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REPORT

ON

NATAL BOTANIC GARDENS

AND

COLONIAL HERBARIUM

FROM

—❧— **JULY 1st 1901 to JUNE 30th 1902** —❧—

BY

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

*Corresponding Member of the Pharmaceutical Society of
Great Britain,*

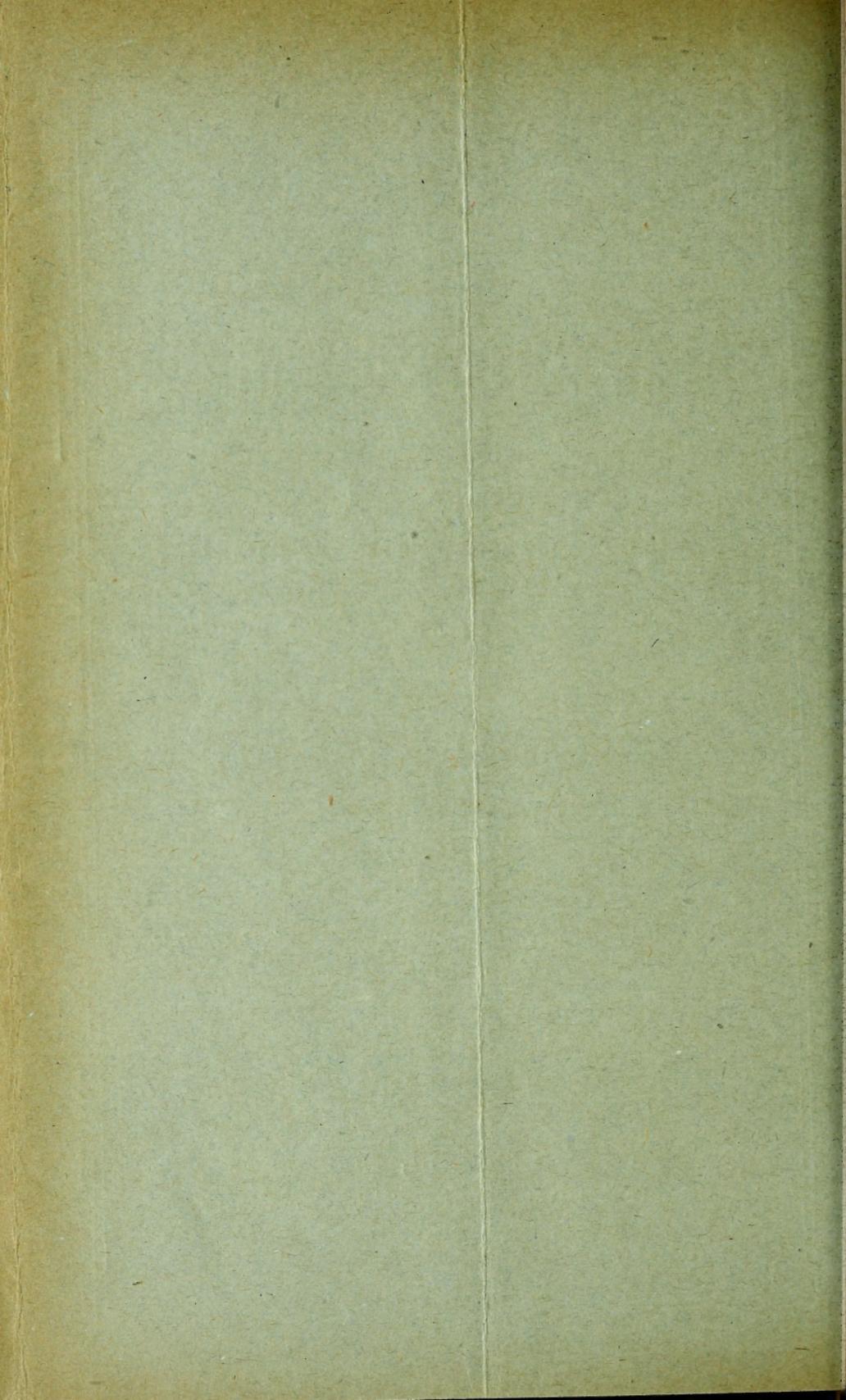
—❧— **CURATOR.** —❧—

DURBAN;

BENNETT & DAVIS, PRINTERS, 345, WEST STREET.

1902.





Durban Botanic Society.

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22084

DURBAN BOTANIC SOCIETY.

President :

SIR B. W. GREENACRE, K.B.

Committee :

MR. T. W. EDMONDS, MR. M. S. EVANS, M.LA.
HON. R. JAMESON, M.L.C. MR. H. H. PUNTAN.
MR. G. RUTHERFORD, C.M.G.

Government Members :

MR. J. S. STEEL. MR. J. D. BALLANCE.
Mayors of Durban and Pietermaritzburg, *ex officio*.

Sec. and Accountant :

MR. F. W. DORE.

Treasurer :

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

Curator :

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

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REPORT.



NATAL BOTANIC GARDENS,
JULY 1902.

TO THE PRESIDENT AND COMMITTEE,
DURBAN BOTANIC SOCIETY.

GENTLEMEN,

In presenting this my 21st Report on the work of the Botanic Gardens, I am pleased to be able to record a very favourable season, the rains have been frequent and copious, and the summer a cool one, especially in the earliest portion of it, during which time the plants did not make the progress that we had expected, but the latter portion of the season was rather more favourable than usual, in consequence probably of the cool spring, the Mango crop was almost a total failure the *Grevilleas* failed to ripen their seeds as usual, and the trees of *Poinciana regia* bore but very few flowers, an unusual occurrence with us. The rainfall for the year according to the Meteorological observations kindly supplied by the Government Astronomer amounted to 48.65 inches which is considerably above the average.

In consequence of the scanty supply of native and Indian labour, caused in a great measure by the large number of men employed by the military, who give higher wages than we can afford to give, but little has been done outside the ordinary routine work of the Gardens and Nursery, and we have in consequence of this and of the unreliable nature of native labour, been compelled to indent for six ordinary gardeners from India. They have not yet arrived, but may do so at any time, and buildings will have to be erected for them as soon as we have notice of their arrival, or of their departure from India. Until these buildings are erected we have a suitable building that can be temporarily used for the purpose without much inconvenience to ourselves.

The old Conservatory which has now been in use for I think nearly 19 years has become somewhat unsightly, and it has been decided to remove it and use it for storing plants, and as a kind of propagating house, and then to enlarge the Fernery

(which is at present far too small) by bringing it out nearly to the main walk, thus occupying the place of the old Conservatory, and I hope that before my next annual Report is written this work will be completed.

As the roof of the Corporation reservoir was dilapidated and required renewal an application was made to the Borough Engineer to have it covered with concrete on iron cross rails, and to allow us to use it as a tank in which to grow aquatic plants, and I am pleased to be able to say that the application was successful, and the staff of the Corporation have now nearly completed the work. This tank is 60 ft x 17 ft and will allow of 18 to 24 inches of water; in the centre is a pit for the purpose of growing the *Victoria regia*, the seeds of which we already have; other aquatic plants both indigenous and imported will also be planted, and every care will be taken to make this an attractive feature of the Gardens, and in my next Report I hope to be able to say that it has been made a success. The hearty thanks of the Committee and myself are due and offered to the Durban Corporation and the Borough Engineer for so kindly acceding to our request. The new building for the herbarium will be found noted in the accompanying Report on the work of the Colonial Herbarium.

Requests have been made to the Committee, the Curator and the Corporation for a gate to be placed on the opposite side of the Gardens to the present entrance, but for many reasons which will be evident to any person acquainted with the circumstances, and being familiar with the work of a Botanic Garden, it was impracticable to comply with this request. A path has however, been cut through the bush into Currie Road, and a set of steps made near to the Jubilee Conservatory, and as soon as the work is finished this entrance will be open to the public during the hours that the Jubilee Conservatory is open, and this should I think satisfy all reasonable demands.

I regret to have to report that we are still subject to depredations of various kinds; quite a number of Palms have been stolen from the Nursery, and we have not been able to obtain any clue that would lead to the detection of the thief, or thieves; damage to seats and smaller mischievous acts are occasionally committed, but with the exception of the Palms and one good seat completely destroyed, the damage has not been very great.

A number of fruits of "Coco de Mer" (*Lodoicea Seychellarum*) were offered for sale and we obtained half a dozen, which have been planted, but it will be a year or two before they germinate, if even they grow at all; the success of the plant in our climate is problematical, but is worth the trial.

<i>Echinocereus phoenicius</i>	<i>Echinocereus, propinquus</i>
„ <i>Salm dyckianus</i>	„ <i>Scheerii</i>
„ <i>stramineus</i>	
<i>Echinopsis Eylesii</i>	<i>Echinopsis decaisneana</i>
„ <i>grassneriana</i>	„ <i>Fischeri</i>
„ <i>nigerrima</i>	„ <i>Pentlandi maximiliana</i>
„ <i>tetracantha</i>	„ <i>turbinata</i>
„ <i>zuccariniana</i>	„ <i>zuccariniana</i> var <i>Rohl-</i> [<i>andii</i>]
<i>Epiphyllum Dr Slawecki</i>	<i>Epiphyllum E. Madlain</i>
„ <i>Madame E. André</i>	„ <i>Madame Fournier</i>
„ <i>makoyanum</i>	„ <i>Mr Belle</i>
„ <i>roseum amabile</i>	„ <i>spectabile carmineum</i>
„ <i>superbum</i>	„ <i>violaceum superbum</i>
<i>Mamillaria candida</i>	<i>Mamillaria centricirna divergens</i>
„ <i>foveolata</i>	„ <i>Lesaurneri</i>
„ <i>uberiformis</i>	<i>Opuntia albicans</i>
<i>Opuntia braziliensis</i>	„ <i>crinifera</i>
„ <i>cucotricha</i>	„ <i>cylindrica</i>
„ <i>dillenii</i>	„ <i>Engelmanni</i>
„ <i>ficus-indica, fruto alba</i>	„ <i>hyplacantha</i>
„ <i>imbricata</i>	„ <i>intermedia</i>
„ <i>leptocaulis</i>	„ <i>maculantha</i>
„ <i>megacantha</i>	„ <i>papyracantha</i>
„ <i>Tuna</i>	<i>Pereskia subulata</i>
<i>Phyllocactus Peacockii</i>	<i>Pilocereus senilis</i>
„ <i>German Empress</i>	

And several unnamed species.

