all the correspondence no hint is given by any of the writers as to the presence of Hemileia in the Colony except in one case. The members of the Commission were C. Manning, Esq., J.P., D. Brown, Esq, G. L. Smith, Esq., Sir J. L. Hulett, S. Crowder, Esq., Chairman. A printed paper containing 24 questions was forwarded to planters, and though the borer and bark diseases are alluded to, the Hemileia is only mentioned by one person, whose name I am not able to decipher with certainty, but it appears to be H. F. Portel, and the letter is numbered (I think wrongly) 94. He says "Leaf disease most virulent, cause and origin unknown, appeared in Ceylon in 1871 or 1872." It is somewhat strange that in all the correspondence this is the only case in which the Hemileia is reported to exist in the Colony, and so far as known to me, this letter received no attention and is not even alluded to in the report of the Committee, which I have lately received from Government in compliance with my request.

During the time that the Commission was sitting, and at a meeting of the "Natal Microscopical Society" held in 1887 I read a paper entitled "Notes on some Parasitical Fungi," and to this meeting the members of the coffee Commission were invited, but as they all with one exception lived out of Durban,

only one, Mr. S. Crowder, who lived in Durban and was Chairman of the Commission was able to attend. This paper had special reference to two of these parasitic fungi, viz.: the "Sugar Cane Smut" *Ustilago Sacchari*, Rabh. about which some correspondence had taken place between myself and the Victoria Planters Association, and an *Hemileia* which I had myself collected and which is now known as *H. Woodii*, Kalch & Cook. This fungus I had found upon two plants *Vangueria infausta* and *V. latifolia*, and the following is an extract from the paper: —

"I now pass on to the particular plant the discovery "of which caused this paper to be written. When I first "collected the fungus I failed to identify it, as it differed "considerably from any other species which I had ex- "amined, and of the genus Hemileia I had no description. "My correspondent in Cape Colony also declared it to be "'indeterminable,' but he had probably forwarded the "best of the specimens which I had sent him to Dr. "Kalchbrenner, for some weeks ago the pamphlet which I "have here in which the plant is described and figured was "forwarded to me from Kew. Upon the receipt of this "pamphlet I was of course anxious to identify the plant "upon which I had found the fungus, and after some "little time I succeeded in doing so, and finding it to be "*Vangueria infausta*, a plant belonging to the same Order "as the Coffee plant, I thought the matter of sufficient "interest to warrant further enquiry. The first question "which may be asked is—What reason have you for "supposing that the fungus which has hitherto been found "on Vanguerias only, will establish itself on the Coffee "plant, should Coffee be extensively grown here?

"It seems to me that if this fungus appears on two "totally different plants, even though both plants belong "to the same genus, we may at any rate suspect that "under favourable circumstances it will transfer itself to "other plants, even though they do not belong to the same "genus, but only of the same Order.

"I have just referred to the Hemileia being found upon "two plants belonging to the same genus, but I should "say that the fact is not yet quite proved. I have here "a specimen of a fungus which I collected upon *Vangueria* "*latifolia*, but the power of my microscope is not sufficient "for me to decide with certainty whether it is an Hemileia "or not, or if it be an Hemileia then it is *H. Woodii*, but "I hope to-night with a higher power of the microscope "we may be able to decide upon the genus at any rate. "(Note.—The fungus on examination proved to be *H.* "*Woodii*).

"Another point upon which information may be "wanted is as to the extent of the damage done by the "Hemileia to the plants on which it is found. I have not "yet had much time to observe, but it appears to me that "the damage done to the plants of *Vangueria infausta* is "equal to that done by *H. vastatrix* on coffee trees in "Ceylon, the leaves of the shrub turn yellow, wither and "fall off, leaving the plant somewhat almost bare, and I "think that it will be an exception if any amount of fruit "be found on a tree which has been severely attacked. I "do not remember to have seen any badly affected tree "with much, if any fruit upon it, though I gathered a "week ago a number of fruits from a tree which had "scarcely a trace of the fungus upon it. I have also found "another fungus upon the Vangueria, an Aecidium I think; "it may easily be distinguished from the Hemileia by its "more definate sori and cellular peridium, but I do not "think that it damages the trees to the same extent as "does the Hemileia, and I have occasionally found both "fungi upon the same plant. One question occurs to me "as being worthy of further investigation, it is this, is it "possible that the Aecidium is but another form of the "Hemileia? You are aware that the existence of poly-"morphism in these fungi has only been completely "proved within the last few years, and both good instru-"ments and careful observers are required to determine "with certainty whether any two forms belong to the "same cycle or not. Whether the Hemileia has two or "three forms or not, is, perhaps, only interesting to men "of science; its effects upon the plant which serves as the "host remain still the same."

In the year 1882, I removed from Inanda, where I had lived for some years, and came to Durban as Curator of the Botanic Gardens, and in 1884 while passing Lower Umzimkulu I collected *Hemileia Woodii* on *Vangueria infausta* and showed it to Mr. Walter Bissett, who thinking that it was *H. vastatrix* became rather alarmed, as he had seen the ravages that this fungus had made in Ceylon. I explained to him that it was *H. Woodii* not *H. vastatrix*, but advised him to have all the plants of the Vangueria in the vicinity rooted out and burned, as I felt sure that it would eventually transfer itself to the Coffee. A few weeks afterwards the true *H. vastatrix* was found upon some Coffee trees belonging to Mr. D. C. Aiken. I therefore by request accompanied Mr. Harry Bissett to Maritzburg, where we saw Sir Chas. Mitchell, and as the result of the interview, Government purchased the small patch of Coffee and the trees were cut down and burned, the roots being unfortunately left

in the ground, but a few weeks afterwards the fungus was found plentifully at the large plantations of the Natal Land and Colonization Co., at Reit Valley, and afterwards at several other places, so that the attempt to exterminate the pest proved a failure. At that time so far as known to me these two species of Hemileia were the only ones known to science, but a short time since I received from the Director of Kew Gardens a number of the *Kew Bulletin*, containing a monograph of the genus Hemileia, showing that four species are now known and described, and further that *H. Woodii* has been found at the following places: Natal on leaves of *Vangueria infausta*, Burch. *V. latifolia*, Sond, and *V. euonymoides*, Schwein, f; at Bukoba, Kilimandscharo on *V. madagascariensis*, J. F. Gmel; Lindi German East Africa; on *Coffea Ibo*, Froehner; Java, on various species of Gardenia: Queensland, on *Gardenia edulis*, F. v. M. At the commencement of the article in the *Kew Bulletin*, it is said:—

"It is somewhat remarkable that no attempt appears "to have been made by those engaged in studying the life- "history of *Hemileia vastatrix*, Berk. and Broome, the "cause of the much dreaded coffee-leaf disease in Ceylon "and elsewhere, to ascertain whether or not an Aecidium "condition existed; the presence of both Uredo- and "Teleuto-spore stages strongly suggesting the probability "of the presence of such."

