714

Proceedings of the Madras Government, Revenue Department, 9th July 1873.

No. 90. Read the following letter from J. BROUGHTON, Esq., Government Quinologist, to the Hon. R. A. DALYELL, Acting Secretary to Government, Revenue Department, dated Ootacamund, 31st May 1873 :—

I HAVE the honour to report on the work that has been performed under my charge during the past official year 1872-73.

2. Manufacture of Amorphous quinine has been carried on during the greater part of the past year, though the rate of work has depended on the supply of the fresh Cinchona bark. As I had the honour of pointing out in my letter attached to G. O., No. 1,646, of December 6, 1872, the supply of trunk-bark is only possible under the system of mossing during a few weeks at the commencement and cessation of the rainy season,—a circumstance that furnishes a considerable, though artificial, difficulty to the systematic carrying out of manufacture. During the past dry season this difficulty has, however, been much relieved by the supply of branch-bark obtained by the pruning of the trees. The total amount of fresh green bark supplied to the Manufactory during the year has been 83,894 lbs., of which 32,791 has been good trunk-bark from trees subsequently mossed and 600 lbs. of trunk-bark from decayed trees, 46,440 was from prunings of red-bark trees, 3,613 of prunings of *C. officinalis*, and 450 lbs. of prunings of *C. Calisaya*. The bark of the prunings of *C. officinalis* and 3,667 lbs. of the prunings of *C. Succirubra* was, however, found by analysis to be nearly worthless.

3. The total amount of Amorphous quinine sent away from the Manufactory in the year has been 215 lbs., or more than double that manufactured in the previous year. Of this quantity, 190 lbs. was sent to the Medical Stores, Madras, and, in March last, 25 lbs. to the Medical Stores, Bangalore, in conformity with G. O., No. 1,227, of the Madras Government of 15th July 1871, and the subsequent letter to the Chief Commissioner of Mysore.

4. But the whole manufacture from the above quantity of bark has not yet been quite completed, as I have found it desirable to reserve some unfinished product in order to keep the establishment at work during the season when no bark is supplied. The total amount of alkaloid by the expenditure of somewhat more labour on this unfinished product will, it is expected, amount to somewhat over 500 lbs.

5. During the past year a slight alteration has been made in the process of working to remedy a fault which caused a certain waste of alkaloid; and in the progress of work, sundry minor improvements have been made in the conduct of manufacture. Simplicity of arrangements and apparatus has been, however, systematically preferred, under the belief that it is more suited to the coolies and the conditions of work at Neddivuttum than the more elaborate and costly arrangements usual in Europe. Analyses have been currently made of the barks supplied to the Manufactory, with the view of ascertaining finally the amount of waste and the working of the process I have adopted. These results will form the basis of a subsequent report, in which I shall have the honour of detailing a number of experiments and results obtained during the past four years, affecting manufacture, its method, and cost.

6. Though, as I have the honour of stating in paragraph 4 of this report, a small amount of further labour and about three months of time will more than

double the amount of product, I beg to give the following statement of the expenditure during the past year in current manufacture, excluding all cost of apparatus and repairs:—

	RS.	A.	P.
Pay of Superintendent and coolies	1,744	8	2
Extra labour...	62	15	6
Contingent expenses	102	11	6
Fuel	82	0	0
Lime	72	8	0
Carriage of alcohol, lime, etc	15	10	9
	18	0	0
Cost of alcohol used	90	0	0
Do. acid as sent out by India Office	407	0	0
Do. Soda	19	13	10
Total...	2,6.5	3	9

Hence the cost of manufacture of 215 lbs., the first portion of the alkaloid obtained from the above-mentioned quantity of bark, has not exceeded twelve Annas two Pies per ounce. The further resulting alkaloid will certainly cost far less, as the expenses of this portion, which amounts probably to 300 lbs., have nearly all been charged in the above statement. I feel myself justified, by present experience, in the anticipation that regular supplies of bark to the Manufactory, under the conditions therein mentioned, will enable me to realize the estimate of the cost I originally furnished in letter attached to G. O., No. 249, of February 7, 1871. On the completion of the manufacture of the whole quantity of alkaloid obtained from the bark supplied during the past year, a report, giving the real details of cost, will be furnished.

7. Attached to this report is a statement of the total expenditure incurred for the Manufactory at Neddivuttum during the year 1872-73. Extra buildings and apparatus are the grounds for half of the expenditure.