Packets of seeds were received during the year as under :—

	PACKETS.
Aburi, Gold Coast	8
Adlam R. W. Johannesburg	9
Agricultural Department, Pietermaritzburg...	1
Ayling, J. H., Bulawayo	1
Ballance, J. D., Durban	4
Bell, ?	2
Billing, J. H., Salisbury	3
Botanic Gardens, Bangalore	1
„ „ Jamaica	1
„ „ Melbourne	60
„ „ Najpur	2
„ „ Ootacamund	29
„ „ Pietermaritzburg	1
„ „ Saharunpur... ..	288
„ „ Sierra Leone	1

Botanic Gardens, Trinidad	...	...	...	3
Bulley, A. K., Durban	...	...	...	1
Burnup, H. C., Maritzburg	...	...	...	1
Buysman, M., Netherlands	...	...	...	10
Colepper, E., Durban	...	...	...	2
Damman & Co., Naples	...	...	...	55
Dixson, Hugh, Australia	...	...	...	1
Dowset, W.	...	...	...	1
Elliott, Commander H.M.S. Beagle	...	...	...	1
Elstone, Lieut.	..	..	..	1
English, W.	..	..	..	1
Farrell, W. A., Mauritius	...	...	...	21
Forests Department, Capetown	...	...	...	2
Franceschi, Dr., Berkeley, California	...	...	...	36
Hanbury, Sir T., La Mortola	...	...	...	131
Harvey, J. C., San Juan Evangelisto, Mexico	...	...	...	5
Hawkins, J.	..	..	..	1
Herb & Wulle, Naples	...	...	...	65
Jameson, Hon. R., Durban	...	...	...	1
Johnston, Col. H. H., Mooi River	...	...	...	3
Kew Gardens, Director of	...	...	...	1
Ledger, W. E., London	...	...	...	1
Leichtlin, Max, Baden-Baden	...	...	...	4
McLean, G.	..	..	..	3
Palmer, G.	..	..	..	84
Pardy, J., Berea	...	...	...	1
Reasoner Bros., Florida	...	...	...	20
Royal Botanic Gardens, Calcutta	...	...	...	16
Sander & Co., St Albans	...	...	...	7
Schofield, J., Ixopo	...	...	...	1
Sprenger, C. C., Naples	...	...	...	109
Technological Museum, Sydney N. S. Wales	...	...	...	1
Thompson, Dr W. L., East Africa	...	...	...	21
Thornley, F.	..	..	..	1
Topham, Mrs J., Maritzburg	...	...	...	3
Wood, Jas., Zululand	...	...	...	1
Zanzibar Government	...	...	...	1

TOTAL 1,028

Packets of seeds were sent away as follows:—

	PACKETS.
Botanic Gardens, Aburi, Gold Coast	86
.. .. Adelaide, Australia	21
.. .. Bangalore, India	21
.. .. Brisbane, Queensland	21
.. .. British Guiana	21

Botanic Gardens, Cambridge, England	...	21
" " Hobart, Tasmania	... ..	21
" " Hong-Kong	... ..	21
" " Melbourne, Australia	... ..	21
" " Montreal University	... ..	23
" " Najpur, India	... ..	21
" " Ootacamund, India...	... ..	21
" " Port Darwin, Australia	... ..	21
" " Saharunpur, India	... ..	21
" " Sydney, New South Wales...	... ..	21
" " Trinidad, West Indies	... ..	21
" " Wellington, New Zealand	... ..	21
Royal Botanic Gardens, Calcutta	... ..	22
" " Ceylon	... ..	21
Agri-Horticultural Society of India, Calcutta...	...	21
Billing J. H., Salisbury, Rhodesia	... ..	3
Damman & Co., Naples	... ..	22
Franceschi Dr Berkeley; California	... ..	23
Fraser, M., New Zealand	... ..	13
Harvey, J. C., Mexico	... ..	23
Herb & Wulle, Naples	... ..	1
Sprenger, C. C. Naples	... ..	1
<hr/>		
TOTAL		574

DONATIONS.

The following donations have been made during the year:—

	£.	s.	d.
Nazareth Home Ball, Loan of Plants	...	5	0
Military Hospital Maritzburg	... ..	3	0
Government House, M.Burg (plants value)	56	11	0
Military Hospital, Maritzburg	... ..	6	6
" " Harrismith	... ..	6	5
Post Office, Stanger	... ..	2	11
Hebrew Congregation, (hire of plants)	... ..	3	3
P. W. Department for Umzinto	... ..	2	0
" " Stanger	... ..	2	0
Charity Ball. (hire of plants)	... ..	2	2
Military Hospital, Harrismith (plants value)	1	5	0
Magistracy 'Nqutu	... ..	5	0
Military Hospital No. 20.	... ..	1	7
Governor's Marine Residence	... ..	22	5
Young Ladies College, (hire of plants)	... ..	2	2
Zionists	... ..	15	0
<hr/>			
130			15
<hr/>			6

and in addition liberal discounts have been allowed on plants supplied or hired for charitable or religious purposes.

During the period between January 1st 1900 and June 30th 1901 we received 13 species of plants and 831 packets of seeds which resulted as follows:—

PLANTS.		SEEDS.	
Dead on arrival ...	0	Failed to germinate ...	239
Died afterwards ...	1	Germinated, but died [afterwards ...	180
Still in pots	12	Still in pots	150
		Annuals and vegetables...	95
TOTAL	13	Not suitable for our climate	81
		Duplicates	86
		TOTAL	831

The following plants were received during the year just ended:—

F. Adolphus Haage, Jr	78 species
Messrs Sander & Co.	11 „

The following plants were put out during the year:—

Acacia, sp. (Fever tree from Delagoa Bay)	Leguminosæ
Adenocalymna nitidum, Mart	Bignoniaceæ
Bauhinia, sp. climber from Rhodesia ...	Leguminosæ
Bignonia purpurea, Lodd.	Bignoniaceæ
Cassia, sp. from Mexico... ..	Leguminosæ
Clusia, flava, Jacq.	Guttifereæ
Cocos Weddelliana, H. Wendl	Palmae
Croton niveus, Jacq.	Euphorbiaceæ
„ tiglium, Linn	„
Kentia McArthur, ?	Palmae
Oncinotis inandensis, Wood & Evans ...	Apocynaceæ
Strophanthus hispidus, D.C.	„
Thunbergia grandiflora, Roxb	Acanthaceæ
Xanthorrhæa hastilis, R. Br. (Grass tree)	Juncaceæ

The following died during the year after being planted out in the Garden for some months:—

Cocos Weddelliana; Thrinax parviflora; Latania aurea; other plants of each have, however been put out.

The only new plant of note that has flowered during the year is Acalypha Sanderiana, which promises to be a good addition to our Gardens.

PUBLICATIONS RECEIVED.

BOTANIC GARDENS SYDNEY.

- Notes from the Botanic Gardens, by J. H. Maiden & E. Betcher.
 Observations on the Eucalyptus of New South Wales, by J. H. Maiden & H. Deane.
 Plants reputed to be poisonous to stock in Australia.
 Miscellaneous publications, 23 pamphlets.

UNIVERSITY OF CALIFORNIA.

- Pickling ripe and green Olives, by F. J. Bioletti.
 Feeding of Farm animals, by M. E. Jaffa and L. Anderson.
 Phylloxera of the Vine, by F. J. Bioletti.
 Tolerance of alkali by various cultures, by F. J. Bioletti, & E. H. Twight.
 The potato worm in California, by W. T. Clarke.
 Erinose of the Vine, by F. J. Bioletti & E. H. Twight.

ROYAL GARDENS CEYLON.

- Heliopeltis by E. E. Green, Government Entomologist.
 School Bungalow and Rest House Gardens, by the Director
 Cacao canker in Ceylon, by J. B. Carruthers, Assistant Director.
 Mosquitoes and Malaria, by E. E. Green, Government Entomologist.
 Camphor, by M. Kelway Bamber, Government Chemist.
 Annual Report of the Mycologist and Assistant Director.

COMMISSIONER OF AGRICULTURE, WEST INDIES.

- West Indian Bulletin. Vol 2, Nos. 1, 2, 3, 4. Vol 3, No. 1
 Scale insects of the Lesser Antilles.
 Bee keeping in the West Indies.
 Barbados Agricultural News.

SECRETARY FOR AGRICULTURE U.S. AMERICA.

- Grass and Forage plant investigations.
 Year Book Department of Agriculture.
 The truth about the Mammoth, by F. A. Lucas.
 Mammoth Ivory, by R. Lydekker.
 On the sense of smell in birds by M. P. Raspail.
 The fresh water biological Stations of the world, by H. B. Ward.
 The Law of Orientation among animals, by Capt. C. Reynaud.

- Funafuti ; The story of a coral reef, by W. J. Sollas.
 Have fishes memory, by L. Edinger.
 The theory of energy in the living world, and the physiology of alimentation by F. Dastre.
 Origin and distribution of the Cocoa Palm, by O. F. Cook.
 The Garden and its Development by Dr P. Falkenberg.
 Relation of motion in animals and plants to electrical phenomena, by J. B. Sanderson.
 Economic status of insects as a class, by L. O. Howard.
 The Tundras and Steppes of prehistoric Europe, by Prof. J. Geekie.
 The "Chayote" a tropical vegetable, by O. F. Cook.
 Range improvement in Arizona, by David Griffiths.
 Algerian Durum Wheats, by C. S. Schofield.
 Kentucky Bluegrass seed, harvesting and curing, by A. J. Pieters and E. Brown.