This probability receives further support from the fact that there exist "four species of Aecidium as yet not "correlated with Uredo or Teleuto-spore stages, parasitic "on the same or closely allied plants as those on which "the various species of Hemileia are parasitic, and also "occurring in the same countries as the latter." These species are as follows:—

Aecidium Vangueriæ, Cooke, on *Vangueria infausta*, Burch, and *V. latifolia*, Sond, Natal. "Often on the same "plant, sometimes on the same leaves as *Hemileia Woodii*, "K. & C." (Cooke, Grevillea, x. p. 124.)

Aecidium Pavettæ, Berk. and Broome, and *A. flavidium*, Berk. and Broome, on *Pavetta indica*, L. Ceylon.

Aecidium Plectroniæ, Cooke, on *Plectronia Gueinzii*, J. M. Wood, Natal.

"Should heteroecism be proved to exist in the genus, "the fact would be of value in any attempt to arrest the "extension of parasitic species. Two species, *Hemileia* "*vastatrix*, Berk and Broome, and *H. Woodii*, Kalchbr. "and Cooke, are now known as parasites on species of

"Coffea, and as these species are shown to be parasitic on "several other Rubiaceous plants belonging to different "genera, which have an extended geographical range, "their distribution should be carefully studied by those "interested in the culture of coffee. The establishment of "a coffee plantation in a district where those species of "Hemileia capable of infecting coffee are at present on "indigenous vegetation, would be tempting providence, and "probably result in disaster."

The note "often on the same plant, sometimes on the same leaves as *Hemileia Woodii*. K. & C." was sent by myself to Kew, and copied by Cooke in Grevillea. Vol. 10, page 124.

Cinnamomum cassia, Blume. (Cassia lignea). In a previous part of this report I gave an account of the damage done to this tree in the Gardens by some unknown person or persons, but as a specimen of it is in Maritzburg Gardens, succeeding much better than our tree has done, and is, I understand, bearing seed regularly, it will not be without interest if I give a short account of its introduction into the Colony, and especially as it appears likely to succeed well in the midland districts. In May, 1881, Mr. Chas. Ford, the Director of the Botanic Gardens at Hong Kong, was, at the instance of Sir J. D. Hooker, permitted to visit the Cassia growing districts in China, as the origin of the Cassia bark was involved in some "mystery and uncertainty;" he was quite successful in identifying the tree, and published a useful report of his work from which I make some extracts. He brought back with him a number of young plants, a few of which he kindly sent to us, and in my report for 1885, I stated that "When the plants arrived from Hong Kong many of them were dead, but by the care and attention of the head Gardener the remainder survived." Two of them were planted in the gardens, one of which did not survive, two were sent to the Botanic Gardens at Maritzburg, one of which has done well, the other was I understand cut down by mistake, as by changes of Curators the name had been lost, and so far as known to me this is the only tree now left in the Colony, unless plants have been distributed from Maritzburg.

Mr. Ford says that it is a medium sized stiff ornamental tree, and the largest seen was about 40 feet high with a trunk about 3 feet in circumference, which was said to be 50 years old, and that this is the only species from which the Cassia bark, buds and leaves of commerce are obtained. The tree was not met with anywhere in a wild state, nor could any native be found who knew where it did grow wild, though Dr. Thorel states, that it grows in a wild state in the forests of Cochin China, about 19 deg. North latitude. The yield of the trees are as follows:—

"Bark. When the trees are about six years old, the "first crop of bark is obtained. The season for barking "commences in March and continues until the end of May, "after which the natives say the bark looses its aroma, "and is therefore not removed from the trees. The "branches, which are about an inch thick, being cut to "within a few inches of the ground, are carried to houses "or sheds in the vicinity of the plantations. All the "small twigs and leaves being cleared off, a large bladed "knife, with the cutting edge something like the end of a "budding knife, is used to make two longitudinal slits, "and three or four incisions, at sixteen inches apart, round "the circumference through the bark; the bark is then "loosened by passing underneath it a kind of slightly "curved horn knife with the two edges slightly sharpened. "Pieces of bark sixteen inches long and half the circum-"ference are thus obtained.

"The bark, after its removal and while it is still "moist with sap, is then laid with the concave side down-"wards, and a small plane passed over it and the epidermis "removed. After this operation, the bark is left to dry "for about twenty-four hours, and then tied up in bundles "about eighteen inches in diameter and sent into the "merchants' houses in the market towns.

"Leaves.—The leaves, which are cleared from the "branches that are barked, are carefully preserved and "dried, and afford by distillation cassia oil. A large "quantity of leaves are sent to Canton, where I was told "the operation of distilling is performed.

"Twigs.—These are removed from the cut branches "at the same time as when the leaves are obtained. They "are a marketable commodity for native uses.

"Buds.—Cassia buds are the immature fruits. They "are gathered when about one-eighth grown. Buds and the "seeds which are annually required for sowing, are "obtained from trees ten years and upwards of age that "are left standing at about fifty and a hundred feet apart "amongst the trees which are cut down every six years for "their bark. These seed-bearing trees are not cut, unless "there is a demand for the very thick bark on their "trunks, when some of the trees which can be conveniently "spared are sacrificed. The yield per acre of bark is said "to be about 1,470 lbs., but the trees are only barked once "in six years. The leaves yield a small income. The "buds, which are gathered annually, realise 15 dollars per "picul ($133\frac{1}{3}$ lbs.), but no satisfactory information could "be obtained as to the yield of buds per acre.

"The total export for 1881 was 54,526 piculs—broken "bark 3,129 piculs, buds 1,729 piculs, twigs 6,941 piculs, "and bark of twigs 2,832 piculs, the picul being $133\frac{1}{3}$ lbs., "the total value of these exports in that year being "329,694 Haikwan taels, but the value of this coin is not "given except that it equals 1.46 dollars, the value of the "dollar in China I do not know."

Khaya senegalensis, A. Juss. "Gambia mahogany." In my last Annual Report I gave some extracts as to the value of this tree for its timber and stated that plants of it had been reared and some of them had been handed over to the Natal Agricultural Department for trial at the Experiment Station. The tree continues to succeed well near Durban, and is of fairly quick growth. A further supply of seeds has been received from Mr. Swymerton, plants have been reared, and a few are promised to the Conservator of Forests, Transvaal, for trial in the low country.

Macadamia ternifolia, F. v. M. "Queensland Nut." We have in the Garden two trees only of this species, which have been here for many years, since the name appears in a list of trees in the Gardens published in 1876, but is there stated to be ornamental only, but an article has appeared in the "Tropical Agriculturist" for February of the present year which shows that the tree has an economic value also. The article is by Mr. H. F. Macmillan, the Curator of the Royal Botanic Gardens at Peradeniya, Ceylon, and I take the liberty of quoting a portion of it.

"The nuts are borne on spikes 4 to 7 inches long, each "being of the size and shape of large marbles, about $\frac{3}{4}$ of "an inch in diameter. These have an agreeable flavour, "which, according to some tastes, is richer than that of "the Hazel-nut. Their chief objection is, perhaps, their "very hard shell, which requires extra strong nut crackers "to break. A wag has suggested that this explains the "derivation of the name 'Macadam' having reference to "the inventor of the system of road-making of that name. "The tree, however, has been named in honour of Dr. "Macadam, a scientist of Victoria. . . . . .