8. I learn that the special product I have proposed, namely, the naturally mixed alkaloids, as the most suitable on grounds of cost for use in this country, is also that which the Netherlands Government have adopted for use in Java, and for whose manufacture I have privately communicated the main results of my experience and method of preparation.

9. The results I have hitherto obtained respecting the working of the system of renewing the bark of Cinchona trees under moss were communicated, through the Commissioner of the Nilgiris, on February 5th. As it possibly may not yet be in the hands of Government, I will mention briefly the main conclusions at which I have at present arrived. I find that simply mossing the existing bark of trees of *C. Succirubra* that are fit for cropping does not generally improve its quality, while it damages its appearance; but on younger trees the bark is improved in yield of alkaloids. The bark renewed under moss is thin, and is not removable under twenty months of growth, and with difficulty at that age. The yield of alkaloids in renewed bark is smaller than that of natural bark, but contains more quinine crystallizing as sulphate. The renewal of the bark appears to be by no means certain, and when it fails to renew the tree is injured.

Proceedings of the Madras Government, Revenue Department,
9th July 1873.

Though it would be unfair to conclude finally until the results of the second and third renewals have been obtained, I am not sanguine as to the final results of mossing applied to *C. Succirubra.* With *officinalis* the moss applied to the existing bark, after eighteen months' application, certainly improves its quality, nor at present does the effect diminish with the increased age of the tree. The bark renews with considerable certainty; but the renewed bark cannot yet be removed, though more than two years of age. The renewed bark is of high quality. I incline to the belief that the process of mossing can be favourably applied to this species, which supplies the kind of bark the most fitted for export. I notice that in all cases the growth and vigour of the tree is much diminished by the renewal of the bark. It is much to be regretted that nearly the whole of the plantations, which afford trees of sufficient age, should have been directed to be barked and mossed before a difinite conclusion had been obtained from the trees experimentally thus treated.

10. Of late, there have appeared in the medical journals numerous statements of the valuable febrifuge effects of the Australian tree, *Eucalyptus globulus*, now grown extensively in South Europe and well known in India. For this reason, I made a careful examination of the bark, and more cursory one of the leaves of this tree. I arrived at the result that no Cinchona or similar alkaloid is to be found therein. This result is since corroborated by the published examination communicated by a French Chemist M. Rabutean to the Academic.* My communication to Government is attached to G. O., No. 907, of 8th June 1872.

11. Attached to G. O., No. 133, of 3rd February 1873, is a communication I had the honour of making to Government respecting the bitter constituent of the bark of *Azadirachta Indica*, the Nim or Margosa tree. This is largely employed by natives throughout India as a febrifuge. The active principle is an intensely bitter resin, but slightly soluble in water, though readily soluble in alcohol. The discovery of a substitution nitro-compound enable me to fix the formula for this resin. In the use of the Nim bark as medicine, the employment of a tincture, instead of an aqueous decoction, is recommended.

12. The intensely bitter tubes of *Aconitum heterophyllum* or "Atis" furnish one of the most effective indigenous febrifuges in use. The tubers are sold in all the bazaars in South India, though the plant is a native of the Himalayas. I have begun an examination of these tubers, and have found that they contain a clearly defined and intensely bitter alkaloid. This substance is still under investigation.

13. Numerous analyses of tobacco have been performed during the past year, and have been communicated to the Revenue Board. Numerous districts in the Madras Presidency would furnish good tobacco if care were taken with its cultivation and curing; the latter being an operation of no special difficulty. As a general result in South India, the finest tobaccos are furnished by the less cultivated and more jungly districts, and not by land that has long been cultivated or irrigated.

* Comptes Reudus I-XXV., 1,032.

ENCLOSURE No. 1.

Statement of Expenditure incurred on the Alkaloid Manufactory at Neddivuttum, Nilgiris, during the official year 1872-73.