DIRECTOR OF EXPERIMENTAL FARM OTTAWA, CANADA

- Apple culture, and list of varieties suitable for Ontario and Quebec.
 Catalogue of plants in Experimental Farm, Ottawa.
 Results obtained in 1900 from trial plots of different crops.

REPORTS.

- Field Columbian Museum, Chicago, U. S. America.
 Royal Botanic Gardens, Calcutta.
 " " " Ceylon.
 " " " Singapore.
 Botanic Gardens, Grenada.
 " " Bangalore.
 " " Nilgiris.
 " " Missouri.
 " " Antigua.
 " " Antiguæ.
 " " Missouri.
 " " Sydney, N. S. Wales.
 " " Aburi, Gold Coast.
 " " St Lucia.
 Gardens and plantations Jamaica.
 Albany Museum, Grahamstown.
 Conservator of Forests Capetown.
 Experimental Farm, Ottawa, Canada.

Annual Report, E. Merck.
 Oklahoma Experiment Station, U. S. America.
 Government Cinchona Plantations and Factory, India.
 Secretary for Agriculture, Nova Scotia.
 Agricultural work for 1900, Barbados.

BULLETINS.

Royal Botanic Gardens, Jamaica. Vol VIII, Parts 6 to 12.
 Vol IX, Part 4.
 " " Trinidad, Nos 28 to 32 inclusive.
 Straits Settlements, Vol. I, Nos. 2 to 7 inclusive.
 Royal Gardens, Kew, Nos. 155 to 156 and 189 to 187 in-
 clusive.
 Central Experiment Station Ottawa, Canada.

MISCELLANEOUS.

Bulletin Herb. Boissier, one Part	...	Dr Schinz
History of Imperial Botanic Gardens, Berlin	... ..	Director.
Garden Beans	... ..	Botanic Garden Missouri.
Oklohama Experiment Station Circular No 3	... ..	Director.
Tropical timbers and their rings of growth, by H. Wright	... ..	Author.
Nova Scotia Crop Report	... ..	Secretary for Agriculture.
Pomelos, by Harold Hume	... ..	Reasoner Bros, Florida.
Some Citrus troubles, by Harold Hume Sunset Magazine...	... ..	" " Southern Paci- fic Co.
Journal d'Agriculture Tropicale	... ..	Editor.
Manchester Memoirs, Vol 45, No 9	... ..	Professor Weiss.
Annals of Congo Museum, Fasc. 2	... ..	Author.
Cultivation of Pineapples, and other products of Florida	... ..	W. Fawcett.
Victoria Journal of Agriculture, Part 1, 1902	... ..	H. W. Potts F.L.S
Studies of the Flora of Katanga, Fasc. 1, by Professor Wildeman...	... ..	Author.
Agricultural Journal of Ceylon, Vol 2, No 1	... ..	Botanic Gardens, Ceylon.

Proceedings Agri-Horticultural Society of Madras.
 „ Agricultural and Horticultural Society of India.
 Indian Gardening.
 Tropical Agriculturist.

INDIGO.—In my last Report I gave some information about the plant which has been known in Java and East Indies as “Natal Indigo,” and stated that I believed the plant to be *Indigofera grata*, E.M. At the request of Dr. Prain, Director of the Royal Botanic Gardens, Calcutta, I obtained specimens of the plant in flower and fruit and forwarded them to him, and he when in England took considerable trouble to identify the plant, and an extract from his letter will be found in the Report of the work in the Colonial Herbarium, from which it will be seen that the plant sent by me is the correct one, the only difference being that it is *I. arrecta*. Hochst and not *I. grata*, E.M., the true *I. arrecta* does not appear in the Flora Capensis, the one there described under that name is quite another plant and will have to find another name. We have in the Gardens specimens of the native plant and also of the plant reared from seeds gathered in India or Java and the two are quite identical. As considerable doubt exists as to whether or not the natural indigo will be able to compete successfully with the artificially made pigment, I take the liberty of copying an article on the subject which appears in the Agricultural Bulletin of the Straits and Federated Malay States as follows:—

Indigo.—A Consular Report on the trade of Marseilles and Lyons for 1900 states:—German artificial indigo is killing Indian natural indigo on the French market. The only possible remedy to the situation, full of peril to Indian planters, is the one already recommended in every other industry imperilled by Germany and the United States; combination and reform in methods. The question is very important to India, and I therefore venture to deal with the subject at some length.

Decreased Imports at Marseilles.—Indigo imports have steadily decreased in the last few years. Ten years ago the Marseilles market received 1,400 to 1,500 cases annually, whereas in 1899 direct imports did not exceed 600 cases. The import rose slightly during 1900. Of the 600 cases imported in 1899, 130 came from Java, 50 from Bengal, the remaining 420 from the coast of Coromandel. The causes of this decrease were as follows:—European buyers no longer care to compete against

the relatively higher prices paid by Japan and the Levant for Cormandel indigo of which they have now become principal buyers. The few Java planters of indigo who used to send their produce here, have now completely given up the cultivation of indigo, which no longer paid, for the cultivation of tobacco and sugar. Imports at Marseilles from Bengal have almost completely ceased, because, in the first instance, consumers buy from the growers direct more than they used to, small dyers receiving one or two cases direct from Calcutta during the season of public sales in that town, and lastly because the Havre Market now almost monopolised Bengal indigo, on which quality term sales are based.

The above-mentioned figures refer solely to indigo actually sold on the Marseilles market. Lastly, German competition in artificial indigo has already decreased the demand for natural indigo at least 10 per cent. at the close of the first year's operations of the German manufacturers in France. This proportion is bound to increase with the output of artificial indigo. The artificial dye already regulates prices. The small crops of last year would have justified a rise in the prices of natural indigo, but owing to the artificial produce put on the market, this has not taken place.

Artificial Indigo.—The researches of German chemists, with unlimited means at their disposal for that purpose, begun in 1865 by Her Von Bayer, resulted in 1890 in the chemical production, at commercial prices, of a dye having nearly all the qualities of Indian indigo, the substance obtained being chemically similar to that produced by the indigo plant. In 1897 Herr Heuman succeeded in producing this dye to which the name of "artificial" or "synthetic indigo" was given, from a cheap chemical substance of unlimited supply, naphthaline, by an easy process. One thing only appears wanting to make this dye perfect, it is not yet impervious to chlorine. But science as practised in Germany, with such eminently practical results, is expected before long to cope with this last remaining difficulty.

Two German firms are now operating in France in the Lyons district. The first to start was the Bedische Anilin und Soda Fabrik of Ludwigs-haven-am-Rhein, holder of the first patent. They established a branch house at Neuville-sur-Saone, near Lyons, where the dye has been manufactured for two years for local consumption. Another German firm who have patented another process, the "Farbwerke" formals; Lucius and Bruming, of Hoechstam-Main, have been selling their artificial

indigo to the French firm, Société Chimique des Usines du Rhone, of Lyons. They are now manufacturing their synthetic indigo in Lyons itself. Specifications of both these patents could be obtained in the usual way through patent office agents in Paris.

Artificial indigo exported from Germany into France is classed for duty with natural indigo. In the United States for some time the artificial indigo was classed with other colouring matters extracted from coal tar, as for instance, alizarine, aniline, which pay a high custom duty ad valorem, But on the representations of the German Government, this was altered to meet German demands. Artificial indigo was first launched on the French market under the name of "Indigo pure, B.A.S F. (Badische Anilin end Soda Fabrik)" and the pure product is still under the same name. But for facility of manipulation, the product is sold in the form of a paste containing 20 per cent of "Indigotina," convenient for transport and use. Goods dyed with artificial indigo are not required to be declared as such. They are sold under the class of goods "dyed with indigo." They are consequently sold at similar prices to goods dyed with natural indigo. Doubtless if the public were aware that the goods they are purchasing are dyed with the artificial dye, they would express a preference for goods dyed with the natural product, which has shown its worth by long experience.

Relative merits of natural and artificial Indigo.—I have taken the opinion of several leading merchants and dyers at Lyons and at Marseilles, and give their views in as concise a form as possible. Indigo not being used in the dyeing of silk, the Lyons dyers are not specially interested in the question. But Lyons dyers of cotton and woollen goods and Lyons dealers in indigo have been consulted:—

(a) Synthetic indigo is easily sold, and is especially appreciated by dyers when clear and pure tints are needed, as for instance, in the printing of "Indiennes," natural indigo is advantageously replaced by artificial indigo in all cases except when carmines and sulphates of indigo are employed for ground colour, in which case natural indigo is preferable because its resin and impurities serve to cover the fibre of the cloth, and give it a metallic sheen which cannot be procured with artificial indigo. Beyond this the artificial dye is equal to the natural dye, and there can be no doubt that the production of the latter is seriously menaced.

(b) Not only is the future market of indigo very seriously menaced, but in many dyeing establishments in France the German artificial dye has ousted it altogether. Their opinion of the synthetic indigo is that its composition is absolutely regular. This quality of uniformity in composition has the great advantage of facilitating manipulation, of enabling equal shades of colouring almost mathematically, to be obtained. It has the advantage of greater cleanliness, whence the possibility of obtaining more beautiful tints, which it is always easy enough to tarnish, if it is desired to imitate the tones of natural indigo of inferior quality. The artificial indigo was at first used without previous preparation by crushing. With equal quantities of both products, better results were obtained from natural indigo, but the yield of synthetic indigo was found to be greatly increased if previously crushed. There was then no loss. The cost of the artificial dye sold at the price of the natural product was thereby lessened. It was also found that the same mills, hitherto employed in the crushing of natural indigo, could be used in the crushing of the German dye. The change of dye by dyers entailed therefore no additional plant.

(c) All the small dyers in France have given up natural indigo for the reasons mentioned in paragraph (b). Another advantage to them is that they can order small quantities of the artificial dye as needed, and do not require to lay in a stock and insure it.

