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MADRAS RECORD OFFICE.

Government of Madras.

Revenue DEPARTMENT.

G.O. No.	473	Press Mis.
Dated	8-5-	1882.

Not to be folded or roughly handled

8TH MAY 1882, No. 473, REVENUE.

GOVERNMENT OF MADRAS.
REVENUE DEPARTMENT.

READ—the following Despatch from the Most Honorable the MARQUIS of HARTINGTON, Her Majesty's Secretary of State for India, to His Excellency the Right Honorable the Governor in Council, Fort St. George, dated India Office, London, 30th March 1882, No. 16 (Revenue).

Referring to my Despatch, No. 14, of the 18th May last, I now enclose, for your Excellency's information, a copy of a Memorandum, showing the results of the manufacture of Chinchona alkaloids from the 250 bales of crown and red barks, which formed part of the consignment received from your Government per steamship *El Dorado*.

ENCLOSURE.

Report on the Manufacture of Sulphate of Quinine and other Chinchona Alkaloids on Government account, dated 18th October 1881.

Last year an experiment was made of manufacturing sulphate of quinine and other alkaloids, on Government account, from the bark sent home from the Nilgiri Government plantations. The result of this was so far satisfactory that it was determined to repeat the experiment on a larger scale. The manufacture of the several alkaloids from the crown and renewed barks yielded, financially, 14 per cent. more in the value of the products than the bark operated upon would have realized if sold in the open market in the usual manner. With the red barks it was different, and the result in the case of these was a slight loss. In the former experiment, mixed alkaloids were extracted from the red barks, the value of which was found to be almost exactly 10 per cent. less than the bark itself would have fetched if it had been sold.

For the purpose of further experimental manufacture, 250 bales,* forming part of the consignment received per steamship *El Dorado* last February, were made over to Mr. Whiffen, samples having been first taken for analysis on behalf of the Secretary of State by Dr. B. Paul, whose report gave the following results:—

						Quinine, Sulphate.	Chinchoni- dine, Sulphate.	Chincho- nine (Alkaloid).
						BALES.	PER CENT.	PER CENT.
						Crown Barks.		
Natural,	N	...	...	...	...	22	3.30	1.34
	C	...	...	...	...			0.27
"	N	...	...	...	...	11	3.87	1.20
	C	...	...	...	...			0.22
Renewed,	N	...	...	...	...	66	5.57	0.72
	NC	...	...	...	...			0.23

						BALES.					BALES.
* Natural, Crown,	N	..	..	..	..	33	Red Natural, P	..	..	..	20
	C	..	..	..	..		Red Mossed, P	..	..	..	30
Renewed	NC	..	..	..	..	100					60
Mossed	MC	..	..	..	..	45					
Branch	PC	..	..	..	..	22					
						200					

8TH MAY 1882, No. 473, REVENUE.

							—	Quinine, Sulphate.	Chinchoni- dine, Sulphate.	Chincho- nine (Alkaloid).
							BALES.	PER CENT.	PER CENT.	PER CENT.
							Crown Barks—(Contd.)			
Renewed,	N	NC	...	...	...	...	34	5.73	0.66	0.21
Mossed,	N	MC	...	...	...	...	35	4.38	1.46	0.30
"	N	MC	...	...	...	...	10	5.06	1.52	trace
Branch,	N	PC	...	...	...	...	22	2.00	0.75	trace
							Red Barks.			
Natural,	P		...	...	...	...	20	1.23	2.97	1.24
Mossed,	P		...	...	...	...	30	1.74	3.24	2.20