Description of Charges.	Amount.			Outturn.	Amount.
	RS.	A.	P.		RS.
Executive Engineer, for building fireplace, etc.	270	8	0	215 lbs. of Amorphous quinine, charged at the English price of the sulphate of quinine it substitutes in medicine, or Rs. 64 per lb.	13,760
Do. do., on account of charges incurred at Neddivuttum.	235	9	8		
Examiner, Dockyard Accounts, Calcutta, freight on three cases Apparatus.	137	11	3		
District Engineer, for mending copper boilers, etc.	323	10	0		
Do. do., for erecting a corrugated iron-shed	2,200	0	0		
Messrs. Binny and Co., for Alcohol ...	270	0	0		
Executive Commissariat Officer, Wellington, for carriage of do. ...	47	11	10		
Lime	72	8	0		
Mr. Pittis, for Caustic Soda, including commission, etc., etc.	142	13	4		
Thatching Neddivuttum premises ..	30	0	0		
Mr. Groves, for a bark press	575	0	0		
Wages of establishment	1,744	8	2		
Extra labour	62	15	6		
Contingencies	184	11	6		
Carriage of apparatus, lime, etc. ...	178	2	8		
Acid	407	0	0		
Total...	6,882	13	11	Total..	13,760

(Signed) J. BROUGHTON,
Government Quinologist.

No. 91. ORDER THEREON, 9th July 1873, No. 714.

Miscellaneous.

THE foregoing annual report on the Proceedings of the Government Quinologist is, upon the whole, satisfactory, and most of the matters brought forward by Mr. Broughton have been disposed of in separate Proceedings.

2. The manufacture of Amorphous quinine, under the sanction given in the G. O., under date 7th February 1871, No. 249, requires more detailed notice. It appears that 83,894 lbs. of bark were supplied to Mr. Broughton during the year, of which about 33,000 lbs. were good trunk-bark and about 47,000 lbs. good bark obtained from prunings; the remainder proving, on analysis, to be worthless. From this quantity of bark, Mr. Broughton has already prepared 215 lbs. of Amorphous quinine, and he expects to produce a further quantity of not less than 285 lbs. during the next three months. His expenditure during the year under report, excluding all cost of apparatus and repairs, has amounted to Rs. 2,615-3-9. If one-fourth of this sum be added as expenditure during the next three months,

c. 27 June/73 Rg 9 July

Proceedings of the Madras Government, Revenue Department,
9th July 1873.

the cost of producing 500 lbs. of Amorphous quinine, excluding the value of the bark, will amount to about Rs. 3,270, or, adding, say, Rs. 1,730 as the annual share of the cost of apparatus and repairs, to Rs. 5,000, or Rs. 10 per lb.

3. If, however, the trunk-bark expended be valued at 1*s.* the lb., and the bark from prunings at 6*d.* per lb., the cost of production will be raised to about Rs. 28,750, or Rs. 57-8-0 per lb., being a rate of Rs. 3-9-6 per oz., instead of the original estimate of one rupee per oz. If the above valuations for wet bark are below the mark, and the figures quoted for dry bark in the despatch from His Grace the Secretary of State, which is recorded in the G. O., 16th October 1872, No. 1,429, would seem to show that they are by no means high, the cost of producing the Amorphous quinine will be materially increased, and will far exceed the price charged in the market for the ordinary sulphate of quinine, which is believed to be a decidedly superior article.

4. Under these circumstances, it may become necessary to reconsider the propriety of attempting the manufacture of any febrifuge in this country, and the Governor in Council accordingly resolves to request Mr. Broughton to report his matured opinion on the subject, and, at the same time, to submit the further actual results of his experimental manufacture, when the supply of bark, referred to in his letter, has been completely worked out.

(True Extract.)

(Signed) R. A. DALYELL,
Acting Secretary to Government.

To the Government Quinologist.
,, the Commissioner of the Nilgiris.
,, the Board of Revenue.
,, Inspector General, Indian Medical Department.
,, President of the Cinchona Commission.

Exd. F. R. Bantleman.

Ootacamund
31st May 1873

From,

W. J. Broughton
Government Cinchonologist

To,

R. A. Dalyell Esq:
Secretary to Government
Revenue Department
Ootacamund

Sir,

I have the honor to report on the work that has been performed under my charge during the past official year 1872—3.

2. Manufacture of Amorphous quinine has been carried on during the greater part of the past year, though the rate of work has depended on the supply of the fresh cinchona bark. As I had the honor of pointing out in my letter attached to G.O. No 1646 of December 6th 1872, the supply of trunk bark is only possible under the system of mossing, during a few weeks at the commencement and cessation of the rainy season, a circumstance that furnishes a considerable though artificial difficulty to the systematic carrying out of manufacture. During the past dry season, this difficulty has however been much relieved by the supply of branch bark obtained by the pruning of the trees. The total amount of fresh green bark supplied to the manufactory during the year has

has been 83,894 lbs: of which 32,791 has been good trunk bark from trees subsequently mossed, and 600 lbs: of trunk bark from decayed trees, 46,440 was from prunings of red bark trees, 3,613 of prunings of C. Officinalis, and 450 lbs: of prunings of C. Calisaya. The bark of the prunings of C. Officinalis and 3,667 lbs: of the prunings of C. Succirubra was however found by analysis to be nearly worthless.