'It is not generally known how largely nuts of "different kinds figure in the list of commercial fruits "and food products of the world. Some nuts afford a "very wholesome diet, as for example Chestnuts, which, "being made into flour, are a standard article of food in "some districts of Southern France and Italy, whence, it "is said, 30,000,000 bushels are exported to England and "America every year. In Spain and elsewhere the culti-

"vation and export of Hazel-nuts form a considerable "industry, whilst the Pecan, Hickory, and Walnuts are all "largely cultivated and of considerable commercial "importance in Europe and the United States. Brazil "Nuts and Butter Nuts form an export from South "America amounting to close on 8,000 tons a year, and the "demand for these is only limited by the supply. "Pistachio nuts are a favourite delicacy, and are largely "eaten by the Turks and Greeks, being also, according to "Rev. Firminger, 'obtainable in great abundance in the "cold weather in the bazaars of most parts of India.' "These are not, however, produced in India, but probably "in Asiatic Turkey, whence about 1,300 cwts. are yearly "imported by England alone.

"Authorities on the subject claim that nuts, especially "the larger and more important kinds, are a nutritious "wholesome food, and predict that the time may come "when they will form one of the staples of human food. "Vegetarians generally advocate extended cultivation of "the better kinds of nuts; these may be cooked and pre- "pared into numerous dainty dishes, which are claimed to "be good substitutes for flesh food."

Our trees are not, perhaps, in a suitable place, and do not not bear fruit in such abundance as stated in the above article, but they bear every season. The great drawback is the great hardness of the shell, and it would probably be necessary to remove it before offering the kernels for sale. We shall try to rear plants when the nuts are obtainable.

Eleusine coracana, Gaertner. "Upoko." This grass was figured in "Natal Plants," Plate 440. Since the publication of that Part a letter appeared in the "Agricultural Journal" from Mr. W. R. Gordon, which I take the liberty of quoting entire, as it may be useful to farmers and others.

"I forward you a sample of native millet, also a few "head which ripened off last—not a good sample—as the "main crop has been reaped. I should say it would be a "splendid thing to feed cattle and horses on when green. "It comes up like grass and throws out ratoons, so that "from a small quantity of seed a large piece of ground "can be planted. It does not require to be planted very "thick. I have not seen Japanese millet, but I should say "the 'poko' is better which has been known to the Natives "of the Colony for many years and regularly planted by "them in certain districts of the Colony. They mix it "with amabele to make beer and also grind it for porridge. "The Indians like it, and give a good price for the grain.

"They call it 'cowree,' and say it is the same as their "Indian millet. I do not know whether any of the "farmers have tried it in the upper districts of the Colony "—none have done so about here that I am aware of. My "coolie gardener procured the seed for me from some of "his friends near Pinetown, and was a very small "quantity. It was planted on about an eighth of an "acre of land, and produced nearly five muid sacks of "seed and about a ton of straw. The stubble when "ploughed in will make excellent manure to invigorate "the soil. As a feed for winter chickens I find it "cannot be beaten, and to those who want to go in "for poultry farming it is invaluable. It should be "planted about October for seed, and for fodder or "green feed for cattle in winter somewhat later. It "must not be allowed to get too ripe before reaping. The "Indians say they put it in heaps in India and muzzle two "oxen which are worked around to tread the heads and "the seed drops out. I performed the operation in a more "simple way by making my Indian walk on it. He him-"self suggested this process, as I knew little or nothing "about it. After it is reaped it must be allowed to dry "for about a week, and the seed then drops out when "touched.

"If any of your readers would like to try and grow "some I can supply them with seed in 10 or 25 lb. bags. "You might insert this letter in the 'Journal' if you "consider it of sufficient interest or of any value to the "farming community."

Baron Mueller says that "horses prefer the hay to any other dry fodder in India," and also that "*E. indica*, Gaertn. only differs as a variety." E. indica is very common in Natal, usually near farm houses and cultivated ground, but I have not noticed that cattle are partial to it. It bears grain in abundance and probably, when in seed, cattle take the seed only, as I have observed they do with *Eragrostis curvula*, Nees. in the upper parts of the Colony, where it is known, as I was told by a farmer, as "seed grass." This grass is also figured in "Natal Plants," Plate 439.

Coleus sp. "Izambane." I also received from Mr. Gordon a few tubers of this plant, which the Natives cultivate for food. It will be noticed that the Native name is the same as the one used for the common potato. This plant has always been known by this name, which was afterwards applied to the potato when it was introduced by Europeans. The tubers were planted and yielded a large crop of small tubers, with a few of about 2 inches in diameter. I had a couple of them cooked

They were not unpalatable, and the plant would no doubt improve by cultivation. The whole of the tubers that we have will be re-planted, and further trials will be made. Very few flowers, and no seed vessels were produced, so that I cannot be quite sure of the genus, but hope to examine it more carefully during the summer. Another species of, I think, the same genus is cultivated by the natives in Zululand. I obtained flowers and leaves of it some years ago, but we have never had it in cultivation; the flowers are blue, while the one we now have bears white flowers; the leaves also are different.

As I have frequent inquiries about rubber-yielding plants I venture to repeat, with a slight addition, an article which I wrote for the "Farmers' Magazine" some years ago and which may, perhaps, be found useful.

Some Notes on Plants Yielding India Rubber.

A correspondent down South writes to me as follows about India Rubber:—

"Is it a sort of cultivation to be risked on our Natal Coast Lands? The extraordinary demand for Rubber in connection with Bicycles, tyres of Motors, carriages generally, and otherwise is creating a bit of bustle over the tropical world, and speculators will eagerly work upon this to float schemes and Joint Stock companies. Witness the Prospectus sent me from London last mail, which I enclose to you for information, and return if you would not mind the trouble. But will not Rubber do on the coast?"

The Prospectus enclosed to me is one issued by a company with a proposed capital of £406,000, with the object of acquiring certain estates on the Pacific coast of Mexico, on which it is estimated that there are 350,000 rubber trees, and as the Mexican Government grant a subsidy of 3 cents for every Rubber tree planted, it is proposed to extend the cultivation of this tree, in view of the greatly increased demand for rubber for tyres for cycles and motor cars. The botanical name of the tree which it is intended to plant is not given in the prospectus, but it is almost certainly either "Castilloa elastica" or "Hevea braziliensis." In addition to this it is proposed to cultivate trees yielding the "Chicle" gum, for which there is a large demand in the United States of America. As I have had several other enquiries about this matter, I propose to notice shortly the trees from which the rubber of commerce is chiefly obtained, and add a few observations on their suitability or otherwise to the climate and conditions obtaining in Natal.