The estimated yield, by analysis, is as follows:—

The estimated yield, by analysis, is as follows:—

	Quantity of Bark, in Lb.	QUININE, SULPHATE.		CHINCHONIDINE, SULPHATE.		CHINCHONINE, ALKALOID.	
		At per cent.	Total.	At per cent.	Total.	At per cent.	Total.
Natural Crown	2,164	3.30	71.41	1.34	28.99	0.27	5.84
Do. do.	1,101	3.87	42.60	1.20	13.21	0.22	2.42
Renewed do.	6,596	5.57	367.39	0.72	47.49	0.23	15.17
Do. do.	3,463	5.73	198.43	0.66	22.85	0.21	7.27
Mossed do.	3,612	4.38	158.20	1.46	52.73	0.30	10.83
Do. do.	997	5.06	50.44	1.52	16.15	trace	..
Branch do.	2,218	2.00	44.36	0.75	16.63	trace	..
Natural Red	..	..	92.83	..	197.05	..	41.53
Mossed do.	2,035	1.23	25.03	2.97	60.44	1.24	25.23
Do. do.	3,069	1.74	53.40	3.24	99.43	2.20	67.61
..	..	..	78.43	..	159.87	..	92.74
..	..	..	1,011.26	..	356.92	..	134.27

The result of the working of these barks has been as follows:—

	200 Bales of Crown Bark.	50 Bales of Red Bark.	Total.
Sulphate of quinine	LB. 1,045.5	LB. 81.5	LB. 1,127
" of chinchonidine	149.5	143	292.5
" of quinidine	25	71	25
Chinchonidine alkaloid	71.25	240	142.25
Amorphous sulph. liquor	404	..	644

From the foregoing figures, it will be seen that, as on the former occasion, the yield of sulphate of quinine has been in excess of the estimated result, and the sulphate of chinchonidine obtained somewhat under the expected yield, but the chinchonine alkaloid shows a slight excess. The sulphate of quinine shows an excess of 115.74 lb., or over 11 per cent. So far as the outturn is concerned, the result is therefore satisfactory.

With regard to the financial results of the experiment, it appears from Messrs. Jenkins' and Phillip's report of their sale that the average prices realized from the sale by public auction of similar parcels of bark, forming part of the same consignment, were,—natural crown, 5s. 8d.;

8TH MAY 1882, No. 473, REVENUE.

renewed crown, 8s. 11d.; mossed crown, 10 bales at 6s. 10d. and 35 bales at 6s.; branch crown, 3s. 4d.; natural red, 2s. 5d.; mossed red, 3s. At these prices the value of the above-mentioned barks was as follows:—

	LB.	s.	d.	£	s.	d.
Natural Crown	3,265	at 5	8	=	925	1 8
Renewed "	10,059	at 8	11	=	4,484	12 9
Mossed " { 10 bales	1,025	at 6	10	=	350	4 2
" { 35 "	3,584	at 6	0	=	1,075	4 0
Branch "	2,218	at 3	4	=	369	13 4
	20,151				7,204	15 11

Deduct allowance for dust, 3 per cent.

" tret, 4 per cent. ... 10½ per cent. = 756 8 0

" discount, 2½ per cent. ...

" brokerage, &c., 1 per cent. ... 6,448 7 11

Natural red ... 2,035 at 2 5 = 245 18 0

Mossed " ... 3,069 at 3 0 = 460 7 0

706 5 0

Deduct allowance, 10½ per cent. = 74 3 1

632 1 11

Total ... £7,080 9 10

The value of the products obtained therefrom at the market prices of the day was—

Crown Barks.

	LB.	s.	£	s.	d.
Sulphate of quinine	1,045.5	at 163	=	8,520	16 6
" of chinchonidine	149.5	at 34	=	254	3 0
" of quinidine	25	at 76	=	95	0 0
Chinchonine alkaloid	71.25	at 15	=	53	8 9
Amorphous sulph. liquor	404	at 1	=	20	4 0

8,943 12 3

Deduct working expenses* ... 1,007 6 6

7,936 5 9

Red Barks.