3. The total amount of Amorphous quinine sent away from the manufactory in the year has been 215 lbs: or more than double that manufactured in the previous year. Of this quantity 190 lbs: was sent to the Medical Stores, Madras, and in March last 25 lbs: to the Medical Stores Bangalore, in conformity with G. O. No: 1227, of the Madras Government of 15th July 1871, and the subsequent letter to the Chief Commissioner of Mysore.

4. But the whole manufacture from the above quantity of bark has not yet been quite completed as I have found it desirable to reserve some unfinished product in order to keep the establishment at work during the season when no bark is supplied. The total amount of alkaloid by the expenditure of somewhat more labour on this unfinished product, will it is expected amount to somewhat over 500 lbs:.

During

5. During the past year a slight alteration has been made in the process of working to remedy a fault which caused a certain waste of alkaloid, and in the progress of work sundry minor improvements have been made in the conduct of manufacture. Simplicity of arrangements and apparatus has been however systematically preferred, under the belief that it is more suited to the coolies and the conditions of work at Neddivattum, than the more elaborate and costly arrangements usual in Europe. Analyses have been currently made of the barks supplied to the manufactory with the view of ascertaining finally the amount of waste and the working of the process I have adopted. These results will form the basis of a subsequent report, in which I shall have the honor of detailing a number of experiments and results obtained during the past four years affecting manufacture its method and cost.

6. Though as I have the honor of stating in para. 4 of this report a small amount of further labour, and about three months of time, will more than double the amount of product, I beg to give the following statement of the expenditure during the past year in current manufacture excluding all cost of apparatus and repairs.

Pay of Superintendent and Coolies	1744	8	2
Extra Labour	62	15	6
Contingent Expenses	102	11	6
Fuel	82	0	0
Lime	72	8	0
Carriage of Alcohol Lime &c.	15	10	9
	18	0	10
Cost of Alcohol used	90	0	0
do Acid as sent out by India Office	407	0	0
do Soda	19	13	10
Rupees	2,645	3	9

Hence the cost of manufacture of 215 lbs. the first portion of the alkaloid obtained from the above mentioned quantity of bark has not exceeded 12 annas 2 pie per ounce. The further resulting alkaloid will certainly cost far less, as the expences of this portion which amounts probably to 300 lbs., have nearly all been charged in the above statement. I feel myself justified by present experience, in the anticipation that regular supplies of bark to the manufactory, under the conditions therein mentioned will enable me to realize the estimate of the cost I originally furnished in letter attached to G. O. N° 249. of February 7th 1871. On the completion of the manufacture of the whole quantity of alkaloid obtained from the bark supplied during the past year, a report giving the real details of cost will be furnished.

7. Attached to this report, is a statement of the total expenditure incurred for the manufactory at Neddiwatte during the year 1872-3. Extra buildings and apparatus are the grounds for half of the expenditure.

8. I learn that the special product I have proposed, namely the naturally mixed alkaloids, as the most suitable, on grounds of cost for use in this country, is also that which the Netherlands Government have adopted

adopted for use in Java, and for whose manufacture I have privately communicated the main results of my experience and method of preparation.

9. The results I have hitherto obtained respecting the working of the system of renewing the bark of Cinchona trees under moss, were communicated through the Commissioner of the Nilgiris on February 5th. As it possibly may not yet be in the hands of Government, I will mention briefly the main conclusions at which I have at present arrived. I find that simply mossing the existing bark of trees of C. Succirubra that are fit for cropping does not generally improve its quality, while it damages its appearance; but on younger trees the bark is improved in yield of alkaloids. The bark renewed under moss is thin and is not removable under 20 months of growth and with difficulty at that age. The yield of alkaloids in renewed bark is smaller than that of natural bark, but contains more quinine crystallizing as sulphate. The renewal of the bark appears to be by no means certain, and when it fails to renew, the tree is injured. Though it would be unfair to conclude finally until the results of the second and third renewals have been obtained, I am not sanguine as to the final results of mossing applied to C. Succirubra. With Officinalis the moss applied to the existing bark, after 18 months

