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[Despatch Abstract.]

Recording Proceedings, Revenue
Deptt., reviewing the Adminis-
tration Report on the Govt
Cinchona plantations for
the year ending 31st Mar. '97.

19/8/97

BACK PAPERS.

G.O.	No.	Department.	Date.	G.O.	No.	Department.	Date.

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G.O., No. 578, 16th July 1897.

JULY.

WITH ORDER

Administration Report on the Government Cinchona Plantations,
 Nilgiris.

Reviewing the — for the year ending 31st March 1897.

GOVERNMENT OF MADRAS.

REVENUE DEPARTMENT.

READ—the following letter from W. M. STANDEN, Esq., Director of the Government Cinchona Plantations, Nilgiris, to the Secretary to Government, Revenue Department, dated Ootacamund, 17th May 1897, No. 33 :—

I have the honour to submit the Annual Administration Report on the Government Cinchona Plantations for the year ending 31st March 1897, printed as desired by Government in G.O., No. 224, Revenue, dated the 7th March 1893.

2. I took over charge of the plantations from Mr. D. Hooper, the Acting Director and Government Botanist, on the 23rd May 1896, and held the post of Director for the remainder of the year.

ANNUAL ADMINISTRATION REPORT ON THE
GOVERNMENT CINCHONA DEPARTMENT, NILGIRIS,
FOR THE YEAR 1896-97.

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I. SEASON AND RAINFALL.—The season during the year under review was, on the whole, decidedly favourable to the growth and condition of the cinchonas. The south-west monsoon, though exceptionally heavy and accompanied by abnormally high gales, did comparatively little damage to the plantations. The rainfall from October to March was more evenly distributed than usual, and there was very little frost.

(a) *Dodabetta*.—The rainfall registered on this estate during the year was 65·52 inches. This was considerably above the average for the past ten years and was 13·52 inches in excess of the quantity registered in the previous year.

(b) *Nedivattam*.—At Nedivattam there were 156 wet days during the year, the total rainfall being 134·06 inches or 41·20 inches more than that of the previous year.

(c) *Hooker*.—On this estate 124.78 inches of rain were registered, the number of wet days being 168. Compared with the rainfall of the year before, there was an excess during the year under review of 47.34 inches.

II. FINANCIAL—(a) *Receipts*.—In September 1895 the budget estimate of receipts for the year 1896–97 was calculated at Rs. 1,00,000, and this was accepted by Government in G.O., No. 701, Revenue, of 25th October 1895. The same figure was subsequently adopted as the revised estimate and sanctioned in G.O., No. 605, Revenue, dated 11th November 1896. Compared with the above estimate, the actual cash receipts during the year amounted to Rs. 1,47,527–4–6, as detailed below, or an increase of Rs. 47,527–4–6 over the budget and revised estimates:—

	RS.	A.	P.
By sale of quinine	1,09,759	9	10
Do. of febrifuge	36,481	10	5
Do. of bark	475	6	5
Do. of jalap	792	3	8
Percentage on Quinologist's fees	11	9	8
Miscellaneous receipts	6	12	6
Total	1,47,527	4	6

Of the above total, Rs. 10,634–13–0 represent amounts due on the transactions of the previous year, and credited as outstandings in the balance sheet (statement 12) appended to the last annual report.

In this statement Rs. 13,368–13–9 were shown as outstanding at the end of the year, but under instructions from the Accountant-General sums amounting to Rupees 2,734–0–9 were adjusted in the accounts for the year 1896–97 after the submission of the annual report and the outstandings were therefore reduced to Rs. 10,634–13–0.

The actual receipts appertaining to the year under review therefore amount to Rs. 1,36,892–7–5, and at the close of the year Rs. 2,867–9–0, as shown below, were due to the department for quinine and febrifuge supplied, giving a total of Rs. 1,39,760–0–6, as the result of the year's transactions to be set against an expenditure of Rs. 78,317–11–1 or a profit of Rs. 61,442–5–5, exclusive of the increase in the value of stock at the close of the year as compared with that at the commencement of the year.

DETAILS of outstandings due to the department.

	RS.	A.	P.
Sums due from Local Fund dispensaries and Municipal hospitals	2,644	9	0
Sums due from the Public	223	0	0
Total	2,867	9	0

The value of quinine packets in stock with Collectors and Postmasters is not included in the above list of outstandings due to the department. These packets being unsold are reckoned as a portion of the stock at the end of the year and are therefore included in the stock statement.

(b) *Expenditure*.—The budget estimate of expenditure for the year was Rupees 87,200 as sanctioned in G.O., No. 701, Revenue, of 25th October 1895. This was altered by the Accountant-General to Rs. 86,600. In September 1896 the revised estimate was framed at Rs. 78,900 and was accepted by Government in G.O., No. 830, Financial of 2nd December 1896. Compared with the budget estimate of Rs. 87,200 and a revised estimate of Rs. 78,900, the actual expenditure amounted to Rupees 78,317–11–1, showing a surrender from the budget of Rs. 8,882–4–11. This reduction is chiefly due to the difference between the salary of the present Director and that drawn by the former incumbent of the post.

The expenditure for the year, viz., Rs. 78,317–11–1, compared with that of the previous year, viz., Rs. 83,087–1–6, shows a saving of Rs. 4,769–6–5. Of the above

total expenditure of Rs. 78,317–11–1 the disbursements on account of Quinologist's salary, laboratory rent, laboratory assistant, chemicals and all charges connected with the manufacture and distribution of quinine and febrifuge amounted to Rs. 28,929–12–0, leaving a balance of Rs. 49,387–15–1, which represents the expenditure on Head office and plantations.

(c) *Financial Returns*.—In place of the two statements hitherto submitted (Nos. 2 and 4) showing receipts and expenditure in detail compared with the budget and revised estimates, one amalgamated statement (No. 2) is now given in which are incorporated all the details formerly contained in the two statements particularized above.

As no instructions have been received with reference to the modification of statements 11 and 12 appended to previous Reports on which the opinion of the Accountant-General was requested in paragraph 11 of G.O., No. 350, Revenue, of 23rd July 1896, the capital and revenue account has not been altered; but in addition to the usual balance sheet, a stock statement is given, showing in detail the quantity and value of the stock in hand at the beginning and at the end of the year. In statements 8 and 12 appended to the last Annual Administration Report the stock of bark at the end of the year was shown as 190,372 lb., though the actual quantity in store at Nedivattam, Dodabetta and Hooker was 300,030 lb. The excess of 109,658 lb. has now been shown in statement 7 and has also been included in the stock statement. It is impossible, however, to apportion this large excess of stock accurately to the crops of previous years, and, as the value of bark in stock has hitherto been given at its actual cost, the total value of the bark, viz., Rs. 80,655–4–3 remaining at the end of last year is not affected, but instead of showing in detail the value of the balance of crop appertaining to various years, the stock account now shows 300,030 lb. of bark at the close of last year at an average cost per lb. of As. 4–3.61 or Rs. 80,655–4–3. The bark harvested during the year is valued at cost price, and the quinine and febrifuge at the rates prescribed by Government for the year 1896–97. In order to arrive at the actual cost of the year's bark crop, the expenditure incurred on the Quinologist's department and factory is deducted from the total expenditure. The result, which represents the expenditure on the Head office and plantations, divided by the number of pounds of bark harvested during the year, gives the cost per lb. of the year's crop. The stock account shows that although the value of the bark in hand at the close of the year was reduced by Rs. 14,793–6–6 there was an increase in the value of the stock of quinine and febrifuge of Rs. 36,245–13–4 owing to the largely increased output from the factory during the year. The net increase in the value of the stock in hand on 31st March 1897 was Rs. 22,559–7–5.

The balance sheet now submitted differs in the following respects from those appended to the annual reports in recent years:—

- (1) It shows the actual amount recovered by the sale of stock remaining on hand at the close of the previous year.
- (2) No credit is taken as cash receipts for stock held by Collectors and postmasters. Such stock is included in the stock statement. The credit balance of Rs. 84,001–12–10 shown in statement 12 may be analysed as follows:—

	RS.	A.	P.
Surplus of receipts and outstandings appertaining to the year	61,442	5	5
over total expenditure	22,559	7	5
Increase in value of stock			
Total	84,001	12	10

III. GENERAL CONDITION—(a) *Dodabetta*.—Viewed as a whole, the trees on this estate are looking exceedingly healthy and vigorous. This satisfactory condition is largely due to the fact that the estate has never been very heavily cropped, and that unlike the plantations of Nedivattam and Hooker only a small proportion of its total area is growing a second crop of cinchona. The results of the coppicing in recent years have been fairly satisfactory but in many instances the growth of shoots from the stools is extremely slow. With the aid of manure and high cultivation, it is hoped that the re-generation by coppice will prove a success. Stools which entirely fail to make growth will be dug out, and their places supplied by healthy young plants

grown in baskets. During the year 17.75 acres were coppiced, the yield of dry bark being 65,066 lb. The number of plants put out during the year was 15,801 but these cannot be considered as additions to the estate as they served only to supply vacancies in the plantings of previous years. The estate has been well cultivated during the year, the different works have been carried out efficiently and at a moderate cost, and there is ample testimony in the satisfactory condition of the plantation to the good work done by the present Superintendent Mr. H. V. Ryan.