	LB.	s.	£	s.	d.
Sulphate of quinine	81.5	at 163	=	664	4 6
" of chinchonidine	143	at 34	=	243	2 0
Chinchonine alkaloid	71	at 15	=	53	5 0
Amorphous sulph. liquor	240	at 1	=	12	0 0

972 11 6

Deduct working expenses* ... 272 18 0

699 13 6

Total ... £8,635 19 3

From these figures it will be seen that the total net value of the products obtained from the bark is 8,635l. 19s. 3d. as compared with 7,080l. 9s. 10d., which would have been realized for the bark if it had been sold with the remainder of the consignment of which it formed a part. The net gain by manufacturing on account of Government instead of selling the bark has thus been 1,555l. 9s. 5d., or nearly 22 per cent. Similarly, it will be seen that the net gain in respect of the crown barks alone is 23 per cent., and in respect of the red barks nearly 10½ per cent. These results are obtained by taking, for purpose of calculation, the price of quinine in May last, the date when the manufacture had been completed and the products were ready for delivery. The result of this experiment is considerably more satisfactory from a financial point of view than the previous one, which showed a net gain of only 9 per cent. more than would have been realized had the bark been sold in the usual manner. It may be a question for consideration whether in future it will be advisable to work up the quinine into liquor unless it can be shown that there is likely to be any demand for it. A preferable plan probably would be merely to precipitate the alkaloid and not purify it, but set it aside in its rough

* Including a proportion of 21½ paid for fire insurance at factory.

state till such time as some use may be discovered for it. In the foregoing calculations, I have taken the value of it at merely the cost of manufacture, viz., 1s. per lb.

As on the former occasion, the gain is chiefly obtained from the crown barks. In the previous experiment, the products from the red barks were obtained in the form of mixed alkaloids, and this resulted in a loss of 10 per cent. in value as compared with what would have been obtained by the sale of the bark. I then suggested that "it might perhaps be found more advantageous, from a pecuniary point of view, to extract the several alkaloids separately from the red bark instead of making Chinchona febrifuge." The result has quite fulfilled my anticipations, for it will be seen from the foregoing figures that the value of the alkaloids separately extracted is 699l. 13s. 6d., taking the price at 163s., as compared with about 632l., the net price which would have been obtained for the bark if sold, showing a gain as already stated of nearly 104 per cent., instead of a loss of 10 per cent., notwithstanding that the red barks used in this experiment were very considerably poorer in quinine sulphate than those operated upon on the former occasion. It may also be noticed that the value of the sulphate of quinine alone extracted from the red bark amounted to more than the bark would have sold for.

This alteration of the mode of dealing with the red bark is the most important part of the present experiment, and deserves further examination. In the former experiment 4,277 lb. of red bark, of a net value of 596l. 2s. 2d., yielded mixed alkaloids of the value of 656l. 7s., the cost of manufacturing which was 130l., or a little less than 20 per cent. of the total value. On the present occasion 5,104 lb. of bark, of the net value of about 632l., yield separate alkaloids of the gross value of 972l. 11s. 6d., and the cost of their production was 272l. 18s., or a little over 28 per cent. In other words, by a process of manufacture 8 per cent. more expensive, a yield is obtained over 20 per cent. of increased value. This result seems calculated to throw some doubt upon the economic value of manufacturing quinetum, and it is submitted that it might be desirable to make an experiment in this country on a tolerably large scale, with bark from the Darjiling plantation, before the Government of India commits itself to any considerable expenditure in the erection of a factory for the manufacture of quinine or quinetum in India.

Hitherto the results of these experiments have been considered from a purely financial point of view. It must, however, not be forgotten that, as has been expressly declared on more than one occasion, the object of the introduction of the Chinchona plant into India was in order to place within the reach of the masses of the people, at the lowest possible rates, the only effective specific that science has yet discovered for the commonest of Indian diseases.