application

application certainly improves its quality, nor at present does the effect diminish with the increased age of the tree. The bark renews with considerable certainty, but the renewed bark cannot yet be removed though more than two years of age. The renewed bark is of high quality. I incline to the belief that the process of mossing can be favorably applied to this species, which supplies the kind of bark the most fitted for export. I notice that in all cases the growth and vigour of the tree is much diminished by the renewal of the bark. It is much to be regretted that nearly the whole of the plantations which afford trees of sufficient age, should have been directed to be barked and mossed, before a definite conclusion had been obtained from the trees experimentally thus treated.

10. Of late there have appeared in the medical journals, numerous statements of the valuable febrifuge effects of the Australian tree Eucalyptus globulus, now grown extensively in South Europe, and well known in India. For this reason I made a careful examination of the bark, and a more cursory one of the leaves of this tree. I arrived at the result that no cinchona or similar alkaloid is to be found therein. This result is since corroborated by the published examination communicated by a French Chemist M. Rabeteau to the Academie‡ My communication to Gov!

‡ Comptes Rendus I-XXV. 1032.

Government is attached to G. O. No. 907, of 8th June 1872.

11. Attached to G. O. No 133 of 3rd February 1873, is a communication I had the honor of making to Government respecting the bitter constituent of the bark of Azadirach ta Indica the Nim or Margosa tree. This is largely employed by natives throughout India as a febrifuge. The active principle is an intensely bitter resin, but slightly soluble in water, though readily soluble in alcohol. The discovery of a substitution nitro-compound enabled me to fix the formula for this resin. In the use of the Nim bark as medicine, the employment of a tincture instead of an aqueous decoction is recommended.

12. The intensely bitter tubers of Aconitum heterophyllum or "Atis" furnish one of the most effective indigenous febrifuges in use. The tubers are sold in all the bazaars in South India though the plant is a native of the Himalayas. I have begun an examination of these tubers, and have found that they contain a clearly defined and intensely bitter alkaloid. This substance is still under investigation.

13. Numerous analyses of tobaccos have been performed during the past year and have been communicated to the Revenue Board. Numerous districts in the Madras presidency would furnish good tobacco, if care were taken with its cultivation and curing, the latter being an operation of no special difficulty.

As

As a general result in South India the finest tobaccos are furnished by the less cultivated and more jungly districts, and not by land that has long been cultivated, or irrigated.

I have the honor to be,

Sir,

Your most Obed. Servt.

John Broughton.

Govt Limnologist.

Statement of Expenditure incurred on the Alkaloid Manufactory at Neddivattum Nilgiris, during the Official year 1872–3.

Description of Charges	Amount	Out-turn	Amount
Executive Engineer for building fireplace &c.	270 8 0		
___do:___do:___on account of Charges incurred at Neddivattum	235 9 8		
Examiner Dockyard Accounts Calcutta, freight on 3 Cases Apparatus	137 11 3	215 tbs. of amorphous quinine charged at the English price if the sulphate of quinine it substitutes in Medicine, or Rs. 64 per tb.	13760..
District Engineer for mending Copper boilers &c.	323 10 0		
___do:___do:___for erecting a Corrugated Iron Shed	2200 0 0		
Messrs: Binny & Co: for Alcohol	× 270 0 0		
Executive Commissariat Officer Wellington for carriage of ___do:	× 47 11 10		
Lime	× 72 8 0		
Mr Pittis for Caustic Soda, including Commission &c. &c.	× 142 13 4		
Thatching Neddivattum premises	× 30 0 0		
Mr: Grobes for a bark press	575 0 0		
Wages of Establishment	× 1448 2		
Extra Labour	× 62 15 6		
Contingencies	× 184 11 6		
Carriage of Apparatus, Lime &c.	× 178 2 8		
Acid	× 407 0 0		
Total Rupees	6,882 13 11	Total Rupees	13760..

8725

John Bagnall Beamington.
Government Quinologist

Ed. 3 February 73 Nos 1-2
- 6 December 72 — 32-33
- 8 June ——— 99-100
- 15 July 1871 — 179-82
- 7 February — 87-91

Revue 1873 Sept

No. 1535

From

The Govt. Zoologist

Potacammund

To

The Secretary to Govt.