(b) *Nedivattam*.—This estate which presents a very uneven appearance as compared with Dodabetta, owing to the want of uniformity in the species grown and to the fact that a considerable proportion of the total area has been replanted after the uprootal of the original trees, has certainly improved in condition during the year. This improvement though due in some measure to the favourable season may also be attributed to more liberal cultivation. The area under original planting, which at the beginning of the year was only 137.21 acres, was still further reduced during the year by the uprootal of 20 acres, leaving 117.21 acres of the original planting standing at the end of the year. Of the remaining area of this estate 165.01 acres carry a second crop of trees ranging from 9 months to 16 years of age and 69.88 acres are lying fallow. It has been found advisable as a general rule to allow land which has grown cinchona for 30 years and upwards a period of at least six years fallow, and as there is no doubt that the natural recuperative power of soils can be increased by judicious treatment while under fallow, it is proposed to work the soil deeply after a plot has been uprooted and grow crops of leguminous plants which will be worked into the soil annually until the plot is again planted with cinchona. This treatment, supplemented by a dressing of lime and cattle manure before a plot is re-planted, should prove effectual in restoring the elements of fertility to soils which have grown cinchonas for a considerable number of years.

During the year plot No. 24 was re-planted with 55,000 *Officinalis* plants and 7,900 plants of the same species were put out in plot No. 23 to replace failures in the planting of the previous year.

At the close of the year these young plants were looking well and it is anticipated that the percentage of failures will be comparatively small.

(c) *Hooker*.—Of the total area of this estate, i.e., 196.48 acres, there are only 10.59 acres under original planting while 185.89 acres are growing a second crop of cinchona. In exposed situations and where the soil is poor the growth of the trees is not satisfactory, but where the conditions are more favourable, the cinchonas are looking very well. It is intended to plant up the most exposed ridges and fields on this estate with *Eucalyptus* as it has been found that such land will not grow a second crop of cinchona successfully.

During the year under review 10,400 crown bark plants were put out to supply vacancies in the plantings of previous years.

IV. *UPKEEP*.—All the roads, drains and bridges on the estates have been kept in good order, and at Dodabetta the cart road to the lower part of the estate which was commenced last year was completed.

V. *MANURE*.—The estates have been well supplied with manure as usual. 1458 cart-loads were put out at Dodabetta, 558 at Nedivattam and 255 at Hooker.

VI. *NURSERIES*.—Particular attention has been paid to the nurseries during the year in view of the fact that the successful re-planting of land from which cinchonas have been uprooted is a matter of considerable difficulty. At Dodabetta 38,000 and at Nedivattam 53,940 plants were transplanted into plant baskets filled with a mixture of manure and rich soil. It is anticipated that by the use of these plant baskets the percentage of failures in next seasons planting will be considerably reduced. In addition to the number of plants mentioned above, the nurseries on all the estates were kept well stocked with seedlings raised from seed gathered from carefully selected crown bark trees. The seed received from the Director of the Public Gardens and Plantations, Jamaica, was handed over to the Curator of the Government Gardens, Ootacamund, who kindly undertook to raise the plants. 3,940 seedlings were sent out to Nedivattam where they were transplanted into baskets ready for next season's planting and 14,767 were sent to Dodabetta where they received similar treatment. There still remain a number of small seedlings which will be sent out to the estates when they are more advanced.

VII. *CROP*.—The total quantity of bark harvested during the year was 186,867 lb. as detailed below:—

Plantation.	Crown.	Hybrid.	Red.	Total.
Dodabetta	65,066	..	..	65,066
Nedivattam	39,563	1,477	61,261	102,301
Hooker	19,500	..	..	19,500
Total	124,129	1,477	61,261	186,867

The crop from Dodabetta was obtained by coppicing alternate rows of trees over 17.75 acres and was augmented by the coppicing of a few sickly trees on various plots. The bulk of the Nedivattam crop was obtained by the uprootal of 3,159 crown and 2,773 red bark trees from plots Nos. 1 and 2. These trees which were planted in 1862 had long since passed their prime. The *Succirubras* or red bark trees would have been uprooted in any case as they are febrifuge yielders only, but the crown bark trees would have been coppiced had they been younger. It has been found that crown bark trees at Nedivattam 30 years old and upwards do not coppice at all well. The few stools that make growth throw up weedy suckers which die off in a few years. This is only what might be expected. To ensure successful reproduction from coppice, the trees should be cut over while in a condition of vigorous growth and before they have passed their prime. Under the circumstances therefore it was considered best to uproot the crown as well as the red bark trees. The land having lain fallow for some years, will eventually be planted up with crown bark plants. As plot No. 1, which was originally planted in 1862 and which consists of 14.12 acres, has now been entirely cleared, the quantity of bark yielded by the final harvest can be given. The final crop taken from this plot up to last year was 11,190 lb. and during the year under review 62,070 lb. were harvested, making a total of 73,260 lb. or 5,188 lb. per acre as the result of the final harvest. The average yield of dry bark per tree was 15.9 lb.

The crop from the Hooker Estate consisted entirely of bark taken from sickly and dying trees and from thinnings.

The actual quantity of bark remaining in store at the close of last year was 300,030 lb. During the year under review 186,867 lb. were harvested, making a total of 486,897 lb. Of this total, 240,146 lb. were disposed of during the year as shown below:—

Used for manufacture of quinine and febrifuge	LB.
Sold	238,100
.. .. .	2,046
Total	240,146

and there remained in store at the end of the year 246,751 lb., of which 104,776 lb. belonged to the 1896-97 crop and 141,975 lb. to the crops of previous years.

Statement No. 5 appended to the report exhibits the yield of bark from the Government Plantations since their commencement.

VIII. *BUILDINGS*.—The only new building constructed during the year was a line of ten houses for the accommodation of coolies on the Hooker Estate. The damage done by the exceptionally heavy gales which prevailed during the south-west monsoon was comparatively slight, and before the end of the year all the buildings on the estates were put into good repair.

The total expenditure under this head was Rs. 2,491-4-1 detailed as follows:—

	RS.	A.	P.
Dodabetta	265	14	0
Nedivattam	496	11	2
Hooker	1,578	14	4
Head office	149	12	7
Total	2,491	4	1

IX. FACTORY.—Owing to the late arrival of the fusel-oil which was indented for in November 1895, but which did not arrive until May 1896, work in the factory was not commenced until the 27th May. From that date, with the exception of an interval during the Christmas holidays, the manufacture of quinine and febrifuge was carried on continuously to the close of the year. It was found that the bark was more completely exhausted of its alkaloids by being treated twice with the mixed oils, instead of once as was done before, and the results for the year which are the most favourable that have been obtained since the manufacture of quinine and febrifuge was started, clearly show the importance of this second washing. Another innovation in connection with the work in the factory was the introduction of monthly returns showing precisely the amount of chemicals used and the quantity of quinine and febrifuge obtained from the bark treated each month. These serve as a useful check on the work done. The total quantity of bark worked up during the year was 238,100 lb. consisting of 237,000 lb. crown, hybrid and magnifolia barks and 1,100 lb. of red bark. From this amount of raw material were extracted 7,891 lb. quinine and 3,350 lb. febrifuge, or a total of 11,241 lb. alkaloids. The total expenditure on factory and chemicals together with the pay of the Government Quinologist, rent of laboratory and labour employed on the distribution of quinine and febrifuge and the making up and despatch of quinine powders was Rs. 28,929-12-0. The following statement represents the cost of manufacture and distribution during the year:—

—	Amount.	—	Amount.
	RS. A. P.		RS. A. P.
Value of chemicals in stock on 31st March 1896.	6,420 5 2	Value of chemicals in stock on 31st March 1897.	7,532 5 9
Quinologist's salary	4,467 14 5	Cost of manufacturing 11,241 lb. alkaloids, viz., 7,891 lb. quinine and 3,350 lb. febrifuge.	91,447 8 2
Laboratory assistant's pay	174 0 0	Cost per lb. of alkaloid, Rs. 8-2-2..	
Factory overseer's pay	1,500 0 0		
Rent of laboratory	600 0 0		
Cost of chemicals, packing and despatching quinine and febrifuge.	20,225 0 6		
Factory labour	1,962 13 1		
Value of 238,100 lb. bark used, viz., 156,009 lb. of previous year's crops at annas 4 and pie 3-61 per lb.	41,935 8 8		
82,091 lb. of 1896-97 crop at annas 4 and pies 2-74 per lb.	21,694 4 1		
Total	98,979 13 11	Total	98,979 13 11

In the above statement, the value of the bark used has been taken at its actual cost price to Government, while the value of the chemicals represents their cost at the factory. As the quinine and febrifuge were obtained by the oil process, the cost of each is practically the same. With the oil process when quinine yielding barks are treated, the febrifuge is a bye-product in the manufacture of quinine. It is intended in future to extract febrifuge from the red barks by the acid process which is a much less expensive method, and arrangements will be made to carry on the work of extracting febrifuge from the red barks in a separate building, simultaneously with the manufacture of quinine and febrifuge from quinine yielding barks in the main factory.

The following table gives the output of quinine and febrifuge since the commencement of manufacture at Nedivattam:—

—	Total bark worked up.	Quinine.	Febrifuge.	Total alkaloids.
	LB.	LB.	LB.	LB.
1888-90	15,250	234	357	591
1890-91	96,200	2,928	1,050	3,978
1891-92	144,500	4,425	3,174	7,599
1892-93	171,717	4,933	3,139	8,072
1893-94	175,000	2,000	5,775	7,775
1894-95	196,600	4,770	1,756	6,526
1895-96	233,800	3,600	2,284	5,884
1896-97	238,100	7,891	3,350	11,241

The rates at which quinine and febrifuge were sold during the year to Medical Stores and the public were Rs. 18 and Rs. 10 respectively. Adopting these rates the value of the alkaloids manufactured during the year was as follows:—

7,891 lb. quinine at Rs. 18 per lb.	1,42,038
3,350 lb. febrifuge at Rs. 10 per lb.	33,500
Total	1,75,538

At the same rates, the value of the alkaloids manufactured during the previous year was Rs. 87,640.