Adopting this view, the Bengal Government calculate the price of their Chinchona febrifuge at its actual cost to the State, which in 1880-81 was Rs. 9-3-10-625 per lb., which is made up as follows:—

Price of bark used in making 1 lb. of febrifuge	Rs.	4.	P.
Cost of manufacture, timing, advertising, &c.	6	4	0-760
	2	15	9 865
Total ...	9	3	10-625

which, at 1s. 8½d. the rupee, is equivalent to 15s. 9-7d. per lb. Adopting a similar process of calculation for the Madras bark, the following result is obtained:—

* Cost of 50 bales (5,104 lb.) of red bark	£	s.	d.
Freight, wharf charges, &c.	259	10	8
Return freight, &c., say	30	6	8
	27	4	8
Total ...	317	2	0

The cost price of the several drugs delivered to the Government of India would thus be—

	Cost of Bark, &c.	Manufacturing Charges, &c.	Total.	Rate per Lb.
Sulphate of quinine ..	£. s. d.	£. s. d.	£	s. d.
" of chinchonidine ..	242 13 0	24 per lb. = 87 16	340 8	83 6
Chinchonine alkaloid ..	69 12 0	18 " = 128 14	179 6	25 0
Amorphous sulphurous liquor ..	23 6 0	8 " = 28 8	50 14	14 0
	1 11 0	1 " = 12 0	13 11	1 1½
	3 7 2 0			

* The total charge against the plantations, including interest on balance for 1879-80, the last year for which a report has been received, was Rs. 1,06,763-3-7, and the amount of the harvest was equivalent to 179,299 lb. of dry bark, the cost of which was therefore 2 annas 6-3 pice per lb., at which rate 5,104 lb. would cost Rs. 3,038-7-7, or 259l. 10s. 8d.

In the same way it may be shown that the sulphate of quinine manufactured from the crown barks will be delivered to Government in India at a cost of only about 40s. 7½d. per lb., at which price it will successfully compete with the Sikkim febrifuge.

A second collection of papers, showing the recent result of the trial of Chinchona febrifuge and other alkaloids prepared in Bengal from the Sikkim bark, has recently been received from India. Copies of these were sent to Dr. Macnamara and to Mr. J. E. Howard for report. The former notices that, "the Chinchona febrifuge manufactured in India from red bark has evidently maintained and, indeed, increased its reputation," and he urges "that the Government factory be placed in a position to produce the febrifuge in such quantity and at so low a price as will provide for its widespread employment." Mr. Howard, on the other hand, points out the inferior efficacy and cheapness of sulphate of chinchonine and of sulphate of chinchonidine. He remarks that, in these papers, the febrifuge seems generally admitted "to be a nauseous medicine detrimental in a greater or less degree alike to Europeans and to Natives." Apart from these effects the efficacy of the remedy seems to be universally admitted, being apparently that of chinchonidine and chinchonine, of which it is chiefly composed." Mr. Howard notices that the amount of febrifuge obtained falls very far short of what is to be expected if the bark were thoroughly exhausted, and he quotes a report by Mr. Moens, in which it is stated that, "in the analytical laboratory of the Medical Department, by Dr. De Vrij's method (so called), out of 3,000 kilograms of dry bark 56 kilograms of quinetum were prepared, less than 50 per cent. of the alkaloid that was present in the bark." Should the Indian Government have any serious intention of improving the alkaloid, Mr. Howard says he should be happy, if desired, to supply further suggestions.

With their letter, No. 26 of 1881, the Government of India forwarded particulars of the process adopted by Mr. Gammie for the manufacture of sulphate of quinine. There is nothing new in this process, indeed it is a very old one which may have been employed in this country, but has certainly been abandoned for improved methods of manufacture for more than a quarter of a century, as it would be impossible by its use to extract the whole of the alkaloids from the bark. But probably this fact has already been ascertained by Mr. Gammie, and that he will be able to introduce some more efficient process of manufacture, before recommending Government to incur expenditure with a view to carrying out the manufacture on an extensive scale.

It may, however, be a question for consideration whether it would not be cheaper to send the bark to England for manufacture, where it would certainly be better made than in India, and the full amount of the alkaloids obtained, instead of permitting half of them to be lost, as is at present the case.