The trees yielding rubber commercially all belong to one of the three orders—Apocynaceæ, Euphorbiaceæ or Urticaceæ—while the one yielding the "Chicle" gum belongs to the order Sapotaceæ. These plants are as follows, alphabetically arranged :—

Alstonia plumosa (Labill) ..	"Fiji rubber"	Apocynaceæ.
Castilloa elastica (Cerv)	"Central American" ..	Urticaceæ.
Chilocarpus viridis (new sp.)		Apocynaceæ.
Ficus elastica (Roxb)	"Assam rubber" ..	Urticaceæ.
,, Vogellii (Mig)	"Liberian rubber" ..	,,
Fosteronia floribunda (G. F. W. Mey)	"West Indian rubber"	Apocynaceæ.
Fosteronia gracilis (Muell) ..	,, ,,	,,
Hevea braziliensis (Muell) ..	"Para rubber"	Euphorbiaceæ.
Leucanotis eugenifolia (A.D.C.)		Apocynaceæ.
Landolphia florida (Bth) ..	"African rubber" ..	,,
,, Kirkii (Dyer) ..	,,	,,
,, Owariensis (Beauv)	,,	,,
,, Petersiana (Dyer) ..	,,	,,
Manihot Glaziovii (Muell) ..	"Ceara Scrap"	Euphorbiaceæ.
Sapium Aucuparium (Jacq) ..	"Colombian rubber"	,,
Willughbea flavescens (Dyer) ..		Apocynaceæ.
Achras sapota (Linn)	"Chicle Gum"	Sapotaceæ.

From the foregoing list we may, I think, delete the following for the present, as the plants are not sufficiently known as sources from which rubber may be obtained, or the trees are not likely to be suitable to our climate, though one or more of them may yet be tried here, if reports as to their suitability for the purpose should prove to warrant it. They are as under :—

Alstonia plumosa, *Chilocarpus viridis*, *Ficus Vogellii*, *Fosteronia floribunda* and *gracilis*, *Leaucanotis eugenifolia*, *Sapium Aucuparium* and *Willughbea flavescens*. The remainder I will take in alphabetical order :—Castilloa elastica (Cerv), a native of Central America, which yields what is known as "Central American Rubber." In 1875, Mr. Robert Cross was sent by the India Office to obtain seeds of this tree ; some 7,000 seeds were sent to Kew, but all failed to germinate. Mr. Cross then despatched a large number of cuttings which were propagated at Kew, and sent to the West coast of Airica, Ceylon and Java. From Ceylon the late Dr. Trimen reported that the plant required a more tropical climate than that of Peradiniya, and the plants were removed to a lower elevation at Heneratgoda. In 1880 Dr. Trimen reports : Our largest trees at Heneratgoda have now a circumference of nearly 17 inches, at a yard from the ground. In October, 1882, the same writer reports :—"We have some sturdy little seedlings coming on from seed. The rubber from Castilloa strikes me as the most satisfactory sort growing here, the proportion of caoutchouc in the milk being larger than in any of the others." As to the yield, Mr. Cross, a competent authority, says :—"A Castilloa tree, if carefully and judiciously

tapped, may be expected to yield about 12 lbs. of rubber per annum," but a writer in the "Tropical Agriculturist" of March in the present year actually estimates the yield at 965 lbs. per tree in the 8th year, which, he says, at 2 shillings per lb. gives £98 10s. per tree per annum, and on that basis he is able to show a profit of £47,620 in the 9th year for a plantation of 500 acres, and by such wild statements as this, the public is often deceived. We have in the Gardens one plant of this species, which makes satisfactory growth in the summer months, but dies down again every winter. If the growth of this plant had been anything like what it is in tropical countries, it should now have been 8 or 10 feet high, but actually it is not more than 18 inches. I, therefore, reluctantly come to the same conclusion for Natal as Dr. Trimen did for Ceylon at Peradiniya, viz., that it requires a more tropical climate for its successful cultivation.

Ficus elastica (Roxb). This is perhaps the best known of all the trees that I have enumerated, it grows well in Natal, and at Home is very much used as an ornamental plant, for which purpose in its young state it is well adapted, but between that and its growth as a rubber-producing plant there is a wide difference, as I will try to show. The Kew Bulletin of September and October, 1896, has an article headed "Cultivation of India Rubber in Assam," from which I make the following extracts:—

"The Assam Rubber Plant (*Ficus elastica* 'Roxb') is a large evergreen tree, found in damp forests from the base of the Sikhim Himalaya eastward to Assam and Arracan. The Government of India issued directions in May, 1884, that for 5 years from that date the Assam plantations should be increased by 200 acres a year. The Government of India also desired that in order to test the financial results of the cultivation of this rubber, 50 mature trees should be experimentally tapped annually. In the reports of subsequent years, the results of these experiments are fully given. The amount of rubber obtained showed singular irregularity year by year. It varied so greatly that while the yield in one year was as much as 26 lbs. per tree, it would fall in another year to a little over 2 lbs. The value in money depended, of course, on the market, but at an average price of 1s. 6d. per lb. the extreme yield per tree varied from 39 shillings to 36 shillings.

The fluctuation of yield of one and the same tree in different years are therefore very considerable, and they remain up to the present inexplicable, since the officers under whose personal supervision these experiments were made have not been able to find out any reasons for, or causes of, these very material fluctuations. There is another point of practical importance. It is well known that Ficus elastica will grow with undiminished rapidity and luxuriance, in situations remote from the hills, but in such localities it fails to yield caoutchouc. Hence, Mr. Mann concludes

that no greater mistake could be made than to start plantations of this tree in the plains of Bengal. This is true also of many parts of the world where the tree has been introduced. In spite of the abundance of the tree under cultivation in the tropics of both the Old and New World it has nowhere proved valuable for the production of rubber except in the mountainous parts of Assam. The Conservator of Forests says: "it requires an exceedingly damp atmosphere to do well," and therefore thrives best at the foot of the mountains. As these conditions do not exist in Natal, and as from our experience of the tree in these Gardens, I judge the yield of sap to be very small indeed, this plant may very safely be left out of our calculations.

Hevea brasiliensis (Mull Arg).—A large tree which is usually 60 feet in height, with a diameter of 6 inches when first tapped for the juice. The rubber obtained from it is known as "Para" and fetches the highest price in the market. It is a native of the forests of the Amazon, where it abounds and attains a large size. The soil in which it grows is deep and rich, mainly alluvial, sometimes a stiff clay, and is frequently inundated during the wet season. The temperature is very equable, ranging from 73 to 95 Fahr., the mean for the year being 81. This condition of temperature is an important one, as is proved by the failure to grow these trees in Northern India, where the nights of the winther months are cold, while in Ceylon and South Burma it is said to be a success. The highest monthly rainfall of about 15 inches is in April. The rest of the year is called the dry season, though there is scarcely a week without some showers. The atmosphere is excessively damp. The bulletin of the Botanical Department of Jamaica, from which the foregoing is condensed, says:—"The Para rubber will probably only succeed in Jamaica in districts with an annual rainfall of 75 inches, at elevations not at any rate greater than 2,000 feet. In Assam the plant failed, and it is stated that this failure had been anticipated, and is attributed to the comparatively low temperature in Assam. Dr. King, Director of the Botanic Gardens, Calcutta, reports that—"It is in vain to hope that this species can ever be cultivated to profit in this part of India, I believe it is useless to try it anywhere in India, except in the South of Burma, the Andamans, or perhaps in Malabar. While plants in Ceylon were 30 feet high, those of the same age in Calcutta were barely 6 feet. In the same year (1879) Dr. Kirk says—"The Para is a less quick grower than the Ceara, and does not branch." In 1880 the late Dr. Trimen, Director of the Botanic Gardens at Peradiniya, Ceylon, says:—"The cultivation of Para rubber will be probably found to be satisfactory only in rich land, when the temperature is high and equable and the rainfall large," If these statements are correct, and I believe they are, all hope of successfully cultivating the Para rubber plant in Natal may certainly be abandoned,