Had it been possible to start manufacture on the 1st April, about 286,000 lb. of bark would have been treated and the outturn of quinine would have been about 9,500 lb., while the febrifuge would have amounted to over 4,000 lb. This is mentioned as an indication of the present capacity of the factory. The crown, hybrid, and magnifolia barks treated during the year yielded an average of 3.32 per cent. of quinine and 1.39 per cent. of febrifuge, while the red barks yielded 4.45 per cent. of febrifuge.

Quinine.—At the close of last year the stock of quinine was 2,880 lb., and during the year under review 7,891 lb. were manufactured, giving a total of 10,771 lb. The issues during the year amounted to 5,908½ lb. as detailed below, leaving a balance in hand of 4,862½ lb.:—

	LB.
Medical Stores department, Madras	333
" " Bombay	2,620
" " Calcutta	1,000
Local Fund Hospitals and Municipal Dispensaries	340
Native States	361½
Superintendents of Jails, Bengal and Bombay	265
The Public	200
Post Offices	628
Collectors	99
Sanitary Commissioner, Hyderabad	62
Total	5,908½

The above total compared with the issues of the previous year shows an increase of 264½ lb. which is chiefly due to the larger sales effected by Postmasters.

Febrifuge.—The quantity manufactured during the year was 3,350 lb. and this added to the stock in hand at the close of last year totals 4,935¾ lb. Of this quantity 3,709¼ lb. were disposed of as shown below, and there remained at the end of the year a balance in hand of 1,226½ lb.:—

	LB.
To Medical Stores, Madras	500
" " Bombay	2,500
" " Local Fund Dispensaries and Municipal Hospitals	591½
" " Native States	54½
" " the Public	63½
Total	3,709¼

The following table shows the issues of quinine and febrifuge since 1889-90:—

	Quinine.	Febrifuge.	Total alkaloids.
	LB.	LB.	LB.
1889-90	234	7	241
1890-91	1,356	200	1,556
1891-92	3,344	3,017	6,361
1892-93	3,204	2,608	5,812
1893-94	2,536	3,513	6,049
1894-95	3,631	3,956	7,587
1895-96	5,644	2,666	8,310
1896-97	5,908½	3,709¼	9,617¾

X. The report of the Government Quinologist is appended.

XI. MISCELLANEOUS—(a) *General*.—During the year under review, the separation of the Cinchona from the Botanical Department was effected pending the sanction of the Right Honourable the Secretary of State for India, the Director being placed in charge of the cinchona plantations and factory; and the Curator in immediate charge of the gardens and parks. Under G.O., No. 3433, Revenue, dated 25th August 1896, the services of Mr. D. Hooper, the Government Quinologist, were placed at the disposal of the Government of India in the Revenue and Agricultural branch. Mr. Hooper officiated as Reporter on Economic Products to the Government of India from the 1st September to the 2nd December 1896. He returned on the 7th December and left on three months' privilege leave on the 23rd February.

(b) *Issue of quinine powders to Collectors*.—There has been a marked decrease in the number of indents received from Collectors during the year as compared with previous years, only 1,385 packets having been supplied as against 2,399 packets sent out in 1895-96. This falling off in issues to the Revenue officials is no doubt largely due to the fact that, during the year under review, the scheme for the sale of quinine at all Post offices in the Presidency was given effect to. Of the two agencies now at work for the sale of quinine to the poorest classes, it would seem, as might be expected, that the Post office is the more successful; and if there be no improvement in the sales effected by Revenue officials during 1897-98, it will be a matter for consideration whether it would not be advisable in the future to rely entirely on the Post offices for the distribution of quinine. The packets sent out to Collectors during the year were distributed as follows:—

Anantapur	...	...	...	...	...	...	...	600
South Canara	...	...	...	...	...	...	...	75
Malabar	...	...	...	...	...	...	...	110
Tinnevely	...	...	...	...	...	...	...	450
Trichinopoly	...	...	...	...	...	...	...	150
Total								1,385

The Collectors of districts have been requested to submit returns showing the sales effected during the year, and on receipt of this information, a full report will be submitted to Government in accordance with paragraph 2 of G.O., No. 224, Revenue, of 7th March 1893.

(c) *Sale of quinine at Post offices*.—The sale of quinine in five grain powders, which was first started on a limited scale in July 1895, has now been extended to all the Post offices in the Presidency with the exception of those in Madras and Chingleput. There are now 1,550 Post offices throughout the Presidency which serve as depôts for the sale of quinine. The number of packets, each containing 102 five grain powders, sent out as permanent advances to Postmasters during the year was 4,450, while subsequent indents, which represent sales effected amounted to 4,180 packets as against 664 packets sold last year. It is satisfactory to note that the average number of packets sold at each Post office during the year was 2.70 as against an average sale of 2.10 packets during the previous year.

A special report on this subject will be duly submitted to Government in accordance with paragraph 3 of G.O., No. 578, dated 8th August 1894.

(d) *Quinine powders sold in Coorg*.—Indents for 343 packets of quinine powders from Postmasters in the province of Coorg were complied with during the year. The average number of packets sold at each Post office in Coorg was 15.59.

(e) *Plantation books*.—These books have been introduced on the three estates with the object of keeping an accurate record of the cost of the various works done and the yield of bark on each plot. As far as possible, the past history of each plot is given, but in the absence of detailed records, the expenditure to date cannot be shown. These books will not only serve as a useful check on the cost per acre of work done, but will show whether money spent on manuring and high cultivation is recouped by

the value of an increased yield of alkaloids. There is no doubt that manure increases the yield of alkaloids, but it has not been proved that the value of the increased yield invariably pays for the cost of the manure and its application.

(f) *Fuel plantation*.—Although there is no immediate fear of a scarcity of fuel for the factory, it is necessary that steps should be taken to secure an ample supply of cheap firewood for future requirements. Arrangements will therefore be made to plant up a few acres at Nedivattam and Hooker with Eucalyptus. It is proposed to make extensions annually for the next few years and to treat the fuel plantations ultimately as coppice, on a ten-year rotation.

(g) *Subordinate staff*.—Mr. H. C. Bonjour, Sub-Overseer at Hooker, having been pronounced physically unfit for further duty was granted an invalid pension of Rs. 13-5-4 per mensem from the 1st November 1896. The post was not filled up from this date pending final orders of Government on the proposed re-organisation of establishment on the Hooker estate. Messrs. H. V. Ryan and E. Collins, the Superintendents of Dodabetta and Nedivattam and Mr. T. Edie, the Factory Overseer, did good work during the year and Mr. Donald Campbell, the Manager of the Head office, worked exceedingly well.

(h) *Store returns*.—In accordance with G.O., No. 920, Financial, dated 13th September 1893, an inventory of the valuable stock in the custody of the Superintendents of the estates has been made.

(i) *Service books*.—All the service books have been kept duly written up to date.

OOTACAMUND,
17th May 1897.

(Signed) W. M. STANDEN,
Director.

ENCLOSURE.

From D. HOOPER, Esq., Government Quinologist, to the Director, Government Cinchona Plantations, Nilgiris, dated Agra, 2nd April 1897.

I have the honour to make the following report on the Quinologists Department for the year ending 31st March 1897:—

Work in the laboratory has been much curtailed during the year on account of my duties as Officiating Government Botanist and Director to the 23rd May, and as Officiating Reporter on Economic Products in Calcutta for three months from the 1st September. I also had to avail myself of privilege leave for three months before the close of the official year.

Value of factory bark.—One of the most important subjects in connection with the plantations is a knowledge of the value of the bark which is annually harvested from the trees. In previous reports, the value has been given of the bark taken from individual trees or from small plots which had been treated with different kinds of manure and variously situated in the estates. The experiments resulting in these valuations have contributed to set at rest many questions which surrounded the cinchona industry on the Government plantations about thirteen years ago. Now that thousands of pounds are being annually powdered and manufactured into quinine in the factory, it is easy to notice any fluctuation in its composition. It is desirable in the first place to use a bark of good quality and in the second place to exhaust it as much as possible of its alkaloids in the manufacturing processes. The bark used for making quinine has been hitherto obtained from the Government plantations and has consisted almost exclusively of that kind known as officinalis. Crown or officinalis bark contains a larger proportion of quinine in its alkaloids than the hybrids and succirubras do in theirs, for while one hundred parts of the mixed alkaloids of officinalis bark yield 70 parts of quinine, the same quantity of hybrid alkaloids give about 40 parts, and that of the succirubras about 20 parts. It is obviously more profitable to make quinine from the first of these kinds, as the cost of working up a pound of bark is the same whether it is poor or rich in alkaloids.