(d) Another authority informs us that synthetic indigo is easier of manipulation and more pleasing to the eye. It will gradually take the place of natural indigo in almost all cases. But as the vegetable dye gives more solidity to the cloth than synthetic indigo, it will still be used, either pure or mixed, by the great wholesale manufacturers of cloth for uniforms by Government contractors. Government inspectors are appointed to verify the nature of the dye used in the making of cloth for uniforms. There is consequently some hope of natural indigo not being altogether dispensed with. But how long this will last, in view of possible improvements of synthetic indigo, it is difficult to say. Doubtless the dyes are already being mixed to reduce cost. The German Government is said to leave the choice of the dye to the manufacturer of the cloth.

(e) The German manufacturers give the synthetic indigo the following praise:—(1) Great purity; vivid colouring. (2) Uniformity of quality. (3) Economy, as every bit of their dye can be used, whereas the vegetable dye always leaves a certain per centage of deposit, not utilisable, in the dye vat. It

can be employed without previous crushing; but this operation, with the old plant in use, gives still more profitable results. (4) It meets the requirements of small dyers, who can purchase it in small quantities as needed. The German manufacturers are confident that as alizarine red has taken the place of madder in the course of ten years, so their synthetic indigo will oust the Indian plant sooner or later.

This German opinion is, perhaps, somewhat too optimistic. I give at the close of these notes some opinions of experts on the other side; but, and this is the most important part of the whole matter, improvements of the Indian methods of cultivation and preparation will have to be made. The fight will be a hard one.

Demand, Output, and Prices.—The present output of artificial indigo in Germany is said on good authority to equal the natural product supplied by plantations of 100,000 hectares (247,000 acres) in India. Germany expects to make from 50,000,000 to 60,000,000 marks (£3,000,000) value of artificial indigo per annum. The appearance of this artificial indigo on the market, chemically similar to the chemical substance extracted from the plant, brought down prices to an alarming extent. In 1897 the product containing 60 per cent of pure indigo sold at fr. 30 per kilo, (10s 10d) per lb, in 1883 prices came down to 20 fr per kilo (7s 2d, per lb.) Prices now ruling are 17 fr 50 c. per kilo, (6s 4d per lb) delivered free at consumers works. It costs the manufacturer about 10 fr per kilo. (3s 7d per lb.) Mark the profit.

The plant of the Badische Anilin and Soda Fabrik cost no less than £9,000,000. Acetic acid one of the chemical substances required in the process, which is obtained from wood, is used to the extent of 2,000 tons annually. This means a consumption of 130,000 cubic yards of wood. The reader of these notes will thus be able to get a fair idea of the colossal nature of this German enterprise, the object of which is to wrest from the British Indian Empire the indigo market. With the discovery of new processes by competing German firms, an inevitable lowering of prices will follow, which natural indigo will find it hard to cope with. But the lowering of prices will not greatly affect the German industry, for pure indigotine could be sold in France at 12 fr per kilo (4s 4d per lb) at a profit. There can be no question of any rises in the prices of the substance, it is extracted from of sufficient importance to cause a rise in indigotine, the supply of coal-tar being illimitable. The demand for

iadigotine is already very great. One of the firms mentioned, the Badische Anilin and Soda Fabrik, have sold 1,000,000 fr worth (£40,000) of artificial indigo in one year in France. Both firms now operating in France cannot keep pace with the demand. As I have said above, both German firms are now manufacturing their indigo in France.

Conclusions.—It must be confessed that the outlook for Indian growers of indigo appears black enough almost to warrant their following the example of the planters in Java who have given up indigo for tobacco and sugar.

Some importers here are of opinion that the substitution of artificial for natural indigo is only a matter of time. It is to the interest of the consumers to favour a product that will put a stop to the too great variations in prices of a dye owing to the nature of the year's crop. They think that natural indigo will still hold its own for some time against its competitor owing to its durability as a fast dye. Madder had to give way to alizarine red, and cheapness, the dangerous weapon in all German competitive struggles, is an inducement very difficult to resist. If the dye will last the cloth, as in cotton print and woollen fabrics not exposed, like uniforms, to sun and rain, what advantage can the manufacturer on the Continent find in a dearer though better dye, if the cheaper be more attractive to the eye and gives so much greater profit.

The way out for Indian planters.—How is the German move to be met. There is a way out. It will be found in improved cultivation, on scientific principles, of the plant, and in improved methods of extracting the natural dye from the indigo plant. Considerable initiative and some outlay of capital is required. The old mechanical method of hand-and-foot labour, as handed down from generation to generation, without any thought of improvement, will have to go. The process of extracting the maximum quantity of pure indigotine from the vats is being closely enquired into by experts, I am told. Authorities in chemistry will undoubtedly succeed in obtaining increased proportions of colouring matter from the plant, which has hitherto not been expected to give more than $1\frac{1}{3}$ lbs. of indigo for 100 lbs. of the plant. At the present moment experiments are in progress in Cambodia, which will be of particular interest to indigo planters in British India. I am told that one Martinique planter has succeeded in obtaining a product containing 73 per cent. of pure indigotine, at a cost of 1s. 1d. per lb. This is a notably lower cost than that of artificial indigo as stated above.

It is thus far from a certainty that natural indigo will disappear from the market as soon as madder did when threatened by German chemical competition. Indigo planters willing to radically alter their old-time methods, improve their cultivation of the crops and alter the mode of extraction of the dye, and who by means of combination with official help, can make the necessary sacrifice that the changes will entail may take heart of grace. The last word has not been said yet on the subject of natural indigo.

Dr. Calmette's method of extraction.—Dr Calmette of Lille, has patented the following process for the extraction of indigotine from the plant. Hitherto the leaves of the indigo plant have been placed in masonry vats in layers. The vats are then filled to two-thirds with water, care being taken not to crush the leaves. The leaves are held down by planks, and water is let in to cover them. Fermentation then sets in, and the liquid, first yellow becomes by degrees green. The temperature of the vat rises, and soon the surface of the vat is covered by a film having a metallic sheen. In this operation "indican," the substance contained in the plant, transforms itself into glucose and white indigo under the influence of the fermentation caused by a bacillus living on the leaf of the indigo plant. The white indigo is transformed into blue indigo by simply beating up the liquid bringing it into contact with air.

A deposit of indigo flakes is formed at the bottom of the vats. It is boiled up with water, dried, and made into small cakes. The primitive method gave only about a third of the indigo contained in the plant. There is a considerable loss owing to the fermentation. Dr. Calmette has endeavoured to regulate this fermentation he suppresses it entirely, and treats the leaves in close vats at a temperature of fifty to sixty degrees centigrade, unexposed to the oxygen of the air. The extraction of the "indican" and its transformation into white indigo, takes about two hours under the influence of a special ferment "Diastase" hydrating and oxydating, which exists in the cells of the leaves. The liquid is then withdrawn from the warm maceration, and is cooled with cold air by some mechanical means. The white indigo becomes blue indigo but insoluble. By these means three times more indigo is produced than by the primitive method. The indigo thus obtained is very pure, and contains from 80 to 82 per cent of indigotine, the colouring matter of indigo."

It will be noticed that the writer of the above article says: "The last word has not been said yet about natural indigo.",

and it is evident that the planters in India are of the same opinion, since Mr H. A. Baily has been sent to Natal by the Indian Government and the Indian Planters Association to collect seeds of *Invisgofera arrecta* and to arrange for future supplies, in addition to which I have received lately inquiries from an Indian firm for 15 to 20 tons of the seed, applications from other persons having been previously received. It appears to me that to grow the seed for export would prove profitable to small farmers, but the quantity required would necessarily be limited. Why it should only be grown for the seed is a matter that planters might well take into consideration. Natal is its native country, it grows luxuriantly over a large portion of the colony, and as it is a legume and when cultivated for the pigment is treated as an annual, it might be grown between the rows of sugar-cane, so as not only to benefit the land, but also yield a profit, as also on land that has become partially exhausted from repeated crops of cane. A book has been published entitled "Sugar as an aid to indigo" I have sent for this book, and propose to refer to it on a future occasion. For the present it will be sufficient to say that as I understand a few tons of the seed would find a ready sale for export to India, and perhaps to other places also for at any rate some years to come, it would be worth while to collect the seeds now, and grow it for a crop to ripen next year, and as it is a perennial it would yield crops of seed for some years from the one planting.

Araucarias.—In my Annual Report for 1899 I noted that the largest trees of *Araucaria excelsa* which were planted in 1867, and are now therefore 35 years old, were dying out from the top, these trees still show signs of life, but are very gradually dying, while trees of *A. Cunninghamii*, *A. Bidwillii*, and *A. Cookii* planted at the same time and in close proximity to *A. excelsa* are still vigorous, of these I prefer the two last named as they seem to be more suited to the colony or at any rate to our part of it than *A. excelsa*, and *A. Cunninghamii* seems to be more subject to blight than the others, from what I have seen of them I can safely recommend them, especially *A. Bidwillii* and *Cookii* as suitable trees to grow for timber, of *A. Bidwillii* the late baron F. v. Mueller says: "A tree attaining 250 feet in height, with a fine grained hard and durable wood particularly valuable for furniture; it shows its beautiful streaks best when polished *** Growth at Port Philip 30 to 40 feet in 20 years." Our tree which was planted in 1867 is now 60 feet in height, and 7 feet in girth at 6 feet from the ground, and is quite healthy. Of *Araucaria Cunninghamii* Baron Mueller says:

“This tree attains a height of 200 feet, with a trunk 6 feet in diameter. Growth in height at Port Philip 30 to 40 feet in twenty years. The timber is fine grained strong and durable if not exposed to wet and dry influences; it is susceptible of a high polish, and thus competes with satin-wood, and in some respects with birdseye maple. Value in Brisbane £2 15s. to £3 10s. per 1,000 superficial feet. The tree grows on alluvial banks as well as on rugged mountains, overtopping all other trees. Araucarias should be planted by the million in fever regions of tropical countries for hygienic purposes, on account of their antiseptic exhalations.”