Landolphia florida (Bth) and allied species:—These are the plants yielding the "African Rubber" of commerce, which is exported in quantity from both the East and West Coast. The genus contains 11 species, 8 of which are natives of tropical Africa, and from 4 of these species the rubber is obtained, the remainder either not yielding rubber at all, or at any rate have not so far been recognised as yielding it in quantity. The range of these plants is from the Congo on the West Coast to Zanzibar on the East Coast. The rubber was first shipped from the West Coast, and afterwards in quantity from the East Coast, where it is collected from Delagoa Bay to the Zambezi. The two species most valued are *L. florida* and *L. Kirkii*, the last maned one being said to yield the best rubber, and in the largest quantity, and this plant is, I think, confined to the East Coast. In 1879 the export of rubber from Mozambique attained a value of £50,000. The whole of these plants are climbers, and succeed best in damp forests, where they climb the trees to a great height. It has been suggested that to simplify the collection of the rubber, the stems might be cut down every year, crushed between rollers, and the rubber then dissolved out by bi-sulphide of carbon, but I am not aware that this process has ever been tried. L. Kirkii is said by Sir John Kirk, its discoverer, to be the only species considered to be of value by the people of the Dar-Salam district. He also says:—"It undoubtedly yields by far the greatest quantity, and also the best." These two species are now in cultivation at the Botanic Gardens, where they seem to do well, but grow slowly. An attempt will be made to propagate them during next season, and the plants will be placed in a more suitable situation than they occupy at present, so that we may be able to report more fully upon them in the future.

"*Manihot Glaziovii* (Muell).—This is the tree yielding the "Ceara Scrap" of commerce, and is a native of the Ceara Coast district of Brazil. Mr. Scott Blacklaw, an expert who visited Natal in 1882, told me that to all appearance our trees were as fine for their age as any that he had seen in South America. As to the growth of the trees here, there is no difficulty whatever, they grow rapidly, appear perfectly healthy, and can with the information we now have, be propagated largely. Unfortunately, our trees were raised from cuttings, not from seed, the consequence being that they are branches, not trees, and therefore any experiment as to the yield of rubber per tree are likely to be fallacious. Some years ago a number of them were handed over to Mr. A. Wilkinson of Ottawa, who reported that they grew well, the yield of rubber was not satisfactory, and he has I believe rooted them all out.

It is a tree which, it is said will thrive in poor soils, where other plants would not be likely to succeed, but it is a soft-

wooded tree, and very likely to damage from strong winds, and certainly would not on that account prove satisfactory in exposed situations. In 1889 we experimented by tapping the trees, and a small quantity of rubber was sent to the Director of Kew Gardens for report, and I extract the following from my Annual Report for that year :—

"The specimen of Ceara rubber is very interesting. "'This rubber is ordinarily seen in the form of tears "'agglutinated together. I never saw before a specimen in "'which it was wound off in the same way as the Landolphia "'rubber of the East Coast of Africa. Your sample is "'evidently of very good quality, and no doubt what is "'stated in the Kew Report for 1882, page 40, would pretty "'well apply to it.' The following is the extract referred to "by Mr. Dyer: 'Has a dry and compact appearance, is free "'from extraneous impurities, and from its tolerably uniform "'condition, has been collected with care. It agrees in all "'respects with Ceara rubber of good and sound quality. "'When washed and dried it gives a loss of 8 per cent. "'This loss is much less than is met with in Ceara of the "'finest quality, and may probably be accounted for by the "'small bulk and facilities offered by time, mode of packing, "'and transit to the escape of the natural moisture of the "'product.' The article concludes by saying: 'This sample "'was valued June 22nd, 1882, as worth 2s. 9d. to 3s. per "'pound. A sample of Para rubber sent from the same "'place was valued at 4s. per pound.'"

In conclusion, I have only to say that from consideration of the above information, together with reports from other sources, I have reluctantly come to the conclusion that the climate of Natal is not tropical enough for the successful cultivation of rubber. Its rainfall is not sufficiently large, its atmosphere too dry, and its winter temperature too low for the trees to grow with the vigour that they do in more favourable climates, or to produce an amount of sap sufficient to make their cultivation profitable. The Landolphias only remain as yet uncertain, but I hope that before long we shall be able to report upon them, whether favourably or otherwise I am as yet unable to say.

The "Chicle" gum noticed in the prospectus, and from which a large revenue is expected by the projected Company, is the product of a tree named *Achras sapota*, but better known as bearing what is popularly called the "Sapodilla Plum." This tree has been for many years in the Gardens, but is only 4 feet high, while in its native country it attains a large size. Our plant flowers every year, but has never produced a single fruit, and to judge from its size and rate of growth I should say that the Chicle gum would have to realise a very high price to make the cultivation of the tree profitable in Natal.

I have only to add to this now, that an article has appeared in "Indian Planting and Gardening" from which I give the following extract:—

"The Ceara Rubber tree (*Manihot Glaziovii*) is now "attracting more attention than it did some five years ago, "when it was brought prominently into notice in these "columns. Those who are thinking of planting this tree "will be interested to learn that it has been seriously sug- "gested to grow it as an annual crop like sugar. E. Manser, "of New York, puts the following questions to the 'India "Rubber World' (March, 1906): 'In a late number of your "'paper you advocated planting Ceara rubber as an annual "'crop like sugar cane, stating that at least as much rubber "'should be produced per acre as cane produces in sugar. "'As I take it, cane produces at least one ton of sugar per acre, "'and I beg to ask: (1) Could a ton of net rubber be harvested "'yearly from such a field of one-year-old Ceara rubber "'cane? (2) What soil, etc. is required?' The editor of "our contemporary replied as follows: 'These questions "'form a problem that it would be difficult if not impossible "'to answer satisfactorily at this time. A solution is being "'earnestly sought, however, and those making the experi- "'ment are confident of achieving success. We shall keep a "'close watch on this phase of the rubber industry and shall "'publish the result of our observation at as early a date as "'possible. With regard to soil and climate suitable for "'planting Ceara, it is probable that arid land and a tropical "'climate in which there were marked wet and dry seasons "'would be the best.'"

Without at present offering any opinion as to the feasibility of this plan, I can only repeat that the tree grows quite well in the coast districts of Natal, but I do not think it likely that a ton of rubber can be obtained from stems of a year old. The same method was suggested some time ago for obtaining rubber from *Cryptostegia madagascariensis*, Linn., a plant which also succeeds well in Natal, but I have heard no more of it, nor do I know whether the experiment wat ever tried.

I have the honour to be,

Gentlemen,

J. MEDLEY WOOD.

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Proceedings of, current Nos.

Indiana Academy of Science.

Proceedings of, Illustrated.

Agri-Horticultural Society of India.