In the following table there is recorded the value, determined by analysis, of all the crown bark ground up during the past eight years at the Naduvattam factory. Several analyses were sometimes made in one year, in such cases the figures for those years are averages of all the determinations. The first sample of quinine made on the Nilgiris was sent into Ootacamund on Her Majesty's birthday, 1889. It was made from a bark received from the Dodabetta plantations containing 4.19 per cent. of sulphate. In the year following, the bark on the whole was not quite so good. When operating upon the bark with sufficient care, it has been frequently proved that the factory results accord with those of the analytical values. Last year four batches of factory bark were analysed and contained 2.69, 3.09, 3.53 and 4.59 per cent. of sulphate of quinine or an average of 3.62 per cent. Considering that a large amount of the

bark was from the abandoned portions of Wood estate and supposed to be rather poor, it is satisfactory to find the annual crop up to the average:—

1889-90	3.89	per cent. sulphate of quinine.
1890-91	3.23	" "
1891-92	3.85	" "
1892-93	3.84	" "
1893-94	3.51	" "
1894-95	3.52	" "
1895-96	3.39	" "
1896-97	3.62	" "
Average	3.60	" "

Alleged deterioration of crown bark.—The subject of the deterioration of crown bark was in some unaccountable manner brought up in the correspondence that ensued when the Secretary of State was asked to supply this department with some fresh officinalis seed. Dr. King in a letter, dated 7th April 1896 (G.O., No. 211, Revenue, 23rd May 1896), writes as follows. "As regards the alleged deterioration in quality of the cinchona bark grown in India, I am of opinion that the allegation is, to a certain extent, true. The yield of quinine from these barks does not appear to be quite so high as it used to be in the early stages of the enterprise." A difficulty in raising healthy plants from the seeds of good Dodabetta trees has lately been experienced, but as far as the trees themselves are concerned, there has been no indication at present of a falling off in the alkaloidal content of the bark. The figures in the foregoing table show how uniform has been the composition of the bark for many years, and there are plots of trees in the Government plantations whose stem bark would yield twice as much quinine if harvested separately. The deterioration (if it may be called so) of the mature trees has only manifested itself in the plants growing on poor soil or on exposed situations such as those presented by certain parts of Hooker estate, but the majority of officinalis trees on all Nilgiri plantations have a most luxuriant growth.

Experiment with manures.—If it is necessary to add further testimony to the benefit of high cultivation for cinchonas, the following experiment may be recorded. Some trees planted in 1866 at Dodabetta were manured with burnt and powdered bones in February 1895. In January 1897, nearly two years afterwards, samples of bark were stripped from the trees and, after being dried in the sun were analysed with the following satisfactory result:—

Quinine	5.34
Cinchonidine	.86
Quinidine	.26
Cinchonine	.52
Amorphous	.44
Total	7.42
Sulphate quinine	7.18

Fire in Cinchona estates.—Among the many causes that influence growing cinchona plants, it has never been ascertained as to how far fire in an estate will effect the bark on the trees. In the dry weather of 1896 several jungle fires entered the estates in the Wynad, and by means of the long dry grass at the base of the trees, passed between the cinchonas, burning the leaves and scorching the bark. The owner of one of these estates, anxious to know what damage was done to his ledgerianas by this treatment, forwarded a sample of the bark for examination and report. The bark was only superficially smoked or blackened; the epidermal layers were intact, and the cambial cells had not been reached by the heat. The bark contained 6.18 per cent. of sulphate of quinine, a similar composition, I was informed, to that which it had shortly before the occurrence of the fire.

Water in quinine.—Quinine sulphate always contains an amount of water which may be driven off entirely when heated to the temperature of boiling water or may be partially lost when exposed to dry air. In one or two cases, medical subordinates have, on the receipt of consignments, placed the contents of the tins in the sun for a few days, and noticed a decrease in the weight in consequence. It is only natural to expect that by submitting the sulphate to such a severe test as the heat of a tropical sun, it will invariably be found wanting. Pure sulphate of quinine, according to the last edition of the "British Pharmacopœia," should contain seven and a half molecules of water of crystallisation, which is theoretically equivalent to 15.2 per cent. On account of the loss of water of hydration occurring in commercial samples even when exposed for a very short time, it has been recently recommended by authorities at home that quinine crystals should be directed in the next Pharmacopœia to contain two molecules only an amount represented by between 4 and 5 per cent. of water. As a practical result of the manufacture of Nilgiri quinine, the maximum quantity of water is seldom reached; by the careful drying which it has received during the past year, the finished product has contained about 10 per cent. of water and has given every satisfaction to the Medical Departments to which it has been issued.

No. 1.
STATEMENT showing the Rainfall at the several Government Cinchona Plantations, Nilgiris, during the official year 1896-97.

Months.	Dodabetta.				Nedivattam.				Hooker.			
	1895-96.		1896-97.		1895-96.		1896-97.		1895-96.		1896-97.	
	Rainfall.	Number of wet days.	Rainfall.	Number of wet days.	Rainfall.	Number of wet days.	Rainfall.	Number of wet days.	Rainfall.	Number of wet days.	Rainfall.	Number of wet days.
1	2	3	4	5	6	7	8	9	10	11	12	13
April	3.83	15	2.35	8	6.12	18	.30	4	6.74	18	0.82	4
May	4.01	13	2.95	9	2.23	12	2.32	10	2.80	13	3.48	9
June	7.90	16	14.25	23	29.85	22	43.26	28	23.27	23	36.17	28
July	4.63	21	8.52	17	18.15	31	46.90	29	14.71	30	43.72	29
August	5.22	26	6.69	21	20.04	29	21.65	28	15.44	28	19.23	29
September	5.79	15	12.74	20	3.79	21	10.52	24	3.08	23	11.23	27
October	10.61	24	3.87	13	9.21	20	3.47	10	8.93	22	3.47	12
November	2.52	11	6.18	14	2.90	6	1.74	8	1.43	10	2.23	11
December	5.38	3	5.73	13	.24	2	1.67	9	1.00	3	2.75	9
January	.18	1	..	..	..	..	..	..	.01	1	..	..
February	..	..	2.08	7	..	..	1.69	4	..	..	1.48	7
March	1.93	3	.15	3	.33	2	.54	2	.03	1	.70	3
Total	52.00	148	65.52	147	92.86	163	134.06	156	77.44	172	124.78	168

No. 2.

STATEMENT showing the Receipts and Expenditure of the Government Cinchona Plantations, Nilgiris, for 1896-97.

Receipts.

Classification.	Budget estimate.	Revised estimate.	Actuals up to the end of the year.
	RS.	RS.	RS. A. P.
Sale of quinine	52,000	52,000	1,09,759 9 10
Do. febrifuge	47,000	47,000	36,481 10 5
Bark supplied to Madras Medical Department	200	200	44 0 0
Do. to Bombay do.	..	..	139 5 7
Do. to private parties	200	200	292 0 10
Sale of seed and plants	50	50	1 0 0
Government Quinologist's fees	50	50	11 9 8
Miscellaneous	500	500	5 12 6
Jalap	..	..	792 3 8
Total ..	1,00,000	1,00,000	1,47,527 4 6

Expenditure.

Classification.	A. Conservancy.			B. Establishment.			Total.		
	Budget estimate.	Revised estimate.	Actuals up to the end of the year.	Budget estimate.	Revised estimate.	Actuals up to the end of the year.	Budget estimate.	Revised estimate.	Actuals up to the end of the year.
	RS.	RS.	RS. A. P.	RS.	RS.	RS. A. P.	RS.	RS.	RS. A. P.
Head Office ..	2,200	2,262	2,399 9 4	15,096	9,218	7,811 4 1	17,296	12,080	10,210 13 5
Dodabetta ..	9,478	9,282	9,278 2 6	3,744	3,744	3,744 0 0	13,222	13,026	13,022 2 6
Nedivattam ..	14,357	14,330	13,806 4 4	3,960	3,770	3,770 0 0	18,317	18,100	17,576 4 4
Pykara ..	7,031	6,940	7,112 10 3	3,360	3,380	3,428 13 8	10,391	10,320	10,541 7 11
Quinologist ..	19,700	19,800	20,825 0 6	7,674	6,174	6,141 14 5	27,374	26,374	26,966 14 11
Total ..	52,766	52,614	53,421 10 11	33,834	26,286	24,896 0 2	86,600	78,900	78,317 11 1

No. 3.
STATEMENT showing the Expenditure in detail on account of the Government Cinchona Plantations, Nilgiris, for the official year 1896-97.

Name of Plantation.	Salaries.			Nurseries.			Working charges.			Manure.		
	Budget estimate.	Revised estimate.	Actuals.	Budget estimate.	Revised estimate.	Actuals.	Budget estimate.	Revised estimate.	Actuals.	Budget estimate.	Revised estimate.	Actuals.
	2	3	4	5	6	7	8	9	10	11	12	13
	RS.	RS.	RS. A. P.	RS.	RS.	RS. A. P.	RS.	RS.	RS. A. P.	RS.	RS.	RS. A. P.
Head Office and General ..	15,096	9,218	7,811 4 1	..	..	..	..	..	..	..	..	..
Dodabetta ..	3,744	3,744	3,744 0 0	250	638	640 14 9	4,322	5,184	5,329 13 7	2,106	2,160	2,064 5 8
Nedivattam ..	3,960	3,770	3,770 0 0	400	700	760 5 3	6,247	5,995	6,644 8 11	2,664	3,587	2,603 1 8
Pykara ..	3,360	3,180	3,428 13 8	500	350	436 6 3	5,051	3,910	3,925 5 5	680	680	671 12 0
Quinologist's Department ..	7,674	6,174	6,141 14 5	..	..	..	..	..	..	..	..	..
Total ..	33,834	26,086	24,896 0 2	1,150	1,688	1,837 10 3	15,620	15,089	15,899 11 11	5,450	6,427	5,339 3 4

Name of Plantation.	Crop.			Repairs.			Contingencies.		
	Budget estimate.	Revised estimate.	Actuals.	Budget estimate.	Revised estimate.	Actuals.	Budget estimate.	Revised estimate.	Actuals.
	14	15	16	17	18	19	20	21	22
	RS.	RS.	RS. A. P.	RS.	RS.	RS. A. P.	RS.	RS.	RS. A. P.
Head Office and General ..	..	..	..	300	100	149 12 7	588	550	518 10 6
Dodabetta ..	2,500	1,000	977 2 6	300	300	265 14 0	..	..	..
Nedivattam ..	1,750	1,300	1,338 12 3	300	400	496 11 2	..	..	..
Pykara ..	500	500	500 4 3	300	1,500	1,578 14 4	..	..	..
Quinologist's Department ..	..	..	..	..	..	..	19,100	19,200	20,255 0 6
Total ..	4,750	2,800	2,815 3 0	1,200	2,300	2,491 4 1	19,688	19,750	20,743 10 11

Statement showing the Expenditure in detail on account of the Government Cinchona Plantations, Nilgiris, for the official year 1896-97—cont.