ORDER—dated 8th May 1882, No. 473, Revenue.

Miscellaneous.

Communicated to the Conservator of Forests in continuation of G.O., 21st June 1881, No. 964.

(True Extract.)

(Signed) E. F. WEBSTER,
Acting Secretary to Government.

To the Conservator of Forests.

- " Board of Revenue.
- " Superintendent, Government Central Museum.
- " Surgeon-General with the Government of Madras (for information in continuation of G.O., 25th October 1880, No. 1395).

Exd A. Grubert.

60 Copies.

Original.
6091. of 1882
REVENUE.

India Office,
London, 30th March 1882.

Revenue,
No. 16.

To His Excellency The Right Honourable The Governor
in Council, Fort St. George.

SIR,

Referring to my Despatch, No. 14, of the
18th May last, I now enclose, for your Excellency's
information, a copy of a Memorandum, showing
the results of the manufacture of Cinchona alka-
loids from the 250 bales of crown and red barks,
which formed part of the consignment received
from your Government per steamship "El
Dorado."

I have the honour to be,

Sir,

Your most obedient humble Servant,

W. C. G. G.

*Cinchona alkaloids — from the barks which
formed part of consignment shipped per
Dorado. — Results of the manufacture of —
Secretary of State's 1881, with forward a copy
Memorandum showing —, forwarded to
Director of Revenue.*

No. 1.

Last year an experiment was made of manufacturing sulphate of quinine and other alkaloids, on Government account, from the bark sent home from the Nilgiri Government plantations. The result of this was so far satisfactory that it was determined to repeat the experiment on a larger scale. The manufacture of the several alkaloids from the crown and renewed barks yielded, financially, 14 per cent. more in the value of the products than the bark operated upon would have realized if sold in the open market in the usual manner. With the red barks it was different, and the result in the case of these was a slight loss. In the former experiment, mixed alkaloids were extracted from the red barks, the value of which was found to be almost exactly 10 per cent. less than the bark itself would have fetched if it had been sold.

Crown Barks.

• Natural Crown,	N _C	Bales
		33
Renewed "	N _{NC}	100
Mossed "	N _{MC}	45
Branch "	N _{PC}	22
		200

	Bales
Red Natural, P . . .	20
Red Mossed, P . . .	30
	50

The estimated yield, by analysis, is as follows:—

	Quantity of Bark, in Lbs.	Quinine, Sulphate.		Cinchonidine, Sulphate.		Cinchonine, Alkaloid.	
		At per cent.	Total.	At per cent.	Total.	At per cent.	Total.
Natural crown	2,164	3.30	Lbs. 71.41	1.34	Lbs. 28.99	0.27	Lbs. 5.84
" "	1,101	3.87	42.60	1.20	13.21	0.22	2.42
Renewed "	6,596	5.57	367.39	0.72	47.49	0.23	15.17
" "	3,463	5.73	198.43	0.66	22.85	0.21	7.27
Mossed "	3,612	4.38	158.20	1.46	52.73	0.30	10.83
" "	997	5.06	50.44	1.52	15.15	trace	—
Branch "	2,218	2.00	44.36	0.75	16.63	trace	—
			932.83		197.05		41.53
Natural red	2,035	1.23	25.03	2.97	60.44	1.24	25.23
Mossed "	3,069	1.74	53.40	3.24	99.43	2.20	67.51
			78.43		159.87		92.74
			1,011.26		356.92		134.27

The result of the working of these barks has been as follows:—

	200 Bales of Crown Bark.	50 Bales of Red Bark.	Total.
Sulphate of quinine	Lbs. 1,045.5	Lbs. 81.5	Lbs. 1,127
" of cinchonidine	149.5	143	292.5
" of quinidine	25	—	25
Cinchonidine alkaloid	71.25	71	142.25
Amorphous sulph. liquor	404	240	644

From the foregoing figures, it will be seen that, as on the former occasion, the yield of sulphate of quinine has been in excess of the estimated result, and the sulphate of cinchonidine obtained somewhat under the expected yield, but the cinchonine alkaloid shows a slight excess. The sulphate of quinine shows an excess of 115.74 lbs., or over 11 per cent. So far as the out-turn is concerned, the result is therefore satisfactory.