Revenue Department

Potacammund

Dated 31st May 1873.
Recd 3rd June

Enclosures - none

Annual Report
for the Official year 1872-3

S.O. No. 714 - 9th July 1873.

Ls. 90-91

C. 27 June/73. A. 9th July

Words 19.

Please tender
here is transcript
of a memo: made
on redduredumo.
Mr B has since returned
2 books more back.
May consider the
memo: as confidential
until you advise
to me whether any
is to be done in
the matter. Yours
H Cornelly

Memo
Cuellona.

1. 72000 lbs of Wh Bark supplied to Mr B. in carriage year 72/8.

2 - Subsp Rec 8000 lbs wet Bark Peels & should be ready about 5 Mccch & Should yield 500 lbs. of Commercial Quinine

3. 42000 lbs of the Bark were used in Quinine. - At 2 Mccch yield should have given 840 lbs. to 420 lbs of Commercial Quinine

4. Rest of whole 72000 lbs of Bark were given out for Experiments

5. Due per contract of Allocation of 72000 lbs Bark should be 6 to 8 Mccch according to Directions (6 to 8 according to Directions)

6. Due according to Contract Bark should be valued at 2 Mccch.

7. Value the above 42000 lbs of Bark to be valued at 4000 lbs of Bark & the dry Bark to have been worth 3 to 4 Mccch. or say 2 to 6 after experiments used - Not Enough of the Bark

Revenue Department.

No. 714

PROCEEDINGS of the MADRAS GOVERNMENT.

Under date the 9th July 1873.

Read the following letter from the Govt Quinologist

Annual Report for the Official year 1872-73. } A.G. 31st May 1873.

The foregoing annual report on the Proceedings of the Govt Quinologist is upon the whole satisfactory and most of the matters brought forward by Mr. Broughton have been disposed of in separate Proceedings.

2. The manufacture of Amorphous quinine under the sanction given in the G.O. under date 7th February 1871, No. 249 requires more detailed

detailed notice. It appears that 83,894 lbs of bark were supplied to Mr Broughton during the year, of which about 33,000 lbs were good trunk bark and about 47,000 lbs good bark obtained from prunings, the remainder proving, on analysis, to be worthless. From this quantity of bark Mr Broughton has already prepared 215 lbs of Amorphous Quinine and he expects to produce a further quantity of not less than 285 lbs during the next three months. His expenditure during the year under report excluding all cost of apparatus and repairs has amounted to Rs 2615-3-9. If one fourth of this sum be

3270

1730

be added as expenditure during the next three months, the cost of producing 500 lbs of Amorphous quinine ex=cluding the value of the bark will amount to about Rs ~~3270~~, or adding, say Rs ~~1730~~ 1500, as the annual share of the cost of apparatus and repairs, to Rs 5,000, or Rs 10 per lb.-

3. If, however, the trunk bark expended be valued at one shilling the lb, and the bark from prunings at 6d. per lb, the cost of production will be raised to about Rs 28,750, or Rs 37. 8. 0 per lb, being a rate of Rs 3. 9. 6 per oz; instead of the original estimate of one rupee per oz. If the above valuations for wet bark are below the

the mark, and the figures for dry bark quoted in the despatch from His Grace the Secretary of State which is recorded in the G.O. 16 Oct.r 1872, N.o 1429, seem to show that they are by no means high, the cost of producing the Amor- phous quinine will be materially increased, and will far exceed the prices charged in the market for the ordinary sulphate of quinine, which is believed to be a decidedly superior article.

4. Under these circum- stances it may become necessary to reconsider the propriety of attempting the manufacture of any febrifuge in this country, and the Governor in Council accordingly resolves to request Mr. Broughton to report his matured opinion on the subject, and at the same time to submit the further actual results of his experi- mental manufacture, when the supply of bark referred to in his letter has been completely worked out.

Note. Mr. Cockerell states that 100 lbs of wet bark are equal to 42 lbs of dry bark and that this has a net value of 2/6 per lb in London after paying all expenses. I have taken dry bark to be worth something under 2/4 per lb which would put wet bark at 1/- per lb.

1 for Quinologist - dec 18th July/73
3. Commr Nilgiris " " ——
14. Board of Rev " " →
6. Dispensed Indian Med Depts 22nd
1. President of the Cinchona Commission
dec 21st July/73