Name of Plantation.	Printing charges.			Peons' clothings.			Travelling allowance.		
	Budget estimate.	Revised estimate.	Actuals.	Budget estimate.	Revised estimate.	Actuals.	Budget estimate.	Revised estimate.	Actuals.
	23	24	25	26	27	28	29	30	31
Head Office and General	RS. 100	RS. 100	RS. A. P. 37 2 4	RS. 12	RS. 12	RS. 12	RS. 1,200	RS. 1,700	RS. A. P. 1,682 0 0
Dodabetta	..	..	..	..	..	..	..	..	..
Nedivattam	..	..	..	..	..	..	..	..	..
Pykara	..	..	..	..	..	..	..	..	..
Quinologist's Department	..	..	..	..	..	..	..	..	..
Total ..	100	100	37 2 4	12	12	12	1,200	1,700	1,682 0 0
Name of Plantation.	House-rent.			Factory.			Total.		
	Budget estimate.	Revised estimate.	Actuals.	Budget estimate.	Revised estimate.	Actuals.	Budget estimate.	Revised estimate.	Actuals.
	32	33	34	35	36	37	38	39	40
Head Office and General	RS. ..	RS. ..	RS. ..	RS. ..	RS. ..	RS. A. P. ..	RS. 17,296	RS. 12,080	RS. A. P. 10,210 13 5
Dodabetta	..	..	..	..	..	..	13,222	13,026	13,022 2 6
Nedivattam	..	..	..	2,996	2,348	1,962 13 1	18,317	18,100	17,576 4 4
Pykara	..	..	..	..	..	..	10,391	10,329	10,541 7 11
Quinologist's Department	600	600	600	..	..	..	27,374	25,374	26,966 14 11
Total ..	600	600	680	2,996	2,348	1,962 13 1	86,600	78,900	78,317 11 1

No. 4.

A.—Statement showing the total yield of the Government Cinchona Plantations, Nilgiris, for the official year 1896-97.

Name of Plantation.	Species of produce.	Bark.						Propagation.		
		Up-rooting.		Coppicing.		Total number of trees barked.	Total quantity of green bark collected.	Total quantity of dry bark.	Seed.	Plants in the nurseries.
		Number of trees barked.	Outturn of green bark.	Number of trees barked.	Outturn of green bark.					
Dodabetta	Crown bark	582	LB. 8,730	7,208	LB. 111,780	7,790	120,510	65,066	7 6	38,000
	Magnifolia	..	..	..	..	..	..	..	1 6	10,000
Nedivattam	Crown bark	3,159	118,691	..	..	3,159	118,691	39,563	..	53,940
	Red bark	2,773	183,285	..	..	2,773	183,285	61,261	1 0	..
	Magnifolia	..	..	1,567	4,428	1,567	4,428	1,477	..	..
Hooker	Crown bark	3,561	24,645	3,555	18,040	7,116	42,685	19,500	2 0	30,000
	Magnifolia	..	..	1,075	7,665	1,075	7,665	..	..	..
Add the balance on 31st March 1896.		..	..	..	..	..	..	186,867	..	..
Excess found in stores.		..	..	..	..	..	..	190,372	..	..
Total ..		..	..	..	..	..	..	109,658	..	..
		..	..	..	..	..	..	486,897	..	..

B.—Statement showing the disposal of bark and other produce from the Government Cinchona Plantations, Nilgiris, for the official year 1896-97.

Name of Plantation.	Species of produce.	Bark.				Seed.		
		Quantity used for quinine and febrifuge.	Quantity sold in the country.	Quantity supplied to the Medical Department.	Total quantity.	Sold to the public.	Used in nurseries.	Total.
Dodabetta	Crown bark	LB. 60,851	..	..	60,851	8	..	0 8
	Do.	59,649	..	..	59,649	..	7 6	7 6
Nedivattam	Red bark	1,100	1,282	764	3,146	..	..	..
	Magnifolia	51,200	..	..	51,200	8	..	0 8
Hooker	Crown bark	19,500	..	..	19,500	..	0 8	0 8
	Magnifolia	45,800	..	..	45,800	..	..	..
Add the balance on 31st March 1897.		..	..	..	240,146	..	..	..
Total ..		238,100	1,282	764	486,897	..	..	8 14

No. 5.

STATEMENT showing the amount of Bark harvested from the commencement of the Plantations to 1896-97.

Official year.	Bark.
To the end of 1874-75	LB. 181,481 $\frac{1}{2}$
Crop of 1875-76	65,170
1876-77	103,341
1877-78	138,838 $\frac{1}{2}$
1878-79	114,320 $\frac{3}{4}$
1879-80	119,299
1880-81	243,896
1881-82	242,052
1882-83	129,712 $\frac{3}{4}$
1883-84	183,765
1884-85	118,017
1885-86	113,360
1886-87	124,333
1887-88	92,746
1888-89	110,162
1889-90	160,226
1890-91	133,351
1891-92	53,833
1892-93	119,483
1893-94	83,467
1894-95	125,557
1895-96	229,700
1896-97	186,867
Total	3,172,978 $\frac{1}{2}$

No. 6.
STATEMENT showing the approximate number of Plants in permanent Plantations, Nilgiris, on 31st March 1897.

Species.	Dodabetta.				Nedivattam.				Hooker.			
	Esti- mated number of plants at close of last year.	Cop- ied or up- rooted.	Vacan- cies by death.	Vacan- cies supplied.	Replant- ed on plots previ- ously up- rooted.	Esti- mated number of plants at close of last year.	Cop- ied or up- rooted.	Vacan- cies by death.	Vacan- cies supplied.	Replant- ed on plots previ- ously up- rooted.	Esti- mated total number of plants at close of year.	Esti- mated grand total at close of year.
C. Succirubra	..	..	..	..	..	23,183	2,773	..	..	..	2,300	22,710
C. Officialis	..	550,646	7,790	15,801	..	542,856	3,159	7,900	15,400	..	365,928	1,043,261
C. Calisaya var. Ledger.	130	..	..	..	..	..	..	..	..	..	..	130
C. Do. other varieties.	..	..	..	..	..	143	..	..	..	..	..	143
C. Micrantha	..	26	..	..	..	..	..	..	..	..	..	26
C. Pitayensis	..	43	..	..	..	..	..	..	..	..	..	43
C. Lancelata	..	..	..	..	..	..	..	..	..	..	..	5
C. Carthagena	..	18	..	..	..	716	..	..	..	..	50	784
C. Santa-Fé	..	9	..	..	..	3	..	..	..	..	..	12
C. Hybrid and others	..	61,806	..	..	..	243,245	1,567	..	..	..	291,920	593,404
Total	612,678	7,790	15,801	15,801	..	604,888	7,499	7,900	10,400	..	660,198	1,662,518

No. 7.

STATEMENT showing the quantity of bark in store at the commencement of the year 1896-97, the amount harvested and disposed of during the year, and the quantity remaining in store at its close.

Description of bark.	Balance at the commencement of the year.				Harvested during the year.	Total.
	Crop of 1893-94.	Crop of 1894-95.	Crop of 1895-96.	Excess found in store.		
1	2	3	4	5	6	7
	LB.	LB.	LB.	LB.	LB.	LB.
Crown bark	..	..	32,638	26,748	124,129	183,515
Red bark	26,157	29,099	73,619	16,246	61,261	206,382
Magnifolia and Hybrid	796	837	27,226	66,664	1,477	97,000
Total ..	26,953	29,936	133,483	109,658	186,867	486,897

Description of bark.	Disposed of during the year.			Balance at the close of the year.		
	Previous crops.	Crop of 1896-97.	Total.	Previous crops.	Crop of 1896-97.	Total.
	8	9	10	11	12	13
	LB.	LB.	LB.	LB.	LB.	LB.
Crown bark	59,386	80,614	140,000	..	43,515	43,515
Red bark	3,146	..	3,146	141,975	61,261	203,236
Magnifolia and Hybrid	95,523	1,477	97,000	..	..	..
Total ..	158,055	82,091	240,146	141,975	104,776	246,751

No. 8.

STATEMENT showing the particulars of Cinchona bark disposed of during the year 1896-97.