Our tree planted at the same time as *A. Bidwillii* is now 90 feet in height, and 5 feet in girth at 6 feet from the base. Of *A. excelsa*, Baron Mueller says:

“A magnificent tree of unsurpassed symmetry, sometimes to 220 feet high, with a stem attaining 10 feet in diameter, and with regular tiers of absolutely horizontal branches, one for each year. The timber is useful for shipbuilding and many other purposes. Growth in height at Port Phillip about 40 feet in 20 years. With *A. Cunninghami* amenable to almost any soil, except a saline one, and not subject to any disease. Endures also the vicissitudes of the climate of lower Egypt.

Our tree planted at the same time as *A. Bidwillii* is now 80 feet in height and 3 feet 9 inches in girth at 5 feet from the base. Of *A. Cookii* Baron Muller says:

“New Caledonia where it forms large forests. Height of tree to 200 feet. Habit and technical value similar to those of *A. excelsa*. Growth at Port Phillip not quite 30 feet in 20 years.”

The tree of *A. Cookii* planted at the same time as the others is now 90 feet in height and 6 feet in girth at 6 feet from the base. We have a large number of plants of all of these trees except *A. excelsa*, and it is to be regretted that more of them have not been planted, especially in the coast districts, and it is quite possible that in a soil more humid than that of the Botanic Gardens, that they might succeed even better than they have done with us.

Dammara australis. “Kauri Pine.”

Baron Mueller says of this tree:

“This magnificent tree measures under favourable circumstances, 180 feet in height and exceptionally 17 feet in diameter of trunk; the estimated but over rated age of such

“ a tree being 700 to 800 years. It furnishes an excellent, “ remarkably durable timber, straight grained, and much in “ use for masts, boats, superior furniture, casks, rims of sieves, “ and is particularly sought for decks of ships, lasting for the “ latter purpose twice as long as the deal of other pines. It is “ also available for railway break-blocks and for carriages, and “ regarded as one of the most durable among timbers of the “ Coniferæ. Braces, stringers and tie-beams of wharves re- “ mained, according to professor Kirk, for very many years in “ good order under much traffic. In bridge building also the “ Kauri-timber gave excellent results; it can likewise be used “ advantageously for the sounding boards of pianofortes. Kauri- “ wood is also used for light handle of many implements, and “ for various instruments, including stethoscopes, for wool- “ presses, the bodywork of wagons, butter casks, brewers vats; “ further in ship-building for bulwarks, and also for the sides “ of boats. In strength it is considerably superior to Baltic Deal “ Kauri ought to be extensively introduced into our densest “ forests. Auckland alone exports about £20,000 worth of “ Kauri-timber annually. It is easily worked, and takes a high “ polish. This tree yields besides the Kauri-resin of commerce, “ which is largely obtained from under the stem. The greatest “ part is gathered by the Maories in localities formerly covered “ with Kauri forests; pieces weighing a ton have been found “ in such places. The value of this resin, as exported from New “ Zealand, in 1883 was £359,936 in 1885 it was £253,929, but in “ 1886 only £132,256, the London price being about £50 the “ ton. The varnish made from it is almost colourless. Recent “ vast destruction of Kauri-forests through fire render the “ establishing of this tree elsewhere all the more imperative.”

Our trees of which we have two, are 80 feet in height, and 5 feet in girth at 6 feet from the ground, one of them has borne seeds and plants have been reared and distributed for trial in other localities.

Dammara alba (D. *orientalis* Lambert.)

Baron Mueller says of this tree :

“ Agath Dammar ” Indian Archipelago and mainland. A “ splendid tree, up to 100 feet high, with a stem to 8 feet in “ diameter, straight and branchless for two-thirds of its length. “ It is of great importance on account of its yield of the trans- “ parent Dammar resin, extensively used for varnish.”

We have one tree bearing this name, it is about 70 or 80 feet in height, with girth at 6 feet from the ground of 3 feet 3

inches, unfortunately it is branched at almost the base, the two stems being almost the same size, but it does not agree with the description given above, as it is leafy almost to the base, and I think it quite possible that it too is really *D. australis*; it has not yet borne any seeds.

One correspondent residing near Gillitt's says of these trees :

"I am in receipt of yours of the 21st instant with regard to the "Kauri Pines" that I obtained from the Gardens some few years ago. The plants, without one single exception did extremely well, not one single failure in all you sent, and the trees are now from twelve to fifteen feet high, and looking well. The only drawback with them is that the tops are extremely tender, in fact more like cabbage than tree tops and as a matter of course more or less liable to be broken off by the wind, but they soon form a second top and grow as vigorously as ever, in fact they rival in rapid growth the ordinary Australian blue gum."

Another correspondent writing from Karkloof in answer to my enquiries says :

"Yours of the 2nd instant re "Kauri Pines" I believe I got them small plants in that year (1886), three of them, the photo sent is the tallest being in a sheltered spot, another is nearly as high, the third gets plenty of sun and wind, and is on a dry bank, it has had its leading shoot broken by the wind three or four times, but it always gets another to take the place of the lost one. I think this the finest tree I have had from you, leaving out the Araucarias; the following is the height of the three Kauris, No. 1, 15 feet 6 inches; No. 2, 13 feet 6 inches; No 3, 9 feet 6 inches."

On the back of the photo he writes "about $4\frac{1}{2}$ inches in diameter 1 foot above the ground."

I think that the above letters show that the "Kauri Pine" is well suited to Natal, and that it will grow in favourable situations from the coast to at least 4000 feet altitude above sea level.

Cedrela odorata. "West Indian Cedar."—This tree also yields a light wood "chosen by preference for cigar boxes." The original tree was planted in the Gardens in 1869, and is now 65 feet high, with a girth of stem at 5 feet from the

ground of 6 feet 8 inches, it bears seeds in abundance and numbers of plants have been reared from them, but the accounts of them are rather conflicting, and it has not always been a success, though a plant put out in the Gardens in 1884 is now about 40 feet in height, and has a girth at 5 feet from the ground of 3 feet 3 inches, but some trees planted at Lower Umzimkulu in the same year are much larger than that. It is only suited for the coast districts.

Cedrela Toona. The "Toon, tree of India." In the "Guide" to the trees in the Gardens published in 1897, it is stated that this is a valuable timber tree, reaching 70 feet in height, one of the best woods for furniture, and takes polish well. Durable and not liable to attacks of white ants. Sometimes called "Chittagong wood" or "Singapore Cedar." Fruit and bark used medicinally. This tree was planted in 1886.

Aleurites triloba. "Candleberry tree." In my Report for 1899 I gave some information as to the yield of nuts from one of these trees in the Gardens, and stated that I had been informed that they were worth for the oil contained in them about £8. 0. 0. per ton. By the kindness of Messrs Steel Murray & Co. a box of the nuts was sent to England and a report on them obtained by that firm, but I regret to say that it was on receipt found to be altogether unfavourable, in fact it was stated that the nuts had no commercial value in England. I was afterwards informed that this was a mistake, and that the nuts were exported from Fiji, and other places in quantity for the purpose of extracting the oil which was used for soap making and other purposes, I therefore wrote to the Curator of the Botanic Gardens at Fiji for information on the subject, and his reply lately received is as follows:—"The tree grows here and all over the colony, but the nuts are not utilised in any way to my knowledge, I think they were once tried but proved a failure" I think it most likely that the reason is that the shell of the nut is so hard that special machinery would be required to break it without injuring the kernel, there is no doubt but that the kernel contains a clear light coloured oil, a sample bottle of which extracted in Durban was for some time in my possession. The tree is a handsome one, and a quick grower, and is worth cultivation as a shade tree, but I do not think that it will succeed far from the coast.

Citrus trees.—The demand for these trees still continues unabated, and large numbers are being planted, not only in Natal, but also in Transvaal and Rhodesia. By far the greater number of the plants that we send out are grafted upon Lemon

stocks, and we constantly hear good accounts of their progress, occasionally however, objections are made to grafted plants, and often for absurd reasons; for instance I was asked not long ago how it was that grafted plants so often bore sour fruit, I said that it was the first time that I had heard such a statement made, but was told that in a plantation of grafted trees in the coast district a large proportion of the trees yielded sour fruit, a few days afterwards I found the following, extracted from a Bulletin issued by the Botanic Gardens at Trinidad:—

“Some advance has been made in the propagation of the imported kinds of orange during the present year, and a fairly good stock of strong budded plants is now on hand. This it is trusted will do away with the complaint so frequently heard of oranges proving sour when raised from seed, a case of which occurred during the previous week.”

This we can understand as it is far more likely that trees reared from seed will bear sour fruit, than that grafted trees will do so, the fact being that grafted trees will bear similar fruit to the tree from which the scion was taken. It is nevertheless a fact that orange trees whether grafted or seedlings will, after having yielded good fruit for a longer or shorter time, produce fruit that is sour and almost uneatable, a case of this kind is within my own knowledge, the reason being that the trees had been neglected, and no manure of any kind had been supplied to them for some years. The American saying about these trees is very true “Feed your trees and they will feed you, starve them and they will starve you.” Another absurd idea has taken possession of the minds of some people, who are quite prepared to prove their statements by facts (so-called), it is that seeds taken from an orange grown on a tree that has been grafted on a lemon will produce lemons, not oranges, but beyond contradicting this statement it is not worth while to say more about it.

MEDICINAL PLANTS.