With regard to the financial results of the experiment, it appears from Messrs. Jenkins and Phillip's report of their sale, that the average prices realized from the sale by public auction of similar parcels of bark, forming part of the same consignment, were,—natural crown, 5s. 8d.; renewed crown, 8s. 11d.; mossed crown, 10 bales at 6s. 10d. and 35 bales at 6s.; branch crown, 3s. 4d.; natural red, 2s. 5d.; mossed

red, 3s. At these prices the value of the above-mentioned barks was as follows:—

Natural crown	Lbs.	s.	d.	£	s.	d.
Renewed "	3,255 at 5 8	=	925	1	8	
Mossed "	10,059 at 8 11	=	4,184	12	9	
Branch "	1,025 at 6 10	=	350	4	2	
	3,584 at 6 0	=	1,075	4	0	
	2,218 at 3 4	=	369	13	4	
	20,151		7,204	15	11	
Deduct, allowance for dust, 3 per cent.						
" tret, 4 per cent.						
" discount, 2½ per cent.						
" brokerage, &c., 1 per cent.						
Natural red	2,035 at 2 5	=	245	18	0	
Mossed red	3,069 at 3 0	=	460	7	0	
			706	5	0	
			74	3	1	
			632	1	11	
			£7,080	9	10	

The value of the products obtained therefrom at the market prices of the day was:—

Crown Barks.

Sulphate of quinine	Lbs.	s.	d.	£	s.	d.
" cinchonidine	1,045.5 at 163	=	8,520	16	6	
" quinidine	149.5 at 34	=	254	3	0	
Cinchonine alkaloid	25 at 76	=	95	0	0	
Amorphous sulph. liquor	71.25 at 15	=	53	8	9	
	404 at 1	=	20	4	0	
Deduct working expenses*			8,943	12	3	
			1,007	6	6	
			7,936	5	9	

Red Barks.

Sulphate of quinine	Lbs.	s.	d.	£	s.	d.
" cinchonidine	81.5 at 163	=	664	4	6	
Cinchonine alkaloid	143 at 34	=	243	2	0	
Amorphous sulph. liquor	71 at 15	=	53	5	0	
	240 at 1	=	12	0	0	
Deduct working expenses*			972	11	6	
			272	18	0	
			699	13	6	
			£8,635	19	3	

From the foregoing figures it will be seen that the total net value of the products obtained from the bark is 8,635l. 19s. 3d. as compared with 7,080l. 9s. 10d. the gain would have been realized for the bark if it had been sold with the consignment of which it formed a part. The net should be 1,555l. 9s. 5d., or nearly 22 per cent. instead of selling to No. 26, thus been 1,555l. 9s. 5d., or nearly 22 per cent. Similarly, it will be seen that the net gain in respect of the crown barks alone is 23 per cent., and in respect of the red barks nearly 10½ per cent. These results are obtained by taking, for purpose of calculation, the price of quinine in May last, the date when the manufacture had been completed and the products were ready for delivery. The result of this experiment is considerably more satisfactory from a financial point of view than the previous one, which showed a net gain of only 9 per cent. more than would have been realized had the bark

* Including a portion of 21l. paid for fire insurance at factory.

been sold in the usual manner. It may be a question for consideration whether in future it will be advisable to work up the quinoidine into liquor unless it can be shown that there is likely to be any demand for it. A preferable plan probably would be merely to precipitate the alkaloid and not purify it, but set it aside in its rough state till such time as some use may be discovered for it. In the foregoing calculations, I have taken the value of it at merely the cost of manufacture, viz., 1s. per lb.