	Previous crops.	Value (cost price) at 4 annas 3-61 pies per pound.		Crop of 1896-97.	Value (cost price) at 4 annas 2-74 pies per pound.		Total.	
		RS.	A. P.		RS.	A. P.	Pound.	Value.
	LB.	RS.	A. P.	LB.	RS.	A. P.	LB.	RS. A. P.
Used for the manufacture of quinine and febrifuge	156,009	41,935	8 8	82,091	21,694	4 1	238,100†	63,629 12 9
Sold to Medical depôts, hospitals and the public	2,046	475	6 5*	..	..	..	2,046	475 6 5
Total ..	158,055	42,410	15 1	82,091	21,694	4 1	240,146	64,105 3 2

* This figure represents the actual amount realized by the sale of the bark.

† The value of the alkaloids extracted from the bark is as follows:—

	RS.
7,891 lb. quinine at Rs. 18 *	1,42,038
3,350 lb. febrifuge at Rs. 10	33,500
Total ..	1,75,538

No. 9.

STATEMENT showing the particulars of Sulphate of Quinine and Cinchona Febrifuge manufactured and disposed of during the year 1896-97.

Particulars.	Quantity in store at the commencement of the year.	Manufactured during the year.	Total.	Disposed of during the year.				Balance at the close of the year
				To Madras Medical Department.	To Bombay and Bengal Medical Departments.	To hospitals post offices Collectors and the Public.	Total.	
	LB. OZ.	LB. OZ.	LB. OZ.	LB. OZ.	LB. OZ.	LB. OZ.	LB. OZ.	LB. OZ.
Sulphate of quinine	2,880 0	7,891 0	10,771 0	333 0	3,620 0	1,955 8	5,908 8	4,862 8
Febrifuge	1,564 0	3,350 0	4,914 0	500 0	2,500 0	709 4	3,709 4	1,226 8
Cinchonidine sulphate ..	21 12	..	21 12					

No. 10.
STATEMENT showing the Capital and Revenue Account of the Government Cinchona Plantations, Nilgiris, from the commencement up to the official year 1896-97.

Year.	Charges.					Total.	Total outlay to end of year.	Simple interest at 4½ per cent. on outlay to end of previous year plus half outlay during the year.	Total of columns 6 and 8.
	Establishment, including Superintendent's salary.	Building and plant.	Working charges.		Total.				
			Departmental labour.	Convict labour.					
1	2	3	4	5	6	7	8	9	
RS. A. P.	RS. A. P.	RS. A. P.	RS. A. P.	RS. A. P.	RS. A. P.	RS. A. P.	RS. A. P.	RS. A. P.	
1860-61	..	..	4,821 15 0	..	4,821 15 0	4,821 15 0	108 7 11	4,930 6 11	
1861-62	..	..	22,914 15 4	..	22,914 15 4	27,736 14 4	732 9 2	23,647 8 6	
1862-63	..	..	48,390 0 0	..	48,390 0 0	76,126 14 4	2,336 15 0	50,726 15 0	
1863-64	12,726 14 7	..	53,173 9 2	..	65,900 7 9	1,42,027 6 1	4,908 7 7	70,808 15 4	
1864-65	24,444 8 11	..	59,666 12 0	..	84,111 4 11	2,26,138 11 0	8,283 11 9	92,895 0 8	
1865-66	25,449 14 0	0 0	58,887 5 0	..	88,037 3 0	3,14,175 14 0	12,157 1 4	1,00,194 4 4	
1866-67	23,803 9 10	3,025 0 0	52,632 0 0	48,666 10 8	1,28,127 4 6	4,42,303 2 6	17,090 12 6	1,45,148 1 0	
1867-68	26,087 3 1	2,600 0 0	43,295 14 4	48,666 10 8	1,20,649 12 1	5,62,952 14 7	22,018 3 6	1,43,207 15 7	
1868-69	25,671 7 10	2,030 0 0	30,636 1 0	48,666 10 8	1,07,004 3 6	6,69,957 2 1	27,740 7 8	1,34,744 11 2	
1869-70	25,783 5 4	5,334 5 8	19,163 0 0	..	60,280 11 0	7,20,237 13 0	31,279 6 2	81,560 1 2	
1870-71	23,730 5 4	300 0 0	6,143 0 0	..	30,178 5 4	7,50,411 2 5	33,059 9 8	63,262 15 0	
1871-72	17,157 5 4	3,250 0 0	13,160 4 9	..	23,567 10 1	7,83,978 12 6	34,523 12 5	68,091 6 6	
1872-73	12,724 0 0	550 0 0	16,441 0 0	..	29,715 0 0	8,13,693 12 6	35,947 10 2	65,662 10 2	
1873-74	12,574 0 0	2,758 0 0	15,091 14 0	..	30,423 14 0	8,44,117 10 6	37,300 12 2	67,734 10 2	
1874-75	16,406 8 0	1,700 0 0	17,417 0 0	..	35,523 8 0	8,79,641 2 6	38,784 9 2	74,308 1 2	
1875-76	17,234 0 0	1,550 0 0	27,423 0 0	..	46,207 0 0	9,25,848 2 6	40,623 8 3	86,830 8 3	
1876-77	8,064 5 4	6,715 8 11	44,850 3 0	..	69,630 1 3	9,85,478 3 9	43,004 13 6	1,02,634 14 9	
1877-78	8,061 5 4	5,468 13 8	56,241 10 3	..	69,771 13 3	10,55,250 7 0	45,916 6 3	1,15,688 3 6	
1878-79	10,092 0 0	10,090 14 1	53,554 10 8	..	73,682 11 5	11,25,932 12 5	49,144 1 10	1,32,320 1 4	
1879-80	11,879 1 0	11,367 0 4	63,096 0 3	..	79,724 5 0	12,08,657 1 5	52,595 12 4	1,52,658 15 6	
1880-81	16,875 14 6	6,278 4 9	90,921 2 1	..	96,105 0 7	13,04,762 2 0	61,269 11 11	1,72,611 5 2	
1881-82	15,094 14 1	82,247 11 5	59,049 11 5	..	1,13,575 6 4	14,18,337 7 4	66,219 0 3	1,95,976 5 8	
1882-83	20,083 7 5	35,348 14 5	60,190 8 7	..	1,06,392 4 11	15,24,729 12 3	76,171 10 0	1,69,312 6 1	
1883-84	20,413 3 4	6,220 10 5	60,629 13 10	..	86,824 6 4	17,36,115 0 11	79,933 11 2	1,67,866 10 2	
1884-85	26,235 7 5	3,513 5 8	48,720 11 2	..	80,378 10 11	18,16,493 11 10	83,637 5 8	1,59,317 5 0	
1885-86	27,581 14 3	7,025 11 1	38,973 13 10	..	84,928 4 6	19,00,722 0 4	87,156 1 11	1,59,837 3 7	
1886-87	30,891 11 6	2,355 9 9	28,400 7 1	..	72,161 3 1	20,42,377 1 4	90,343 5 8	1,61,621 8 8	
1887-88	26,686 14 3	2,724 12 7	40,082 3 1	..	69,493 13 11	21,10,557 9 6	93,441 0 6	1,71,574 11 4	
1888-89	38,105 12 2	1,014 4 11	28,400 7 1	..	68,180 8 2	21,85,471 10 3	96,660 10 7	1,77,566 15 0	
1889-90	42,061 6 6	2,132 13 10	30,719 12 5	..	74,914 0 9	22,61,276 11 10	1,00,051 13 5	1,82,418 1 9	
1890-91	49,837 3 10	1,835 12 8	24,082 1 1	..	75,805 1 7	23,40,162 7 6	1,03,632 6 1	1,80,022 4 1	
1891-92	49,561 10 9	1,098 0 5	28,296 0 6	..	78,855 11 8	24,13,293 5 2	1,06,951 6 5	1,88,770 4 8	
1892-93	32,181 11 6	1,010 6 5	39,878 11 9	..	73,070 13 8	24,91,643 13 10	1,10,359 12 0	1,97,080 8 5	
1893-94	34,610 6 11	1,130 13 8	42,669 4 1	..	78,410 8 8	25,74,750 15 4	1,13,993 6 11	1,95,942 11 9	
1894-95	34,429 7 5	2,119 5 1	46,598 5 0	..	83,087 1 6	26,53,048 10 5	1,17,625 0 8	1,96,479 10 2	
1895-96	24,896 3 2	2,491 4 1	50,930 6 10	..	78,317 11 1	..	20,53,430 15 9	47,06,479 10 2	
1896-97	..	..	15,29,459 11 3	1,46,000 0 0	26,53,048 10 5	..	..	..	
Total ..	8,00,564 2 7	1,77,024 12 7	15,29,459 11 3	1,46,000 0 0	26,53,048 10 5	..	20,53,430 15 9	47,06,479 10 2	

Statement showing the Capital and Revenue Account of the Government Cinchona Plantations, Nilgiris, from the commencement up to the official year 1896-97—cont.