Proceedings of, current Nos.

J. H. Maiden, F.L.S.

Critical Revision of the Genus Eucalyptus, Part 7.

Various.

Agricultural Co-operation, by E. F. Mullin.	Author.
Bietrage zur Flora von Africa.	Dr. R. Schlechter.
Botany of N. Western, N.S. Wales, F. Turner, F.L.S.	Author.
Ceylon Circulars, Nos. 1-3 and 5-13 inclusive	Director.
Chemist and Druggist, current Nos.	Publishers.
Diseases of Apples, Cherry, Peach and Plum, by E. Mead Wilcox	Author.
Filices Madagascariensis, by Prof. Palacky	Author.
Foliar Periodicity of Endemic and Indigenous Trees in Ceylon, by H. Weight	Author.
Farmers' Advocate	Publishers.
Gleanings of Bee Culture	Publishers.
Journal Linnean Society, Vol. 37	J. Medley Wood.
„ of Mycology, current Nos,	Publishers.
„ Quarterly, of Commercial Research Liverpool University	Directors.
Mango, The, by Marshall Woodrow	Author.
Pharmaceutical Journal, current Nos.	Publishers.
Repertorum Novarum Specierum Regni Vegetabilis, by Frederic Teede	Author.
Some Aspects of Vegetation at Home and Abroad, by Prof. F. E. Weiss	Author.
Trade between S. Africa and Australia, by H. J. Scott	Author.
"Vegetable Production:" Life of Rev. Manasseh Cutler	Author.
West Indian and Guiana Ferns	Guiana Bot Gardens.

Purchased.

Botanisches Centralblatt; Gardeners' Chronicle; Indian Gardening; Journal of Botany; Tropical Agriculturist.

Abstract of Meteorological Observations for Year ending 30th June, 1906.

TAKEN AT THE NATAL OBSERVATORY, DURBAN. READINGS, 9 A.M AND 3 P.M.

Reading of Barometer reduced to sea level and 32° Fahrenheit. A light wind has a mean force of 1·00. A fresh wind a mean force of 2·00. 10 corresponds to an overcast sky. Zero to a clear sky.

	1905. July.	1905. Aug.	1905. Sept.	1905. Oct.	1905. Nov.	1905. Dec.	1906. Jany.	1906. Feby.	1906 Mar.	1906. April.	1906. May.	1906. June.	Year.
	In.	In.	In.	In.	In.	In.	In.	In.	In.	In.	In.	In.	In.
Barometer—Highest ...	30·648	30·535	30·430	30·509	30·386	30·262	30·308	30·301	30·365	30·401	30·632	30·479	30·648
Lowest ...	29·876	29·793	29 687	29·654	29·714	29·647	29·696	29·699	29·625	29·814	29·811	29·811	29·625
Mean, 9 a.m.	30·349	30·229	30.104	30·109	30·120	30·025	29·985	30·053	30·098	30·133	30·208	30 206	30·135
Thermometer in Shade—	Deg.	Deg.	Deg.	Deg.	Deg.	Deg.	Deg.	Deg.	Deg.	Deg.	Deg.	Deg.	Deg.
Highest ...	83·9	84·2	84·6	86·9	89·1	90·7	97·2	92·0	89·1	84·0	83·7	82·4	97 2
Lowest ...	47·3	47·2	50·6	49·5	54·4	61·6	62·8	60·1	61·2	54·0	50·8	50·8	47·2
Mean, 9 a m.	61·8	62·5	68·2	70·6	71·3	74·9	78·5	76·4	73·4	69·7	66·3	62·8	69·7
Mean Reading of													
Maximum Thermometer	75·4	72·9	76·3	77·2	77·8	81·7	86·1	84·1	81·4	78·3	76·1	76·7	78·7
Minimum „	53·7	54·4	59·2	61·8	63·3	67·4	70·4	67·6	66·0	61·9	59·0	54·6	61·6
	In.	In.	In.	In.	In.	In.	In.	In.	In.	In.	In.	In.	In.
Rainfall in inches ...	·71	1·29	2·39	3·87	6·87	3·01	2·35	6·31	4·61	3·66	1·76	1·02	37·85
No. of days on which	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.
rain fell	4	13	16	14	16	22	16	15	17	14	9	5	161
Wind—Mean Force of ...	·62	·92	1·11	·92	1·16	1·00	·79	·87	·87	·87	·89	·87	·91
Cloud—Mean Amount of	1·66	4·58	4·80	5·74	6·37	6 81	6·07	4·88	5·73	4·00	2 65	1·93	4·60

DURBAN BOTANIC SOCIETY.

Receipts and Expenditure for the Year ending June 30, 1906.

RECEIPTS.

	£	s.	d.
Balance in Bank 30/6/05	669	4	8
Sale of Plants	2284	17	6
Government Grant for year ending 30th June, 1906...	350	0	0
Government Grant, Herbarium ...	300	0	0
Government Subscription to "Natal Plants" (2 years)	130	0	0
Subscriptions and donations	266	11	2
	£4000	13	4

EXPENDITURE.

	£	s.	d.
Balance due Treasurer 30th June, 1905	1	6	2
New Fernery—Balance of Building A/c	42	0	0
Tea Room Kiosk—Building	385	8	0
,, ,, Furniture	22	9	11
Salaries and Wages, European ...	1435	14	0
Indian and Native Wages	580	5	6
Rations and Fodder	137	13	7
General Maintenance	674	19	3
Herbarium Department—			
Salaries... ... ... £176 0 0			
Printing "Natal Plants" 189 9 0			
Postages and Stationery 25 18 6			
	391	7	6
Balance in Bank 30th June, 1906 ...	329	9	5
	£4000	13	4

Audited and found correct.

(Signed) ROBT. P. McNAIR,
Incorporated Accountant, England,
Borough Auditor, Durban.

July, 1906.

Colonial Herbarium.

REPORT

FROM

July 1st, 1905, to June 30th, 1906,

BY

J. MEDLEY WOOD, A.L.S.,

Corresponding Member of the Pharmaceutical Society of Great Britain.

DIRECTOR OF BOTANIC GARDENS,

DURBAN.

COLONIAL HERBARIUM.

During the year ending 30th June, 1905, the number of specimens in the Herbarium have been increased from 34,061 as stated in my last Report to 35,924. Of these 10,590 are South African and 25,334 from foreign countries. The whole of these specimens are mounted and in their proper position in the Cabinets, there are a few more still to mount, and we have a large number available for exchange with other Botanists and Botanical Institutions.

We have sent away during the year named specimens of the Natal flora as under :—

Biltmore Herbarium	59
Yu-Shun-Kudo, Japan	202
U.S. America, National Herbarium ...	123
E. M. Reineck, Germany	100
M. Petitmengen, France	205
C. G. Pringle, U. S. America	142
M. P. Somes, „	145
F. M. Reader, Australia	123
Prof. J. Macoun, Canada	98
C. Copineau, France	200
J. H. Maiden, F.L.S., Sydney	100
Calcutta Royal Botanic Gardens	98
E. Moullifarine, France	100
	1,695

The following are unfortunately omitted from last year's report :—

J. Burtt Davy, F.L.S, Govt. Herbarium, Pretoria (Foreign)	670
Prof. MacOwam, Govt. Herbarium, Capetown ...	302
J. H. Maiden, F.L.S., Govt. Herbarium, Sydney ...	88
Geological Survey, Canada	114
Dr. R. Schlechter, Germany	530
	1,704

A large number of these last named ones were foreign specimens of plants already represented in our collection.