As on the former occasion, the gain is chiefly obtained from the red crown barks. In the previous experiment, the products from the red barks were obtained in the form of mixed alkaloids, and this resulted in a loss of 10 per cent. in value as compared with what would have been obtained by the sale of the bark. I then suggested that "it might perhaps be found more advantageous, from a pecuniary point of view, to extract the several alkaloids separately from the red bark instead of making Cinchona febrifuge." The result has quite fulfilled my anticipations, for it will be seen from the foregoing figures that the value of the alkaloids separately extracted is 699l. 13s. 6d., taking the price at 163s., as compared with about 632l., the net price which would have been obtained for the bark if sold, showing a gain as already stated of nearly 10½ per cent., instead of a loss of 10 per cent., notwithstanding that the red barks used in this experiment were very considerably poorer in quinine sulphate than those operated upon on the former occasion. It may also be noticed that the value of the sulphate of quinine alone extracted from the red bark amounted to more than the bark would have sold for.

This alteration of the mode of dealing with the red bark is the most important part of the present experiment, and deserves further examination. In the former experiment 4,277 lbs. of red bark, of a net value of 596l. 2s. 2d., yielded mixed alkaloids of the value of 666l. 7s., the cost of manufacturing which was 130l., or a little less than 20 per cent. of the total value. On the present occasion 5,104 lbs. of bark, of the net value of about 632l., yielded separate alkaloids of the gross value of 972l. 11s. 6d., and the cost of their production was 272l. 18s., or a little over 28 per cent. In other words, by a process of manufacture 8 per cent. more expensive, a yield is obtained over 20 per cent. of increased value. This result seems calculated to throw some doubt upon the economic value of manufacturing quinetum, and it is submitted that it might be desirable to make an experiment in this country on a tolerably large scale, with bark from the Darjiling plantation, before the Government of India commits itself to any considerable expenditure in the erection of a factory for the manufacture of quinine or quinetum in India.

Hitherto the results of these experiments have been considered from a purely financial point of view. It must, however, not be forgotten that, as has been expressly declared on more than one of the estimates of the introduction of the Cinchona plant into India, somewhat under-estimated, the only effective specific that we have discovered for the commonest of Indian diseases.

Adopting this view, the Bengal Government, in the price of their Cinchona febrifuge at its actual cost, the price of the bark used in making 1 lb. of febrifuge, which in 1880-81 was Rs. 9. 3. 10-625 per lb., which is made as follows:—

Price of bark used in making 1 lb. of febrifuge	R. A. P.
Cost of manufacture, tinning, advertising, &c.	6 4 0-760
Total	2 15 9-865
	Rs. 9 3 10-625

which, at 1s. 8½d. the rupee, is equivalent to 15s. 9-7d. per lb. Adopting a similar process of calculation for the Madras bark, the following result is obtained:—

	£	s.	d.
* Cost of 50 bales (5,104 lbs.) of red bark	259	10	8
Freight, wharf charges, &c.	30	6	8
Return freight, &c., say	27	4	8
	£317	2	0

The cost price of the several drugs delivered to the Government of India would thus be,—

		Cost of Bark, &c.	Manufacturing Charges, &c.	Total.	Rate per Lb.
	Lbs.	£ s. d.	£ s. d.	£ s. d.	s. d.
Sulphate of quinine	81.5	242 13 0	24 per lb. = 97.15	340.8	83 6
" cinchonidine	143	50 12 0	18 " = 128.14	179.6	25 0
Cinchonine alkaloid	71	22 6 0	8 " = 28.8	50.14	14 0
Amorphous sulphurous liquor	240	1 11 0	1 " = 12.0	13.11	1 1½
		£ 317 2 0			

In the same way it may be shown that the sulphate of quinine manufactured from the crown barks will be delivered to Government in India at a cost of only about 40s. 7½d. per lb., at which price it will successfully compete with the Sikkim febrifuge.