Year.	Receipts.				Total.	Surplus.	Deficit.	
	Value of bark supplied to Quinologist, or for experimental purposes, and the value of quinine and febrifuge sold.		Value of bark sent to England, sold or supplied to other Governments or private parties.					Sale of plants, seeds, &c.
	10	11	12	13				
	RS. A. P.	RS. A. P.	RS. A. P.	RS. A. P.	RS. A. P.	RS. A. P.	RS. A. P.	
1860-61	..	..	..	..	..	..	4,930 6 11	
1861-62	..	..	..	..	..	..	23,647 8 6	
1862-63	..	..	..	..	..	..	50,726 15 0	
1863-64	..	..	..	..	..	..	70,808 15 4	
1864-65	..	..	..	..	..	..	92,895 0 8	
1865-66	..	..	..	..	..	..	1,00,194 4 4	
1866-67	..	..	..	..	..	..	1,42,698 1 0	
1867-68	..	287 8 0	..	..	..	..	1,42,980 7 7	
1868-69	..	..	..	..	..	..	1,33,064 11 2	
1869-70	1,512 6 4	..	323 14 0	..	..	..	80,047 10 10	
1870-71	4,364 14 8	..	..	..	..	..	58,574 2 4	
1871-72	9,542 12 8	3,479 3 6	..	..	..	..	55,069 6 4	
1872-73	16,806 15 8	4,388 2 1	227 1 4	..	..	..	43,240 7 1	
1873-74	21,138 7 0	36,417 6 3	300 9 0	..	..	..	3,870 3 11	
1874-75	8,576 0 0	..	273 4 0	..	..	..	65,458 13 2	
1875-76	..	60,404 7 11	2,000 0 0	..	..	..	24,426 0 4	
1876-77	..	1,07,878 4 0	2,579 3 10	..	..	7,822 9 1	..	
1877-78	..	3,51,746 0 6	5,469 0 2	..	..	241,526 13 2	..	
1878-79	..	3,92,317 10 1	8,136 9 2	..	..	277,627 6 0	..	
1879-80	..	4,24,323 12 8	15,462 12 4	..	..	3,07,466 7 8	..	
1880-81	..	3,33,295 1 3	13,175 4 8	..	..	1,93,813 6 5	..	
1881-82	..	5,64,236 3 11	7,653 2 9	..	..	3,97,044 5 5	..	
1882-83	..	5,82,003 10 1	4,345 7 10	..	..	4,13,737 12 9	..	
1883-84	..	80,519 10 6	4,561 2 8	..	..	..	1,10,895 8 6	
1884-85	933 12 0	83,351 10 0	1,543 13 5	..	..	..	77,166 12 11	
1885-86	1,418 0 8	1,02,101 0 0	1,589 10 4	..	..	..	56,203 11 1	
1886-87	2,127 1 0	68,067 4 8	1,595 4 9	..	..	..	96,075 15 9	
1887-88	1,203 0 0	1,875 0 0	763 1 11	..	..	..	1,56,376 3 1	
1888-89	2,134 0 0	420 0 0	1,047 11 10	..	..	..	1,56,236 7 9	
1889-90	4,018 10 6	792 1 9	599 12 4	..	..	..	1,56,181 0 1	
1890-91	27,635 0 10	835 13 10	504 15 1	..	..	..	1,42,698 13 7	
1891-92	75,262 10 5	1,038 13 6	765 2 3	..	..	..	1,42,698 13 7	
1892-93	71,746 5 5	926 14 10	134 3 7	..	..	..	98,790 4 10	
1893-94	68,373 11 7	705 8 4	258 2 11	..	..	..	1,09,610 9 11	
1894-95	76,875 2 4	402 12 0	433 14 8	..	..	..	1,10,684 13 3	
1895-96	1,05,425 5 10	132 2 0	58 1 6	..	..	..	1,11,058 7 8	
1896-97	1,46,241 4 3	475 6 5	810 9 10	..	..	..	91,464 15 1	
Total	6,45,263 9 2	32,02,421 8 1	77,742 0 2	39,25,427 1 5	18,38,938 12 6	26,19,991 5 8	48,415 7 3	

No. 11.

Stock account of the Government Cinchona Plantations, Nilgiris, for the year ending 31st March 1897.

	RS.	A.	P.		RS.	A.	P.
Value of chemicals in store on 31st March 1896.	6,420	5	2	Value of chemicals in store on 31st March 1897.	7,532	5	9
„ of quinine in store on 31st March 1896, lb. 2,880 at Rs. 18.	51,840	0	0	„ of quinine in store on 31st March 1897, lb. 4,862½ at Rs. 18 per lb.	87,525	0	0
„ of febrifuge in store on 31st March 1896, lb. 1,564 at Rs. 10.	15,640	0	0	„ of febrifuge in store on 31st March 1897, lb. 1,226½ at Rs. 10 per lb.	12,265	0	0
„ of cinchonidine in store on 31st March 1896, lb. 21½ at Rs. 12 ..	261	0	0	„ of quinine in stock with Collectors on 31st March 1897, 3,323·15 packets at Rs. 1.	3,323	2	6
„ of quinine in stock with Collectors, 3,576·31 packets at Rs. 1.	3,576	5	2	„ of quinine in stock with postmasters, 7,865 packets at Rs. 1.	7,865	0	0
„ of quinine in stock with postmasters, 3,415 packets at Rs. 1.	3,415	0	0	„ of lb. 141,975 bark of previous years at As. 4·3·61 per lb.	38,163	2	9
„ of lb. 300,030 bark in store at As. 4·3·61 per lb.	80,655	4	3	„ of lb. 104,776 bark, 1896-97 crop at As. 4·2·74 per lb.	27,693	11	0
Total ..	1,61,807	14	7	Total ..	1,84,367	6	0

No. 12

Balance sheet for the year 1896-97.

	RS.	A.	P.		RS.	A.	P.
Value of stock as above on 31st March 1896 ..	1,61,807	14	7	Value of stock as above on 31st March 1897.	1,84,367	6	0
Outstandings due to department on 31st March 1896.	10,634	13	0	By cash on account of outstandings of previous year.	10,634	13	0
Total expenditure on plantations and head office.	49,387	15	1	By sale of 2,880 lb. quinine, 1895-96 stock ..	52,258	5	6
Total expenditure on Quinologist's department.	28,929	12	0	„ of 1,585½ lb. febrifuge and cinchonidine, 1895-96 stock.	16,019	0	6
Balance representing profit for the year ..	84,001	12	10	By sale of quinine and febrifuge, 1896-97 outturn.	67,329	1	3
				By sale of lb. 2,046 bark	475	6	5
				„ percentage of Quinologist's fees	11	9	8
				„ sale of jalap	792	3	8
				„ miscellaneous receipts	6	12	6
				„ outstandings due for quinine and febrifuge.	2,867	9	0
Total ..	3,34,762	3	6	Total ..	3,34,762	3	6

OOTACAMUND,
17th May 1897.

(Signed) W. M. STANDEN,
Director.

READ—the following letter from W. M. STANDEN, Esq., Director of the Government Cinchona Plantations, Nilgiris, to the Secretary to Government, Revenue Department, dated Ootacamund, 17th June 1897, No. 37 :—

The Accountant-General, Madras, has just furnished this office with a copy of his Consolidated Civil Budget Estimate of Receipts of this Department for 1896-97, has been entered as Rs. 1,18,000, whereas the sum sanctioned by Government for the above in G.O., No. 830, Financial, dated the 2nd December 1896, is Rs. 1,00,000. Similarly the Budget Estimate of Receipts for 1897-98 has been entered by the above officer as Rs. 1,15,000, while the sum allotted by Government in the above-quoted Government Order is Rs. 1,00,000.

2. Further, the Revised Estimate of expenditure for 1896-97 is given by the Accountant-General as Rs. 79,100, whereas that sanctioned by Government in G.O., No. 830, Financial, of 2nd December 1896, is Rs. 78,900; and the Budget Estimate of Expenditure is given as Rs. 84,800, while the sum allotted by Government in the above Government Order is Rs. 85,100.

3. I have the honour to report the above in connection with my Annual Administration Report on the Government Cinchona Plantations for 1896-97 now before Government.

ORDER—No. 578, Revenue, dated 16th July 1897.

Miscellaneous.

With the first of the letters read above, Mr. Standen, the Director of the Government Cinchona Plantations, Nilgiris, submits his report on the administration of the plantations and the factory under his control during the year 1896-97, as well as Mr. David Hooper's report on the Quinological Department for the same period.

2. As stated in paragraph 2 of the review of the previous year's report, Mr. Standen took charge of his appointment of Director of the Cinchona Plantations and factory on 23rd May 1896, in pursuance of the scheme proposed by this Government and approved by the Government of India for the separation of the Cinchona and Botanical Departments. The details connected with this scheme were under correspondence with the Right Honourable the Secretary of State for India during the year under review, and his Lordship has since accepted it provisionally for a term of five years. Mr. Hooper, the Government Quinologist, was, during the year under review, away at Calcutta in September, October and November, acting for Dr. Watt as Reporter on Economic Products and on his return he was granted three months' privilege leave with effect from 23rd February last. Mr. Hooper was thus in charge of the Quinological Department for about six months only, during which time his duties were nominal. The post of Government Quinologist has been abolished with effect from 23rd May last and Mr. Hooper has been appointed Assistant Curator in the Indian Museum at Calcutta.

3. The abandonment of the Wood estate and the separation of the Botanical from the Cinchona Department necessitated certain minor alterations in the constitution of the subordinate staff of the two departments concerned. The chief alterations sanctioned were the abolition of the appointments of the Superintendent and store-keeper of the Pykara Plantations and the placing of the Hooker estate in the immediate charge of an overseer on Rs. 50 under the general control and supervision of the Superintendent of the Nedivattam plantations. The special herbarium establishment entertained at Ootacamund was also abolished, the strength of the Director's office staff was slightly increased and a few modifications in the establishments attached to the Government gardens, the Government Quinologist's laboratory and the plantations themselves were made. The net result of the reorganization thus effected was a saving to Government of about Rs. 300 per mensem.