Moschosma riparia.—This plant is well known in the coast and midland districts of the colony, and is figured and described in “Natal Plants” Vol 1, plates 1 & 2. It is singular amongst the Labiatae, the order to which it belongs, from the fact of its being dioecious, that is bearing its staminate and pistillate flowers on separate plants, and as stated in the note in Natal Plants, it is used medicinally by the natives. In April last I received a letter from a medical man in England who said: “I have been informed that a plant called *Moschosma riparia*

“indigenous to Durban and district has very powerful medicinal action in controlling epidemic influenza and some forms of enteric, if this is so I should like to obtain some of the plant and try it.” A few days afterwards a circular letter from the War Office was sent for my perusal and for information about the plant, I replied that some of the information in this letter was taken almost verbatim from “Natal Plants,” and I promised to obtain leaves for trial. I asked Mr Wylie on his recent trip to Zululand to keep a lookout for the plant and collect leaves and young shoots, and have them dried, which he did, 3 sacks of these leaves yielded when dry about 7lbs, half of this was sent to my Home correspondent, who was the first applicant, the other half was handed over to Colonel McCormack, R. A. M. C. for transmission to England, with also a small quantity of the dried twigs and young leaves for trial there. It will most likely be some time before any reliable information will be received about it, but it is my intention to have a few plants reared in the Gardens, and seed collected in the season for distribution, the plants in the Garden are unfortunately both male, and I therefore wish to obtain female ones also, as even though the plant should not be found to have all the virtues it is credited with, I still believe that it is not altogether without efficacy, and in addition it is a very ornamental plant

Ipomoea congesta—A small quantity of this plant consisting of the stems and roots has been sent to Messrs Burroughs & Wellcome as stated in my last Report, and since then they have asked for a further supply which has been sent to them, and it is to be hoped that the plant may be found to have some value, it is not uncommon in the coast and midland districts, and the natives uses it as an aperient.

Monsonia ovata.—Of this plant I have no further information to report, the tincture is commonly used in cases of dysentery, but perhaps, not always with success. Seeds of the plant have been distributed to most of our correspondents, but I have no report as to the success of the plant in other countries, here it grows almost as well as it does in the upper districts.

Paspalum dilatatum.—The first person to bring this grass to the notice of Natal farmers was I believe the Hon. F. R. Moor, M.L.A. who on his return from Australia brought with him some of the seeds, and gave very favourable accounts of its value as a fodder grass. I had previously collected it at Newcastle, believing it to be *P. scrobiculatum*, a grass which is said to be poisonous to cattle when in seed, a mistake which was not rectified until I had collected the real *P. scrobiculatum*,

and both were submitted to the Herbarium at Kew for report. As stated in my last Report I again visited Newcastle and brought a number of the plants with me, these were planted in the Gardens, and are now growing in close proximity to plants of *P. dilatatum* reared from seed imported by Government from Australia, and they prove to be practically identical specifically, since then the plant has been found by Mr F. Churchill near Gillitts, by Mr Claude Fuller near Maritzburg, and others, but it is certain that the plant is not indigenous, but imported accidentally, and has evidently been for some years in the colony unrecognised.

In my last Report which ended June 30th 1901 I stated that though the growth of the plants had ceased for the season they still remained green and succulent, and they remained in this condition until growth commenced again, which was but a very short time, and since then seeds have been produced in great abundance and distributed to applicants. A small patch of it was cut in April, and another early in May, in both cases leaves were produced almost immediately, and both are now green and succulent, in spite of the very cold and dry weather that we have had.

In the Legislative Assembly at Melbourne a discussion arose as to the advisability of planting this grass on the sides of the railways as a preventative of grass fires, and one member (Mr Madden) said of it :

“ This grass was introduced to Victoria by the late Baron Mueller. Its greatest advantage was that it would keep green and succulent through the hottest summer and would never burn at any part of the year. That was quite apart from its excellence as a fodder plant, for it was more luxuriant and more fattening than lucerne. Another point was that it would grow upon any land whether white sand or black soil.”

The Melbourne Argus in an article on this grass says :

“ At the present time amongst the many plots to be seen in this district is one in the very heart of the town. It was put in last season by Mr McKnight and is about one eighth of an acre in extent. It took 1,000 plants to cover this area. They were put in 18 inches apart, with a similar distance between the rows. The plant was of course allowed to go to seed. This seed was not gathered. The result is that to-day all the interstices between the plants and the spaces between the rows, are covered with a mass of seedlings which are

“springing up with wonderful rapidity since the hot weather set in. All the other grasses in the vicinity are becoming bleached, and are dying off, but this plot of paspalum, which has never been watered, and never tended with special care, is as green as a leek, and as succulent as any fodder can possibly be”. The article concludes by saying: “What is required to induce farmers to grow this grass more extensively is not exhaustive experiments”, but an exhaustive drought. This would drive them to this drought resisting fodder plant, and if it did this, the drought would indeed eventually prove to have been a blessing in disguise.”

From our experience with it here I believe it to be the best fodder plant for the coast districts that has yet been tried, and I should recommend every farmer who has cattle or horses to feed, to have at least a small patch of it, more especially for winter feeding, “Guinea grass” is good for the summer, but is not available in the green state in the winter months, while paspalum is available all the year round with ordinary care.

Manihot utilissima.— “Cassava.” In my annual report of 1892 I alluded to this plant, and gave an extract from the *Florida Despatch* showing its value as a food plant, and again in my annual report for 1896, I stated that cuttings of nine different varieties of it had been obtained from the Botanic Gardens of Mauritius, some yielding heavy crops and being used for cattle food, others yielding lighter crops, and being more suitable for human food, and I also gave a description of the manner in which the roots are prepared for food in Mauritius. By the kindness of a friend in Mauritius I obtained a box of biscuits made from the tubers of these plants, and these if produced in the Colony would I think find a ready sale, I regret, however, to say that but very few applications have been made to us for cuttings, though a few have been sent out, and we still have them in stock. I note that in a local paper the cultivation of the plant is again advocated, and I therefore take the liberty of quoting largely from two articles in the *Tropical Agriculturist*, one appeared in the issue for May last, and this one I take entire, the second appeared in the June issue, and as this is a lengthy article by Mr. Robert Thompson, formerly Superintendent of the Botanic Gardens of the Government of Jamaica, and has special application to Jamaica, I do not quote entire, but make somewhat copious extracts as follows:—

“About three years ago an American tourist in Jamaica, Mr. Perkins, was struck with the value of Cassava as a

“starchyielding plant. On his return to Florida he organised a company and erected a great factory at Lake Mary, 18 miles from Orlando, for the manufacture of Cassava starch. I visited the factory at the end of June, and was kindly permitted to see through it, the managers taking a great interest in Jamaica. One thousand acres of Cassava are cultivated in the vicinity, hundreds of acres of which by gentlemen connected with the factory. There are fields of 100 acres each which I had the pleasure of inspecting. Within 60 miles of the factory the managers purchase the tubers delivered at railway stations at \$5 per ton, and the culture is extending rapidly.

“This factory crushes 40 to 50 tons of tubers daily during the cropping season of four months. This plant grows remarkably well on the always present sandy soil I pointed out that larger returns would be obtained from a better soil, in fact, double the crop. The yield of starch from the tuber is 17 to 20 per cent. It is also noteworthy that the manufacture of tapioca and dextrine from Cassava are to be taken up with the least possible delay.

“During my sojourn in Florida I collected other valuable information regarding Cassava as an article of food for cattle, etc. Indeed, Florida is determined to make Cassava a leading staple product. The matter is discussed everywhere. From the report of the Professor at the Florida Agricultural Experiment Station, I make the following extracts: “With all the facts procurable, and with the experience not only of myself, but of many practical farmers to support the opinion, I have reached the conclusion that, all things considered, Cassava comes nearer furnishing the Florida farmer with a more universally profitable crop than any other which he can grow on equally large areas. It can be utilised in more ways, can be sold in more different forms, can be more cheaply converted into staple and finished products, and can be produced for a smaller part of its selling price than any other crop. It is unquestionably true that cassava, all things considered, comes nearer supplying a perfect ration for farm stock than any other concentrated food produced upon Florida farms. Every beef animal in Florida can be put in the condition of western stall-fed cattle by the simple use of cassava at a mere fraction of the cost to the corn feeders of the west. An acre yielding 40 bushels of corn would at this rate produce 1,187 lbs. of starch, while an acre of cassava producing 6 tons would yield 2,400 lbs. of starch. It thus appears that cassava is today the cheapest known source of starch, costing at present

“market values of raw material only about one-fourth as much
 “as its nearest competitor. Not only therefore the high yield
 “of starch in cassava place it prominently before manufacturers
 “as a probable new material for the great glucose industry, at
 “present practically dependent upon corn, but moreover
 “cassava contains two other constituents worthy of considera-
 “tion in this connection, namely, its 3 per cent. of sugar.
 “against the 0·4 per cent. in corn, and 1·68 per cent. of fibre, as
 “compared with 2·20 per cent. of corn. Manufacturers are now
 “considering the importance of these facts, and there is good
 “reason for expecting the erection of at least two gluco
 “factories in the near future, which will depend upon cassava
 “for their raw material.” The same authority says in another
 “report: “The actual profit on the feeding of the cassava
 “steers was 48·42 per cent. on the investment. The cotton
 “seed steers returned a profit of 37·43 per cent., and the corn
 “fed steers 14·98 per cent. The difference between lots 1 and
 “2 is decidedly apparent, and shows cassava to be very
 “materially the cheapest and best ration which can be used for
 “fattening purposes. The most astonishing fact, however, is
 “the very great difference demonstrated between the cost and
 “the result of feeding corn and feeding cassava, the difference
 “being almost two-thirds in favour of the latter. Cassava
 “proves itself a most superior beef fattening food. . . .
 “I pointed out that the cassava is peculiarly drought resisting
 “flourishing as it does in arid regions, as well as in humid
 “regions. Thus about 14 inches of rainfall secured abundant
 “crops, whereas for rice cultivation from 50 to 60 inches are
 “requisite. I also pointed out that some of the varieties when
 “cooked as Irish potatoes rival that edible in point of palat-
 “ableness. . . .

“The cultivation is exceedingly simple; it thrives under
 “the most diverse conditions of climate, on the Liguanea and
 “other dry plains, on rocky hill sides, as well as on humid
 “plains and hills wherever the soil is friable or gravelly. To
 “obtain large crops it must be planted annually; it may be
 “planted twice a year in Jamaica; the roots or tubers can be
 “dried to keep for some time, thus the weight is greatly
 “reduced for transport to be brought from distant parts to a
 “factory. . . . As a matter of fact an acre of it is
 “worth more than an acre of sugar cane.”