We have received specimens in exchange as under:—

Biltmore Herbarium, U.S. America ...	195
Dr. Bolus, Capetown ...	125
E. E. Galpin, F.L.S., Queenstown ...	130
Prof. Palacky, Bohemia ...	197
Geo. L. Fisher, Canada ...	72
Yu-Shun-Kudo, Japan ...	200
M. Copineau, France ...	496
J. H. Maiden, F.L.S., Sydney	204
Royal Gardens, Calcutta	40
F. M. Reader, Victoria ...	117
M. Petitmengen, France ...	201
Prof. J. Macoum, Canada	89
	1,866

It may be noticed that the number of specimens received does not agree with the number placed in the Herbarium. This is caused by the fact that amongst the parcels received from different correspondents there always occur duplicates, that is, specimens that are already well represented in our collection, and which have been received from other correspondents. This necessitates much work, since it is imperative that every specimen shall be verified as to whether it is in the collection or not. If not, it is poisoned and mounted. If already there, it is compared with our specimen and the best one, or often both are retained. This is, of course, quite unavoidable, and occupies a large amount of the time of the assistants, as also does the looking out of parcels of specimens for sending away, for care must be taken not to send duplicate specimens to the same correspondent.

In my last report it is stated that the plant *Moraea spathacea* Ker. had been three times sent to me for indentification, being supposed to be poisonous to stock. Since then the plant has been tested and reported on by District Vet. Surgeon S. L. Amos, who kindly sent to me a copy of his report, which concludes as follows:—

> "From the manner in which this plant was eaten, the "clinical symptoms produced and the *post mortem* examina- "tion, I have no doubt in my mind that the plant Moraea "spathacea is poisonous to cattle and a very dangerous one "to have near any grazing ground. A small quantity is "quite sufficient to produce clinical symptoms, and not a "large quantity is required to be eaten to prove fatal."

During the year two other plants have been sent for identification under the idea that they were poisonous to cattle. They are *Diclis reptans*, Bth. and *Senecio bupleuroides*, D.C, The first-named I believe to be harmless, while I do not think that cattle often

if ever, eat the second. Since then the two closely allied plants, *Senecio Burchelli*, D.C. and *S. latifolius*, D.C., have been found to be injurious to cattle, full particulars of the experiments are given in the "Cape Agricultural Journal" for May of the present year. Both of these plants are natives of Natal. The former is found in the midland and upper districts. The latter I have gathered at Inanda, and it is very closely related to S. bupleuroides D.C., which is now known to be poisonous, or at least very deleterious, to cattle.

In my last Annual Report I gave a list of plants which had been identified during the year, and in many cases information as to their properties, and I now give a similar account of this work for the past year.

1. Identification of a plant, *Crassula arborescens*, Willd.; probably introduced.

2. Examination of several specimens of plants which were thought to be poisonous to cattle; all proved to be harmless but one, which was most likely a Phytolacca, but better specimens were required to be quite certain.

3. Examination of a grass from the upper districts which proved to be *Bromus unioloides*, H.B.K.

4. Identification of an Orchid, *Mystacidium filicorne*, Ldl.

5. Examination of 19 species of plants from Rhodesia, most of which were identified and the names forwarded to the sender.

6. Identification of three species of plants gathered near Barberton, Transvaal.

7. Identification of a grass which was said to remain green during the winter months in the upper districts; it proved again to be *Bromus unioloides*, H.B.K.

8. Information as to the probability of the cultivation of Ginger being successful in the midlands of the Colony.

9. Identification of *Barosma lanceolata*, Sond., which was supposed by the sender to be a heath, the plant really belonging to Rutaceæ.

10. Identification of three Orchids, belonging to the genera *Disa*, *Satyrium*, and *Eulophia*, the specimens not being sufficiently complete for certain specific identification.

11. Identification of *Morœa spathacea* Ker, now known to be poisonous to cattle.

12. Indentification of *Diclis reptans*, Bth., thought to be poisonous to cattle.

13. Information as to the growth of *Pithecolobium Saman*, Bth., the so-called Rain tree in the gardens; the reputation that this tree has had of attracting rain is purely mythical, its powers in this respect being no greater than those of other trees of similar habit.

14. Identification of 9 specimens gathered near Durban, some of them being escapes from cultivation.

15. Information as to the *Agaves*, *Fourcroyas*, and *Phormium tenax*, Forst, grown in the Colony, and as to where plants could be obtained.

16. Identification of an Orchid *Habenaria bonatea*, Reichb. f.

17. Identification of a grass from the upper districts which proved to be *Bromus unioloides*, H.B.K.

18. Identification of an Erica from 'Nkandhla.

19. Identification of a weed *Gomphrena globosa*, Linn., which was said to be rapidly spreading in the Colony.

20. Identification of 9 specimens from Drakensberg.

21. Identification of 11 indigenous plants.

22. Identification of *Watsonia densiflora*, Baker, a very imperfect specimen, it was thought to be injurious to cattle, no flowers were present, and it was most probably thought to be *Moræa spathacea*, Ker.

23. Identification of a Silene, most likely *S. Thunbergiana*, E. & Z., but specimen was imperfect.

24. Identification of a grass *Anthistiria imberbis*, Retz.

25. Identification of 9 indigenous plants with remarks about some of them.

26. Identification of a grass *Lolium multiflorum*, Lam., a native of Europe, found in a field in the upper districts.

27. Examination of a grass, a species of *Festuca*, not indigenous, and most probably worthless, also an imported *Oenothera*.

28. Identification of flowers of *Adenum multiflorum*, Klotsch, with information as to where plants of this species are likely to be met with.

29. Identification of *Senecio bupleuroides*, D.C., which is thought to be poisonous to cattle, with remarks as to its habitat.

30. Identification of 8 species of indigenous plants collected on the hills above Maritzburg.

31. Examination of a species of *Kniphofia*, which was said by the sender to yield a good fibre.

32. Examination of three species of grasses from the upper districts, viz.: *Bromus maximus*, Desf., a grass which it would be advisable to eradicate; a species of *Festuca* probably a good pasture grass, and a species of *Danthonia;* the specimens of the two latter were two small and incomplete for certain identification, and were probably accidentally included in the parcel.

33. Identification of *Centaura melitensis*, L., which was found growing with Algerian Oats, the seeds having been imported. The Centaurea is a native of Europe, and is occasionally found as an alien in Britain.

34. Examination of a species of *Echium*, which was thought by the sender to be indigenous, but is really an escape from some garden.

35. Identification of *Vanqueria latifolia*, Sond., an indigenous plant, and one of the plants infested by the destructive fungus *Hemileia Woodii*, Kalch & Cook.