4. The report of the Director shows that, though the year was marked by exceptional rains and gales, the general condition of these estates was even more satisfactory than in the previous year. The number of trees standing on 1st April 1896, excluding those on the Wood estate, was 1,630,998, of which 34,101 died and 23,480 were either coppiced or uprooted during the year under review. Before the close of the year, 89,101 crown bark trees were newly put down and on the 31st March 1897, therefore, there were 1,662,518 trees standing on the three estates or 31,520 more than at the commencement of the year. Of this number, 1,043,261 trees were of the *C. officinalis* kind. During the course of the year a recommendation of Dr. King, Director of the Royal Botanical Garden, Calcutta, as to the working of the plantations on a twenty years' rotation was considered. The Director reported that to give effect to the system without seriously reducing the output of quinine it would be necessary either to acquire fresh land or to purchase bark in the local market, and also promised to submit a working plan on receipt of the final orders by the Government. The Government having decided to sanction the purchase of bark from the local market, the Director is requested to expedite the submission of the working plan referred to.

5. In the nurseries a new system of transplanting seedlings into baskets filled with a mixture of manure and rich soil was introduced during the year and it is anticipated that this will in the future considerably reduce casualties among young trees. The number of seedlings raised from the seeds of trees grown on the hills so treated was 91,940. Crown bark seeds were received from Jamaica and seedlings raised from them at the Government Gardens, Ootacamund, and of these 18,707 are

reported to have been sent to Nedivattam and Dodabetta and there transplanted in baskets. The seeds were imported to remedy the deterioration of the plantation-bred crown bark plants which experts reported to be due partly to hybridisation and partly to climatic influences. This matter should receive the careful attention of the Director. The comparative success of the plants grown from the foreign and home seeds should be noted in future reports. The Director should also report whether the recommendation of the Director of the Royal Botanical Gardens, Kew, to maintain a small plantation of stock of crown bark in an isolated position so as to render hybridisation impossible has been tried and with what success.

6. The subjoined statement exhibits the quantities of cinchona bark, quinine and febrifuge in stock at the beginning of the year, the additions made thereto and the quantities disposed of during the year and the balance on hand at its close :—

	In stock at the beginning of 1896-97.	Additions made during 1896-97.	Total.	Disposed of during 1896-97.	Balance.
	LBS.	LBS.	LBS.	LBS.	LBS.
Bark	300,030	186,867	486,897	240,146	246,751
Quinine	2,880	7,891	10,771	5,909	4,862
Febrifuge	1,586	3,350	4,936	3,709	1,227

It will be noted that the figures given in the second column of the statement above do not agree with those given in the last column of the corresponding statement attached to paragraph 7 of the review of the report for 1895-96, wherein the balance outstanding at the close of that year of bark, quinine and febrifuge was shown to be 190,372 lbs., 2,940 lbs. and 1,564 lbs., respectively. The figures given in statements 8 and 12 appended to the previous year's report so far as the bark is concerned are now reported to be wrong, but it has not been explained how the mistake arose. In the case of quinine, however, Mr. Hooper had already stated that 60 lbs. should be excluded as due to "dryage" and in reply to a reference made on this point in paragraph 7 of G.O., No. 350, Revenue, dated 23rd July 1896, Mr. Standen in August last explained that the deficit was not actually due to any "dryage," but was the result of "a loss amounting to about 1 per cent. experienced in repacking quinine in small quantities and in putting up the powders in envelopes." The increase noticeable in the stock of febrifuge at the beginning of the year has nowhere been explained, and on this point as well as the probable cause of the abnormal difference in the figures relating to the bark in stock, the Government desires to receive a further report from Mr. Standen.

7. No bark was purchased from private growers during the year under review with reference to the orders issued in December 1896 and the addition of 186,867 lbs. made during the year represented the quantity harvested from the Government plantations. The bark utilized in the manufacture of quinine and febrifuge amounted to 238,100 lbs. and the quantity of the two drugs extracted therefrom, 7,891 lbs. and 3,350 lbs., respectively. The percentage of the yield of quinine to bark was thus 3.3 as against 1.5 in the previous year. The difference is partly to be attributed to the fact that a very slightly larger percentage of crown bark was used in 1896-97, but was chiefly due to the improved system of the manufacture of quinine introduced by Mr. Standen during the year under review. Briefly, this system consisted in more thoroughly exhausting the bark of its alkaloids. It involves, however, a greater expenditure of fusel oil and hence the Director intends to restrict its application to crown bark. From the figures furnished in the report it cannot easily be ascertained whether a lb. of quinine under the new system actually costs less than under the old. Mr. Standen is requested to report on the point.

8. The quantity of quinine manufactured and that disposed of during the year under review were the highest on record since the establishment of the Nedivattam factory in 1889-90. Of the disposals, the supplies to the Government Medical Stores formed as usual the heaviest items. There was, however, a noteworthy fall in

the supply (333 lbs.) made to the Madras Medical Stores Department from which the indents received and complied with during the previous five years ranged between 1,000 and 2,000 lbs. as shown in the margin. The cause of the fall noticed above should be ascertained and reported by the Director for the information of Government. The quantity of quinine

sent out to the post offices in the shape of packets for sale to the people rose from about 249 lbs. in 1895-96 to 628 lbs. in 1896-97, while that despatched to the Collectors fell from about 192 lbs. to 99 lbs. during the same period. The fall in the supply to Collectors is probably the natural result of the expansion of the sale of packets by the postal agency. The further examination of these figures will, however, be deferred pending the receipt of the annual report which has under existing orders to be separately submitted on the subject. The outturn and distribution of febrifuge do not call for any special remarks.

9. The total receipts, excluding the value of the quinine packets in stock with Collectors and Postmasters amounted during the year to Rs. 1,47,527. This sum exceeds the sanctioned estimate for the same period by Rs. 47,527 and the corrected figure for the previous year (Rs. 1,05,616) by Rs. 41,911. The amount which could properly be credited to or was the direct result of the working of the department in the year was, however, a little less, viz., Rs. 1,39,760. The expenditure on the other

* Rs. 100 falling under 30. Stationery and Printing.

+ Rs. 82,923 given in the Civil Budget Estimate for 1897-98 have been taken.

hand was Rs. 78,318 as against a sanctioned estimate of Rs. 86,600 * and was less than the actuals of 1895-96 + by Rs. 4,605. The decrease is chiefly due to the difference between the pay of the late Mr. Lawson and the present Director and also to the saving in the salary of the Government Quinologist during the three months Mr. Hooper was absent at Calcutta. Taking Rs. 1,47,527 as the receipts during the year, the net result of the year's working was a surplus of revenue over expenditure of Rs. 69,209. In the previous year's review it was stated that during the twelve years of the late Mr. Lawson's administration of the department the revenue then reported was exceeded only once, viz., in 1885-86. The figures furnished at the time were, however, wrong and it is now found that the receipts in 1895-96 actually exceeded those of 1885-86 by about Rs. 1,500. The administration of the department during the year under review wherein the revenue was as already pointed out Rs. 41,911 more than in 1895-96 and the surplus of receipts over expenditure was treble that of the latter period must, in these circumstances, be considered to have been eminently successful.

10. With reference to the second of the papers read at the head of the present Proceedings, Mr. Standen will be informed that the figures given in the printed "Civil Budget Estimate" are the final ones accepted by the Government of India and should be adopted in preference to any others in the preparation of all reports and budgets. It is observed in this connection that the Director has overlooked the fact that in column 6 of his statement No. 10 he has shown the expenditure for 1895-96 as Rs. 83,087, while on page 173 of the "Civil Budget Estimate for the year 1897-98" the figure given is Rs. 82,923. The difference of Rs. 164 is presumably due to the inclusion in the one and the exclusion from the other of the items of expenditure which fall under "30—Stationery and Printing." A report on the point should be submitted and to avoid confusion in future, information in regard to the expenditure under the two heads of "26—Scientific and other Minor Departments" and "30—Stationery and Printing," should be separately furnished in the body of the administration report.

11. The Government approves of the slight modifications introduced by Mr. Standen in the form of the report. With reference to the Director's statement that he has not altered the forms of statements Nos. 11 and 12 appended to previous

reports (i.e., Nos. 10 and 12 of the present one) pending the receipt of the Accountant-General's opinion thereon, called for in paragraph 11 of G.O., No. 350, Revenue, dated 23rd July 1896, he will be informed that the Accountant-General reports that the matter was inadvertently overlooked in his office and promises to submit his opinion at an early date.

12. The Quinologist's report contains some interesting notes on the comparative value of different kinds of factory bark, the influence of fire on the bark alkaloids, &c.

(True Extract.)

J. H. M.

for Ag. Secretary to Government.

To the Director of Government Cinchona Plantations.
 " the Board of Revenue (all departments).
 " the Deputy-Adjutant-General, Madras Command.
 " the Public Department.
 " the Financial Department.
 " the Educational Department.
 " the Surgeon-General.
 " the Accountant-General.
 " the Postmaster-General.
 " the Resident in Travancore and Cochin.

Copy to the Honorary Secretary, Agri-Horticultural Society.

" " Chamber of Commerce.
 " " Reporter, *Economic Products*, Calcutta.

Exd. Shaik Karim.

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ENCLOSURES TO C. No.

ORDER OF GOVERNMENT

LETTER OF GOVERNMENT

STATEMENT WITH DITTO

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