The other article is as follows:—“The cultivation of cassava
 “or Manioc (*Manihot utilissima*) is spreading rapidly in Florida
 “and the neighbouring States. One great advantage is that
 “the plant grows in sandy soils unsuited to most crops, and can

“ be fertilised by means of leguminous crops without the aid of other manures. The acre is said to yield 8 tons of roots, and the starch got from it is sold for $2\frac{1}{4}$ d. per pound, while it goes six times as far as the best wheat starch at 3d. per lb. As a cattle food it is a great acquisition, making it possible, so it is said, to put on a pound of carcase at the cost of a little over $\frac{1}{2}$ d.”

Rubber Yielding Plants.—I have frequent applications for seeds or plants of *Castilloa elastica*, or *Hevea braziliensis*, and am compelled to reply that it is quite unlikely that either of these trees will succeed in Natal. A plant of *Castilloa elastica*, which we had in the Gardens, grew a little in the summer months, but died to the ground in the winter, and finally disappeared altogether during last year. *Hevea braziliensis* we have not tried, but it is quite unsuited to the climate of Natal. 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, and the atmosphere is excessively damp, these being conditions which are not found in any part of Natal. *Manihot Glaziovii* grows well here, but the expense of collecting the rubber would, I fear, equal, if it did not exceed its value when collected; the trees also are very brittle, and liable to be damaged by high winds. *Landolphia Kirkii*, and *L. florida*, we have in the Gardens, but their growth is slow, and I fear that they would not succeed commercially.

Euphorbia, spp.—The aborescent species of this genus have often been suggested as a source of rubber, or of some substance akin to it, but experiments made in the Cape Colony in the years 1863 and 1864 showed that it was not likely to prove a profitable industry. A sort of Ebonite was made from it in small quantities, but on sending the sap to England for trial the recipients said:—“ I much regret to say we cannot turn the *Euphorbia* milk or juice to account. We can but get it into a solid condition, and that only with difficulty and expense. It is then found to be of little value compared with India rubber, gutta percha, or hulata (*Sapota muherii*), so that I dare not encourage a hope of ever offering a price that would pay freight, let alone expenses.”

The European staff has not been changed, except that Mr. Blunden's place was taken by Mr. R. Smith. Mr. Wylie and Mr. Harman have now completed 20 years' service, and Mr.

Rutter 11 years, and I am pleased to be able to offer my hearty thanks to the whole of them for willing and efficient service. To my chief assistant, Mr. Wylie, my special thanks are due, he takes entire supervision of the Garden and Nursery work, often under difficult conditions in consequence of the scarcity of coloured labour, which so very frequently handicaps us in the prosecution of our work.

I have the honour to be,

Gentlemen,

Your obedient servant,

J. MEDLEY WOOD.

ABSTRACT OF METEOROLOGICAL OBSERVATIONS

FOR YEAR ENDING 30TH JUNE, 1902.

	1901.												1902.											
	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	April.	May.	June.	Year.	Jan.	Feb.	Mar.	April.	May.	June.	Year.				
Barometer—Highest	In. 30·494	In. 30·532	In. 30·565	In. 30·520	In. 30·452	In. 30·270	In. 30·311	In. 30·288	In. 30·296	In. 30·305	In. 30·469	In. 30·541	30·565	In. 30·311	In. 30·288	In. 30·296	In. 30·305	In. 30·469	In. 30·541	30·565				
Lowest	29·718	29·991	29·720	29·823	22·337	29·580	29·557	29·795	29·668	29·743	29·749	29·695	29·557	29·557	29·795	29·668	29·743	29·749	29·695	29·557				
Mean, 9 a.m.	30·273	30·288	30·257	30·187	30·044	30·005	29·992	30·059	30·045	30·068	30·212	30·171	30·133	29·992	30·059	30·045	30·068	30·212	30·171	30·133				
Thermometer in shade—	Deg. 82·6	Deg. 97·9	Deg. 91·2	Deg. 88·0	Deg. 98·8	Deg. 94·1	Deg. 92·1	Deg. 95·2	Deg. 93·8	Deg. 86·2	Deg. 83·5	Deg. 78·3	98·8	Deg. 82·6	Deg. 95·2	Deg. 93·8	Deg. 86·2	Deg. 83·5	Deg. 78·3	98·8				
Highest	46·8	49·7	52·0	53·5	55·6	59·6	56·4	60·5	59·2	56·9	52·0	47·4	46·8	56·4	60·5	59·2	56·9	52·0	47·4	46·8				
Lowest	59·8	64·4	65·8	68·0	72·0	7·47	74·0	78·2	74·5	70·1	66·5	61·6	69·1	74·0	78·2	74·5	70·1	66·5	61·6	69·1				
Mean, 9 a.m.	73·1	75·3	73·4	75·4	80·3	84·2	82·7	87·1	84·1	80·2	77·4	78·3	78·9	82·7	87·1	84·1	80·2	77·4	78·3	78·9				
Maximum Thermometer	52·0	55·8	57·0	59·8	63·7	66·6	66·5	68·6	66·7	63·3	59·3	52·6	61·0	66·5	68·6	66·7	63·3	59·3	52·6	61·0				
Minimum	·02	3·17	7·07	3·20	8·17	3·89	6·35	2·09	10·23	2·52	1·21	·73	48·65	6·35	2·09	10·23	2·52	1·21	·73	48·65				
Rainfall in inches	No. 3	No. 8	No. 16	No. 21	No. 24	No. 22	No. 23	No. 12	No. 20	No. 9	No. 10	No. 3	171	No. 23	No. 12	No. 20	No. 9	No. 10	No. 3	171				
No. of Days on which rain fell	0·72	0·74	1·00	1·16	0·85	1·18	1·27	0·99	0·99	0·87	0·75	0·61	0·98	1·27	0·99	0·99	0·87	0·75	0·61	0·98				
Wind—Mean force of	1·52	2·77	5·45	6·44	7·22	6·81	6·52	4·41	5·84	3·49	2·36	1·34	4·51	6·52	4·41	5·84	3·49	2·36	1·34	4·51				
Cloud—Mean amount of																								

Colonial Herbarium.

REPORT

FROM

❧ JULY 1st, 1901, to JUNE 30th, 1902. ❧

—BY—

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

*Corresponding Member of the Pharmaceutical
Society of Great Britain,*

CURATOR OF BOTANIC GARDENS,

DURBAN.

COLONIAL HERBARIUM.



During the year ending June 30th, 1902, the number of dried specimens in the cabinets have been increased from 26,758, as stated in my last report, to 27,953, of which 9,089 are South African and 18,864 foreign plants, and a large number of duplicates are on hand for distribution and exchange. Six new cabinets have been obtained, making 40 in all, and more will shortly be required. Specimens have been sent away as under:—

Biltmore Herbarium, Biltmore, U.S. America ...	300
Bolus, H., F.L.S., Capetown ...	117
Royal Botanic Gardens, Calcutta ...	158
Prof. Wagner, Austro-Hungary ...	100
Prof. J. Fowler, Queen's University, Canada ...	252
Botanic Gardens, Sydney, New South Wales ...	100
H. B. Williamson, Victoria, Australia ...	212
	<hr/>
	1239

And specimens have been received in exchange as follows.—

F. Reisen, Walhausen, Germany ...	219
H. B. Williamson, Victoria, Australia ...	190
Biltmore Herbarium, Biltmore, U.S. America ...	85
Botanic Gardens Sydney, New South Wales ...	68
National Herbarium, U.S. America ...	83
Prof. Macoun, Dominion Bot., Ottawa, Canada	110
Botanic Gardens, Saharunpur, India ...	83
	<hr/>
	838

As stated in my last report, a Grant was obtained from Government for the erection of a more suitable building, the one in which we have hitherto worked being not only too small,

but quite unsuitable for the purpose, but also being constructed of wood and iron, it was always in danger of fire, in which case the specimens that have taken so long to acquire would almost certainly have been altogether lost. The cost of the new building was estimated at £1,600, but on account of scarcity of labour and material it was found that it could not be completed for that amount, under these circumstances the Grant was increased to £2,080; the builders commenced work on Dec. 5th, and the work is now nearly completed. It contains one room 52 x 25 feet for the cabinets; Curator's office, 19.6 x 12 feet; Library, 22.6 x 12 feet; Drawing office, 19 x 12 feet, and work-room, 22.6 x 12 feet, and it has been built so that a second story can be added when required. A further amount of £200 was placed on the Estimates for furniture, but I fear that this will scarcely be sufficient for the purpose, since if a Botanical Museum is to be formed in connection with the Herbarium, cases, bottles, &c., will have to be provided from time to time as required.

We are at present engaged in preparing for removal into the new building, which will take some time, as all the specimens will have to be fumigated, and only a small portion of them can be treated at once.

The 3rd Part of Vol. 3, "Natal Plants," was much delayed in the press, but was issued in March, and the 4th Part, containing index, and concluding the volume, was published in June.

PUBLICATIONS RECEIVED.

ROYAL BOTANIC GARDENS KEW.

Flora capensis, Vol. V. Part 1
 Flora of Tropical Africa, Vol. VIII. Parts 1, 2, 3.
 Icones Plantarum Vol. VIII. Parts 1 & 2.

NATIONAL HERBARIUM. UNITED STATES OF AMERICA.

Petrified forests of Arizona, by L. F. Ward.
 Plant life of Alabana, by Chas. Mohr, M.D.
 Relation of plant physiology to the other sciences, by Dr
 Wiesner.
 Seed coats of certain species of Brassica, by A. J. Pieters
 and Vera K. Charles.
 Seeds of commercial Saltbushes, by G. N. Collins.

IMPERIAL BOTANIC GARDENS, ST' PETERSBURG.

Acta Hortae Petropolitani, Vol III. Fasc. 1, 2, 3; Vol. XIX
Fasc. 1 & 2.

Messrs BURROUGHS & WELLCOME, LONDON.