36. Identification of 6 indigenous plants from the upper districts.

37. Identification of 7 indigenous plants.

38. Identification of 12 species of Transvaal plants, six of which were not in our collection.

39. Identification of a grass *Anthistiria imberbis*, Retz. var. *Burchellii*, Stapf., known in the upper districts as "Blue grass."

40. Identification of a grass *Bromus maximus*, Desf., with information as to the difficulty of eradicating it when it has once become established.

41. Identification of *Isoglossa Woodii*, C. B. Clarke, Syn. *Ecteinanthus origanoides*, T. And., with information as to its peculiarity of not bearing flowers every year.

42. Identification of a tree *Ximenia caffra*, Sond.; the fruit is eatable but rather acid, and the seeds contain a quantity of oil.

43. Identification of a grass *Bromus arvensis*, Linn , a native of Europe, not previously recorded from Natal, but has been found in Cape Colony.

44. Identification of fruit of *Ximenia caffra*, Sond.

45. Identification of a plant found in cultivated ground on the midlands; it proved to be *Silene Burchelli*, Oth., an indigenous plant.

46. Identification of a native heath, *Erica Woodii*, Bolus, gathered near Mooi River.

47. Identification of *Euphorbia Tirucalli*, Linn., supposed to be valuable as a source of gutta percha, with information as to previous trials of species of Euphorbia which were thought to be

useful as yielding "vulcanite" or "ebonite," but these trials seemed to prove that the industry would not be likely to be a commercial success.

48. Information as to the plants *Tacca pinnatifida*, Baker., *Maranta arundinacea*, from both of which "arrowroot" is obtained.

49. Examination of seeds and seed vessels of an Atriplex adhering to Mohair; the plant was almost certainly *A. holocarpa*, F. v M. The sender was of opinion that on account of their property of so readily adhering to wool, that the plant might possibly prove a nuisance in sheep farming districts. As I have no information as to their being so in other countries I sent the specimen with the wool to J. H. Maiden, F.L.S., Director of the Botanic Gardens at Sydney, asking for information on the subject.

50. Identification of 3 indigenous plants from the upper districts.

51. Information as to fibre-yielding plants suitable for the Colony, and identification of a leaf which proved to be that of *Agave americana*, Linn.

52. Information as to fibre plants, with special reference to *Agave rigida*, Mill. var. *sisalana*, and to Fourcroya.

53. Information as to fibre-yielding plants generally, but especially to the species Agave and Fourcroya.

54. Same as above, this and the previous application being from different persons in different parts of Transvaal.

55. Identification of a plant, which was correctly supposed to be injurious to wool; it proved to be an introduced species of *Alternanthera*. (This application was from Cape Colony.)

56. Identification of a grass, *Panicum pyramidale*, Lam. var. *hebetata* Stapf., found near Newcastle. This variety was not in our collection.

57. Information as to the probability of success of rubber and vanilla growing in Madagascar.

58. Examination of a mushroom, which was almost certainly *Agaricus* (*Lepiota.*) *africana*, Kalch. This fungus is certainly not poisonous, and is probably edible, but the specimen sent was not quite complete.

59. Identification of an indigenous, fibre yielding plant *Sanseviera thyrsiflora*, Thunb, with information as to be fibre obtained from this genus of plants.

60. Examination of an Orchid which proved to be *Mystacidium filicorne*, Ldl.

61. Identification of leaves of a tree from East Coast, whose seeds are said to contain 30 per cent. of oil; it proved to be a *Trichilia.*

62. Identification of seeds of *Trichilia emetica,* and information as to the probability of obtaining same in quantity for the purpose of soap making.

63. Identification of leaves of a plant, no flowers being obtainable, the plant was almost certainly *Platycarpha glomerata,* Less., the object of the sender being to ascertain whether the plant was likely to be useful for fodder, but of this I have no information, the plant is not common, and exists so far as known to me in Natal, only in Weenen and Klip River Counties.

64. Identification provisionally of a tree, leaves only being sent; the tree is almost certainly *Bridelia micrantha*, Planch.

With reference to the grass *Bromus maximus*, Desf., which is apparently spreading in the Colony, since it has been sent to me for identification from different parts of the Colony, as will be seen by the present and also my last Annual Report. I find in the "Cape Agricultural Journal" for June last a note by Mr. J. Burtt Davy, the Government Botanist for Transvaal, which I take the liberty of quoting as follows:—

> "The grass you send is as you suggest the 'Broncho' "grass of the Mediterranean region, *Bromus maximus*, Desf. "It is one of the most injurious veldt weeds that can be "introduced into the country. As a rule, stock dislike it "even when young; as it matures, the long barbed awns "get into their nostrils, mouths and eyes, often doing "damage; it also damages wool, and finally, on account of "its hardy drought resisting qualities, it is able to overtop "and choke out better and finer grasses, which may make "slower growth. I would therefore advise that Cape "farmers and stockmen should take a little trouble to "eradicate it before it takes hold of the district. I may say "that I have seen thousands of acres of valuable stock veldt "in California which have been ruined by this and other "grasses, such as *Bromus rubens* and *B. mollis.*

As one of my correspondents expressed his intention of cultivating this grass I think it advisable to give this warning. It was figured, with full description, by Dr. Stapf in "Natal Plants," Vol. 5 Part 3, Plate 458.

It was suggested to me at the time of the visit of the British Association that I should write a revised list of the plants of Natal. This is now nearly completed and will be published by the South African Philosophical Society when ready. As soon

after that is published as possible I propose to revise and publish with consent of the Committee the more popular list which has been in hand for so long a time, and which has been delayed partly by the press of other work and partly on account of the changes which are being made at Kew in the nomenclature of the species of the Order *Asclepiadaceæ*. From the information already given in the Flora of Tropical Africa I might be able to work out the species that we have, but unfortunately there are many of which we have no specimens, and even if we had them I should still be at a loss to supply the new specific names. It has therefore been suggested that the list should be published, leaving out the Asclepiadaceæ, but I have not yet decided to do so. It will depend upon how long it is likely to be before the part of the Flora Capensis containing this Order is published.

Three Parts of "Natal Plants" have been published during the year, viz., Part 4 of Vol. 4, completing the volume, and Parts 2 and 3 of Vol. 5, which contain grasses only, Part 4 of Vol. 4, and Part 3 of Vol. 5, being issued simultaneously. One Part more will complete the 5th volume, and I am pleased to be able to say that with very few exceptions all the known indigenous grasses will be figured when the volume is completed, and in addition some will be figured with which we are not credited in the Flora Capensis.

At the end of September, 1905, Miss Dean left, and has since married, and in March of the present year I obtained the services of Miss Neuman, and hope to be able to retain her for a time at any rate. She has been engaged in preparing specimens for the Herbarium Cabinets, entering them, looking out parcels for exchange, and various other necessary work, while Miss Franks in all her spare time has been engaged in dissecting and making drawings of the grasses which remain yet to be figured. As in consequence of the native disturbance very little collecting has been done during the best of the season, we have to fall back on our unnamed specimens, many of which have in consequence of press of other work been put aside for the time, and I hope to get many others ready for distribution as soon as the grasses are out of hand.

J. MEDLEY WOOD,

Director.