A second collection of papers, showing the recent result of the trial of Cinchona febrifuge and other alkaloids prepared in Bengal from the Sikkim bark, has recently been received from India. Copies of these were sent to Dr. Macnamara and to Mr. J. E. Howard for report. The former notices that, "the Cinchona febrifuge manufactured in India from red bark has evidently maintained and, indeed, increased its reputation," and he urges "that the Government factory be placed in a position to produce the febrifuge in such quantity and at so low a price as will provide for its wide spread employment." Mr. Howard, on the other hand, points out the inferior efficacy and cheapness of sulphate of cinchonine and of sulphate of cinchonidine. He remarks that, in these papers, the febrifuge seems generally admitted "to be a nauseous medicine detrimental in a greater or less degree alike to Europeans and to Natives. . . . Apart from these effects the efficacy of the remedy seems to be universally admitted, being apparently that of cinchonidine and cinchonine, of which it is chiefly composed." Mr. Howard notices that the amount of febrifuge very far short of what is to be expected if the bark were

From these figures, and he quotes a report by Mr. Moens, in which it is obtained from the analytical laboratory of the Medical Department, 10d., which method (so called), out of 3,000 kilograms of dry bark 3½ the remainder of quinetum were prepared, less than 50 per cent. of the gain by means present in the bark." Should the Indian Government having bark has intention of improving the alkaloid, Mr. Howard says he should be very happy, if desired, to supply further suggestions.

With their letter, No. 26 of 1881, the Government of India forwarded particulars of the process adopted by Mr. Gammie for the manufacture of sulphate of quinine. There is nothing new in this process, indeed it is a very old one which may have been employed in this country, but

* The total charge against the plantations, including interest on balance for 1879-80, the last year for which a report has been received, was Rs. 1,06,763. 9. 7. and the amount of the harvest was equivalent to 179,299 lbs. of dry bark, the cost of which was therefore 9 annas 6-3 pies per lb., at which rate 5,104 lbs. would cost Rs. 3,038. 7. 7, or 259l. 10s. 8d.

has certainly been abandoned for improved methods of manufacture for more than a quarter of a century, as it would be impossible by its use to extract the whole of the alkaloids from the bark. But probably this fact has already been ascertained by Mr. Gammie, and that he will be able to introduce some more efficient process of manufacture, before recommending Government to incur expenditure with a view to carrying out the manufacture on an extensive scale.

It may, however, be a question for consideration whether it would not be cheaper to send the bark to England for manufacture, where it would certainly be better made than in India, and the full amount of the alkaloids obtained, instead of permitting half of them to be lost, as is at present the case.

18th October 1881.

- F. C. D

N. 10.

Revenue

30th March 1882.

The

Letter to Lord St. George

N. 16. enclosure

No. 2201.

Order. 11/73

Communicated to the
Conservator of Forests in
Continuation of G.O. 2154
June 1881, no 904.

From

The Secretary of the
Forest Department.

Dated

20 March.

Recd.

25 April.

No.

16 Revenue.

- To
1. The Conservator of Forests.
 2. The Board of Revenue
 3. The Insp. Genl. Central Museum
 6. The Surgeon-Genl. with the Forest
for information in connection with
S.O. 25/10/50 of 13/5/51
 6. By Genl. of Forests & Wildlife

Note. The results of the former experi-
ment referred to in this Paper are embodied
in S.O. 25/10/50 of 13/5/51. There the Secy of
State required that certain samples
should be tried and reported upon.
The Surgeon-Genl. has not yet done
this for reasons explained in C.O. 2336
put up. No such request is made
in the present paper, so that it is
presumed that no special orders
are required upon it. Should this
paper be communicated to the
Public through the Press or otherwise

Sufficiently made a
copy be made on 11/2/51

SUBJECT.

1. The results of the experiments
of Pinchona alba trials
from the 250 barrels
of Crown & red bark which
formed part of the consi-
ment received from
Madras Govt. per steamer
"El Dorado".

11/5

Communicated.