- A New admixture of commercial *Strophanthus*, by P. E.
F. Perredes, B.S.
Anatomy of bark of *Robinia pseud-acacia*, by F. B. Power,
Ph. D.
Chemistry of the bark of *Robinia pseud-acacia*, by F. B.
Power, Ph. D.
Contribution to the pharmacognosy of official *Strophanthus*
seeds, by P. E. Perredes, B.S.

MISCELLANEOUS.

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|--|--------------|
| Annals of Congo Museum (Botany) ... | Director. |
| Apocynaceous plants collected by M.
Gentel, by E. de Wildeman ... | Author. |
| Biltmore Botanical Studies, Vol. 1, No 2. | Director. |
| Five pamphlets on botanical subjects,
by E. M. Holmes | Author. |
| Flora of Western Middle California,
by W. L. Jepson, M.D. | Author. |
| Hybrid Conifers, by Maxwell T. Masters. | Author. |
| Mycological Notes, by G. G. Lloyd ... | Author. |
| Native vegetation and crops of the
Colorado delta, by J. Burt Davy... | Author. |
| Pharmaceutical Journal. Current Nos.... | President. |
| Report of Govt. Entomologist, Natal ... | Author. |
| Proceedings of the Indiana Academy
of Science | President. |
| Sundry pamphlets | B. H. Shim. |
| Transaction of the Linnean Society,
Vol. VI, Part 1 | N. E. Brown. |

PURCHASED.

Journal of Botany, Gardeners Chronicle, Botanical Magazine and Icones Plantarum.

A very large number of indigenous plants have been named for many applicants, including plants supposed to have medicinal or economic value, and in all these cases there has been no difficulty in supplying the names, and where required information as to the properties of the plants also. Increasing

interest would appear to be taken in the indigenous grasses of the colony, since there has been more applications for the names and for information about these plants than in any other year since the establishment of the Herbarium. Colonel Johnstone, R.A.M.C. of the Mooi River Military Hospital has spent several days in the Herbarium and all possible assistance has been given to him in identifying the valuable collection of plants that he has made in the Mooi River district. Mr G. H. Davies, Forest Ranger at Qudeni, Zululand has also sent a large number of specimens for identification, some of them being new species and many rare, and it is to be hoped that others may follow his example, and thus not only enrich the Herbarium with specimens of our flora, but also be placed in a position to obtain themselves a better knowledge of it. Parcels of specimens when marked O. H. M. S. and addressed to Curator, Colonial Herbarium, Berea, Durban will pass free through the post, and directions for drying and preparing the specimens will be sent on application.

I regret that chiefly in consequence of the war, by which the upper districts of the Colony have been completely closed to us, and also on account of press of other business, but little collecting has been done, except in the vicinity of Durban, the flora of which has, however, been fairly well worked out, but it is hoped that now that the war is happily over, further collections will be made during the coming season. In March last Mr. Wylie proceeded on a collecting tour into Zululand, visiting the Ngoya district, and in addition to plants and seeds for the Gardens he brought a number of dried specimens for the Herbarium, including some rare species, and amongst them leaves, flowers, and pods of a tree which I believe to be identical with the large trees so well known at Kwamakwaza in Zululand, I have for many years been wishful to obtain specimens of this tree, but with the exception of leaves and pods which were kindly obtained for me by Mrs. McKenzie, have always failed. This tree now proves to be a *Lonchocarpus*, a genus which has not hitherto appeared in any list of Natal plants. It appears to be *L. laxiflorus*, G. & P., but is included in the Flora Capensis as *L. Philenoptera*, Benth., and was collected by Mr. McCabe near Lake Ngami, it is also found in the Mozambique district, and in other parts of Central Africa, it appears to be a fine tree, but I have no information as to its value, It is now nearly 50 years since I saw the large trees at Kwamakwaza, but from recollection I think that they were at least 50 feet or perhaps more in height, and with straight unbranched trunks, but I shall endeavour to obtain more information about them.

Before His Excellency Sir Walter Hely-Hutchinson left the Colony, he requested me to obtain for analysis roots of the plants known to the natives as "Mahaden," these plants are *Phytolacca stricta*, and *P. abyssinica*, after much trouble I at last succeeded in obtaining both of them, the first named was obtained for me by my friend Colonel Johnstone in the Mooi River district, after I had been on a fruitless journey to Newcastle in search of it, and some time afterwards my native collector found *P. abyssinica* in the vicinity of Durban, the roots of both of these plants have now been handed over at the request of the Government to the Medical Board. I may say that it is believed that several cases of poisoning among the natives have been caused by one or other of these plants.

It has frequently been reported that some rubber yielding plants are to be found in quantity in the neighbourhood of St. Lucia Bay, and during last year our Government deputed two gentlemen to visit the locality, obtain specimens and report generally, the few specimens brought were, in consequence of the season incomplete, that is flowers were not to be got, but such as the specimens were they were sent to me for determination, and found to be as under, the names given being those attached to the specimens by the collectors.

Ibungu-vine.—Of this plant leaves and fruit only were sent. It is a *Landolphia*, and most likely *L. Kirkii*, Dyer, but there appears to be some confusion about the native name, that, however, is not very material, provided that the plant is really as I believe it to be *L. Kirkii*, which is said to yield the best rubber of Zanzibar coast, and it would appear from the collector's report that it is fairly plentiful.

Mkahla (Brazil "Rotsho").—Of this plant leaves, fruit, and a portion of a branch was sent. It is undoubtedly *Tabernaemontana*. This tree contains a milky sap, but I have never heard that rubber has been obtained from it.

Mpifa (Costa Rica "Caucho").—This is undoubtedly a species of *Ficus*, and may perhaps yield rubber, but as it was impossible to identify the species from the specimen sent I can give no information about it.

Rubber yielding plant from Kosi Bay.—The specimen of this plant were incomplete, as no leaves were present. It belongs to the Order *Apocynaceæ*, some members of which yield rubber, but it was impossible to identify the plant even generically from the specimens sent to me.

Creeper of Caucho.—A portion of a climbing stem was sent which it was not possible to identify, and as it was not said to be a rubber yielding plant, it was scarcely worth while to take any trouble about it.

The only plant of known value was therefore *Landolphia Kirkii*, and if this plant is found in the quantity reported it would perhaps pay to gather the rubber, but whether or not it would pay to cultivate even in that locality is uncertain, on this side of the Tugela I think certainly not. A friend and correspondent who has travelled and botanised in many parts of South Africa, including the vicinity of Delagoa Bay writes me from German New Guinea as follows :

“The rubber plant you would find at St Lucia Bay would be *Landolphia Kirkii*, which seems to go down south quite into Zululand, I found it South of Delagoa Bay. But these plants only pay for a few years, until they are all cut down by the natives. I have had to look into many rumours about new rubber trees, and always when I get to the bottom of it they turn out to be humbug. People do not intend to cheat you, but whenever they find a tree yielding latex they think that they have discovered rubber. This is really getting worse than rumours about gold discoveries.”

Another correspondent in Mexico to whom I wrote on this matter and who has had considerable experience in rubber planting tells me that during the short time that he has been in Mexico he has planted 125,000 *Castilloa* plants, which in three months from planting were 10 inches in height, he says as follows :

“I feel much interested regarding your *Landolphias*, I doubt though if the *Willoughbeas* or the *Landolphias* can be made a commercial success as cultivated plants ; by forest conservancy in a state of nature, yes.

In a late issue of the *Pharmaceutical Journal* I find the following written by Mr J. R. Jackson :

“It is stated that the Acting Consul at Zanzibar has made the discovery, that an elastic product resembling *Gutta Percha* is contained in the fruit of a native plant ; may I say, that, judging from the description of the fruit, as well as the manner in which the milky juice flows on the fruit being cut, there seems to be nothing new in this discovery. The fruit is evidently that of a species of *Tubernaemontana*, belonging to

“the Natural Order *Apocynæ* the coagulated milk from several species of which has been known for a considerable time to form an elastic, or rather plastic substance when fresh, but upon drying it becomes brittle and friable, and frequently breaks up into fine powder. So long ago as the great Exhibition in 1862 the coagulated milk of *Tabernaemontana utilis* was shown as a probable substitute for Gutta Percha. A portion of this sample is contained in the Kew Museum, together with others of more recent date, and from different species and countries, but all go to prove the worthlessness of the *Tabernaemontana* juices either as a substitute for, or for mixing with Gutta Percha”.

As Mr. J. R. Jackson was the Curator of the Kew Museum, his opinion on this matter must have considerable weight, and I am compelled therefore to come to the conclusion that the plant called *Mkahlu*, which is undoubtedly a *Tabernaemontana*, is of no value as a rubber yielding plant. It appears certain then that the only known plant likely to yield rubber in the St. Lucia Bay district is *Landolphia Kirkii*.

In conclusion, I wish to call attention to the fact that the new Herbarium building is intended to contain not only collections of dried plants, but also to be the foundation of a Botanic Museum; up to the present time no attempt to form a Museum of this kind could be made in consequence of want of space to contain the specimens, and therefore the few specimens that have already been collected only form a small nucleus from which I hope will grow a Museum that will be found to be of some practical value. Primarily, it is my wish to obtain specimens of native woods, fruits, fibres, barks, roots or other portions of plants used medicinally by the natives, and any similar articles which are or are likely to become of economic or commercial value.

With this end in view, I venture to ask for contributions from those who are willing to assist in this matter. One thing only must be remembered, that is that the specimens required are only those of vegetable origin; minerals, insects (except those that are destructive to vegetation), would not properly find their place in a general Museum.

It only now remains for me to say that Miss Lauth, who has now been employed in the Herbarium for more than seven years, has rendered very valuable assistance, more especially with the grasses, a very difficult Order, with which she is rapidly becoming familiar; she has not only made the drawings

of these plants, which have been published in "Natal Plants," Vol. 2, but has done the dissections also, a work requiring considerable skill and practice. Miss M. Franks was engaged in November, 1901, and I am pleased to be able to say that she promises when more familiar with the work to become very useful; she has done some of the drawings of plants in Vol. 3, and will shortly commence those of Vol. 4.

J. MEDLEY WOOD.

